

# REPORT

## Warilla Seawall Renewal

Review of Environmental Factors (REF)

Client: Shellharbour City Council

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## List of Abbreviations

AHD	Australian Height Datum (m)
ARI	Average Recurrence Interval (years)
EP&A	Environmental Planning and Assessment
EPI	Environmental Planning Instruments
Hs	Significant wave height
LEP	Local Environmental Plan
REF	Review of Environmental Factors
REP	Regional Environmental Plan
RL	Relative Level (m)
SEPP	State Environmental Planning Policies
SCC	Shellharbour City Council
Tp	Peak wave period

# 1 Introduction

## 1.1 Overview

This document comprises a Review of Environmental Factors (REF) for Shellharbour City Council (Council), for the proposed Warilla Seawall renewal at Warilla Beach, Warilla. It is a written statement that considers the impact of the proposed works on the natural and built environments, and the proposed method of mitigating any adverse effects.

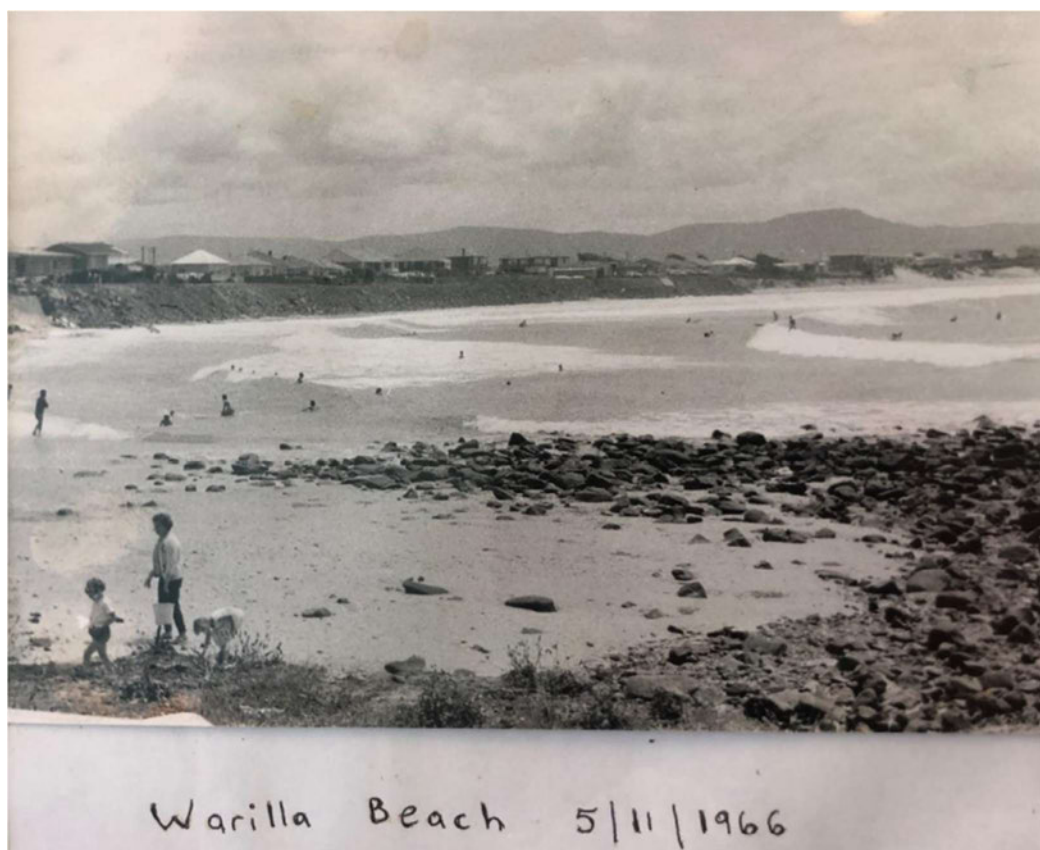
## 1.2 Background

Warilla Beach is located approximately 10 km south of Port Kembla. It is a coastal embayment spanning between Elliott Lake entrance to the south and Windang Island to the north (**Figure 1**). Warilla Beach is situated within a dynamic interface between the ocean and the land, exposed to open ocean waves, varying and rising sea levels and extreme weather.



Figure 1: Site location and works area.

The foreshore land along the southern section of Warilla Beach was developed in the early 1950s. To mitigate against an eroding shoreline and the threat to private property and infrastructure, rock armour was dumped along the toe of the erosion scarp over two years from 1966 (**Figure 2**). Council has maintained and extended the rock revetment north since 1966, typically in response to extreme weather. The existing revetment was not built to an acceptable engineering standard, as rock armour was placed in an adhoc manner as an emergency response measure.



*Figure 2: Photograph of Warilla Beach in 1966 showing recently placed rock armour (in the background).*

In 2017, areas of asbestos containing material (ACM) were discovered within the revetment structure. The ACM has been typically identified as non-friable and is located along the entire length of the revetment structure, with higher-density ACM primarily occurring to the south.

The Shellharbour Coastal Zone Management Plan (CZMP) (BMT WBM, 2018) was gazetted in June 2018 after an extensive planning process. Implementation Action Plan item 2.4.10 addresses actions regarding assessing and upgrading the Warilla Seawall. This includes:

- Determine the seawall's current condition and ability to provide future protection from erosion, recession and wave overtopping
- Detail required upgrades, recommend funding options and appropriate trigger for these
- Recommended seawall protection upgrades should be designed and constructed to coastal engineering standards;
- Future upgrades should also provide for an improvement in public access and amenity;

Royal HaskoningDHV (RHDHV) has been engaged by Council to undertake a peer review of the detailed design, prepared by SMEC, and to undertake the REF for the proposed renewal of the existing rock revetment structure.

### 1.3 Scope of Work

This REF has been undertaken in support of the proposed rock revetment works on behalf of the proponent and determining authority, Council, under Part 5 of the Environmental Planning & Assessment Act 1979 (EP&A Act). The REF addresses the following requirements:

- Legislative and policy requirements and description of the type of approval being sought (**Section 2**);
- Consultation process (**Section 3**);
- Proposed activity and consideration of various alternatives (**Section 4** and **Section 5**);
- Impact assessment (**Section 5**);
- Summary of mitigation measures and the environmental factors considered (**Section 7** and **Section 8**); and
- Conclusion (**Section 9**).

### 1.4 Level Datum

All reference to Reduced Level (RL) in this report is given to Australian Height Datum (AHD), which is approximately mean sea level at present.

## 2 Planning Context and Other Approvals

### 2.1 Land Ownership and Zoning

The site is comprised of Leggett Park and Strong Reserve. This is Council Land (Lot 45 DP23239, Lot 67 DP21893 and Lot 76 DP238866 (refer **Figure 3**). Leggett Park and Strong Reserve are zoned Public Recreation (RE1) under the Shellharbour Local Environmental Plan 2013. The portion of the beach and ocean below MHWL is Crown Land outside the Shellharbour City Council Local Government Area (LGA). Crown Land below the MHWL is under the direct management of the Department of Planning, Industry and Environment (DPIE).





Figure 3 Land zoning in the region of the proposed works

A search of the National Native Title Tribunal register of Native Title Claims indicates a native title claim was lodged by the South Coast People in 2017, however the claim is yet to be determined.

## 2.2 NSW Planning and Approvals

The NSW environmental planning legislative framework provides for the classification of developments, and the assessment of impacts from developments and activities. This framework comprises:

- EP&A Act 1979;
- EP&A Regulations 2000;
- Environmental Planning Instruments (EPI) made under the EP&A Act (i.e. State Environmental Planning Policies (SEPP), Regional Environmental Plans (REP), and Local Environmental Plans (LEP)); and
- Other planning codes, policies, guidelines and strategies that relate to any proposed development of a site including Development Control Plans (DCP) and Council codes and policies.

The statutory basis for planning and environmental assessment in NSW is set out in the EP&A Act 1979 and the EP&A Regulations 2000.

Part 4 of the EP&A Act sets out the development assessment requirements for those developments that require consent. Part 5 of the EP&A Act specifies the environmental impact assessment requirements for activities undertaken by or on behalf of public authorities that are permissible without development consent.

As set out in **Section 2.2.1**, the proposed works fall under Part 5 of the EP&A Act. Under Part 5 of the EP&A Act, the Minister or public authority which is responsible for deciding whether to approve or proceed with an activity (called a “determining authority”) must examine and take into account to the fullest extent possible all matters which are likely to affect the environment if the activity goes ahead (Division 5.1 EP&A Act). As such, the proposed works require the preparation of an Environmental Assessment. The factors to be taken into account in an Environmental Assessment are listed under Clause 228 of the EP&A Regulation.

Where it is identified that an activity under Part 5 of the EP&A Act is likely to significantly affect the environment, threatened species, populations, ecological communities or their habitats, an Environmental Impact Statement (EIS) must be prepared. On the basis of items listed under Clause 228 of the EP&A Regulation, it is considered that the proposed works are not likely to significantly affect the environment and an EIS is not required. Therefore, the REF contained herein represents the environmental assessment as required under Part 5 of the EP&A Act.

### **2.2.1 State Environmental Planning Policy (Coastal Management) 2018**

SEPPs are drafted by the NSW State Government and apply to issues and developments of state significance. The SEPP most relevant to the proposed revetment renewal and replacement is SEPP (Coastal Management) 2018. SEPP (Coastal Management) 2018 updates and consolidates into one integrated policy SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection), including clause 5.5. of the Standard Instrument – Principal Local Environmental Plan. These policies are now repealed.

The SEPP (Coastal Management) gives effect to the objectives of the *Coastal Management Act 2016* from a land use planning perspective, by specifying how development proposals are to be assessed if they fall within the coastal zone. Coastal protection works are defined to be beach nourishment activities or works, and activities or works to reduce the impacts of coastal hazards on land adjacent to tidal waters including, but not limited to, seawalls, revetments and groynes.

Under Clause 19(2) of SEPP (Coastal Management) 2018, a public authority may carry out coastal protection works without development consent if the works are:

- (i) Identified in the relevant certified coastal management program, or
- (ii) Beach nourishment, or
- (iii) The placing of sandbags for a period of not more than 90 days, or
- (iv) Routine maintenance works or repairs to any existing coastal protection works

As noted in Section 1, the Shellharbour CZMP was certified in June 2018 and included the assessment and upgrading of the Warilla Beach seawall. As the upgrading of the seawall at the site is identified in the certified CZMP, development consent for the works is not required in accordance with Clause 19(2) (I) and Clause 19(2) (IV) of SEPP (Coastal Management), and the proposal can be assessed under Part 5 of the EP&A Act.

**Coastal Management Act 2016** - The Coastal Management Act 2016 replaced the Coastal Protection Act 1979 and established a new strategic framework and objectives for managing coastal issues in NSW. The Act defines the coastal zone as comprising four coastal management areas. As stated above the SEPP (Coastal Management) 2018 gives effect to the objectives of the Act from a land use planning perspective, by specifying how development proposals are to be assessed if they fall within the coastal zone.

The four coastal management areas are:

- 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.

The proposed works fall within the coastal environment area and coastal use area. The objectives of the coastal environment area are:

- To protect and enhance the coastal environmental values and natural processes of coastal waters, estuaries, coastal lakes and coastal lagoons
- Enhance natural character, scenic value, biological diversity and ecosystem integrity
- To reduce threats to, and improve the resilience of, coastal waters, estuaries, coastal lakes and coastal lagoons, including in response to climate change
- To maintain and improve water quality and estuary health
- To support the social and cultural values of coastal waters, estuaries, coastal lakes and coastal lagoons
- To maintain the presence of beaches, dunes and the natural features of foreshores, taking into account the beach system
- To maintain and, where practicable, improve public access, amenity and use of beaches, foreshores, headlands and rock platforms.

The objectives of the coastal use area are:

- To protect and enhance the scenic, social and cultural values of the coast by ensuring that—
- The type, bulk, scale and size of development is appropriate for the location and natural scenic quality of the coast, and
- Adverse impacts of development on cultural and built environment heritage are avoided or mitigated, and
- Urban design, including water sensitive urban design, is supported and incorporated into development activities, and
- Adequate public open space is provided, including for recreational activities and associated infrastructure, and
- The use of the surf zone is considered, and
- To accommodate both urbanised and natural stretches of coastline.

It has been identified that the proposed works have the potential to impact on:



- Coastal Processes
- Geology and Soils
- Water Quality
- Air Quality
- Aboriginal and Non-Aboriginal Heritage
- Ecology
- Noise
- Waste
- Public access and Safety
- Traffic
- And Landscape and visual Impacts

All of the above sensitivities and impacts are discussed in detail in **Section 6**.

The objectives of the Coastal Environment Area zone are identified below in **Table 1**. The proposed works either meets these objectives or in no way is contrary to them.

Table 1: Objectives of Coastal Environment Areas (Coastal Management SEPP)

Objective No.	Objective Description	Works Compliance?
1	<b>To protect and enhance the coastal environmental values and natural processes of coastal waters, estuaries, coastal lakes and coastal lagoons.</b> <i>The work will continue to protect existing built and environmental assets, and the overall form of the shoreline in this area.</i>	✓
2	<b>Enhance natural character, scenic value, biological diversity and ecosystem integrity</b> <i>The works are not contrary to the characteristics of the area, being a replacement of an existing structure with a structure that closely resembles the original. The works will not impact on biological diversity or ecosystem integrity.</i>	✓
3	<b>To reduce threats to, and improve the resilience of, coastal waters, estuaries, coastal lakes and coastal lagoons, including in response to climate change</b> <i>The works will improve the resilience of this stretch of shoreline.</i>	✓
4	<b>To maintain and improve water quality and estuary health</b> <i>The works will not impact on water quality of the adjacent ocean.</i>	✓
5	<b>To support the social and cultural values of coastal waters, estuaries, coastal lakes and coastal lagoons</b> <i>The works will not impact on or alter social and cultural values of the area.</i>	✓
6	<b>To maintain the presence of beaches, dunes and the natural features of foreshores, taking into account the beach system</b> <i>The works will maintain the presence of the shoreline in this area being a structure of similar scale and form to the existing structure.</i>	✓

Objective No.	Objective Description	Works Compliance?
7	<b>To maintain and, where practicable, improve public access, amenity and use of beaches, foreshores, headlands and rock platforms</b> <i>The works will not alter public access in this area once works are complete. Provision has been made for beach access in the form of stairs and ramps in the design. Community consultation will further inform the provisions for public access.</i>	✓

The coastal use area is land adjacent to coastal waters, estuaries, coastal lakes and lagoons, where development is or may be carried out and impacts of development on the scenic and cultural values and use and enjoyment of the beaches, foreshores, dunes, headlands, rock platforms, estuaries, lakes and the ocean need to be considered.

The coastal use area represents some of the most environmentally, economically and socially valuable land in NSW. Development in this area must maintain and improve the scenic, social and cultural values of the coast for the enjoyment of current and future generations. Development proposals must address public interest and built form criteria to avoid, minimise or mitigate impacts on:

- Existing safe access to and along a foreshore, beach, headland or rock platform, including access for people with a disability
- Overshadowing, wind funnelling and loss of views from public places to foreshores
- The visual amenity and scenic nature of the coast, including headlands
- Aboriginal cultural heritage, practices and places, and
- Cultural and built environment heritage.

As per SEPP (Coastal Management), development proposals must also consider the type, bulk, scale and size of the proposed development in the context of the surrounding area. The coastal use area applies to land only. Development controls for coastal waters are in the coastal environment area. Foreshore development which straddles land and coastal waters (i.e. this particular development) is assessed against development controls for both the coastal use and coastal environment areas.

The objectives of the Coastal Use zone are identified below in **Table 2**. The proposed works either meets these objectives or in no way is contrary to them.

Table 2: Objectives of Coastal Use Areas (Coastal Management SEPP)

Objective No.	Objective Description	Works Compliance?
1	<b>The type, bulk, scale and size of development is appropriate for the location and natural scenic quality of the coast</b> <i>The works are similar to the existing revetment, and will cause no additional impact to the scenic quality of the coast.</i>	✓
2	<b>Adverse impacts on cultural and built environment heritage are avoided or mitigated</b> <i>There is no known or anticipated cultural or environmental heritage at this location. Any unexpected finds will be referred to the relevant regulatory authority.</i>	✓

Objective No.	Objective Description	Works Compliance?
3	<b>Urban design, including water sensitive urban design, is supported and incorporated into development activities</b> <i>The works will not impact on water flow or drainage in any way.</i>	✓
4	<b>Adequate public open space is provided, including for recreational activities and associated infrastructure</b> <i>Once complete the work will not impact on access or the public space.</i>	✓
5	<b>The use of the surf zone is considered</b> <i>There will be no impact on the surf zone.</i>	✓

In addition to giving effect the objectives of the of the *Coastal Management Act 2016* the SEPP (Coastal Management) provides, in Division 3 Section 13 assessment provisions for development on land within the coastal environment area. Development consent must not be granted to development on land that is within the area identified as “coastal environment area” unless the consent authority is satisfied that the assessment provisions are met by the development. These provisions, and how the development meets them is set out in **Table 3** below.

Table 3: Section 13 SEPP (Coastal Management) Provisions.

Section 13 (1) Clause:	Assessment	Works Compliance?
(a)	<b>The integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment</b>  <i>Section 6 of this report identifies a range of biophysical and ecological values that may be impacted by the works. Section 7 sets out how impacts will be mitigated. In general impacts from soils and geology, impacts to coastal process and impacts to ecology are relatively low risk and are mitigated.</i>	✓
(b)	<b>Coastal environmental values and natural coastal processes</b>  <i>Section 6.1 indicates that coastal processes will not be impacted by the works. Other environmental values are assessed in Sections 6.2 through to 6.12. all of these values are low to moderate risk with mitigation measures set out in section 7.</i>	✓
(c)	<b>The water quality of the marine estate (within the meaning of the Marine Estate Management Act 2014), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1 of the SEPP (coastal)</b>  <i>No coastal lakes are impacted by the works</i>	✓
(d)	<b>Marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms.</b>	✓

	<i>No headlands or rock platforms are impacted by the works. Section 6.8 of this report identifies that there is a low likelihood of impacting ecology as a result of the works. Mitigation measures are detailed in Section 7 of the report.</i>	
(e)	<b>Existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability</b>  <i>The works have been designed to relevant standards for access, as detailed in the design drawings in <b>Appendix A</b>.</i>	✓
(f)	<b>Aboriginal cultural heritage, practices and places</b>  <i>Section 6.6 of the report identifies that there is no impact to known Aboriginal cultural heritage places. Section 7 of the report specifies that there will be unexpected finds procedures in place to protect Aboriginal cultural heritage items that may be discovered during the works.</i>	✓
(g)	<b>The use of the surf zone</b>  <i>The works will not impact the surf zone.</i>	✓

Similarly the SEPP (Coastal Management) provides, in Division 4 Section 14 assessment provisions for development on land within the coastal use area. These provisions, and how the development meets them is set out in **Table 4** below.

Table 4: Section 14 SEPP (Coastal Management) Provisions

Section 14 (1) Clause:	Assessment	Works Compliance?
(a)	<p>Has considered whether the proposed development is likely to cause an adverse impact on the following—</p> <ul style="list-style-type: none"> <li>(i) existing, safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,</li> <li>(ii) overshadowing, wind funnelling and the loss of views from public places to foreshores,</li> <li>(iii) the visual amenity and scenic qualities of the coast, including coastal headlands,</li> <li>(iv) Aboriginal cultural heritage, practices and places,</li> <li>(v) cultural and built environment heritage, and</li> </ul> <p><i>The works have been designed to relevant standards for access, as detailed in the design drawings in Appendix A. The levels of the revetment wall will not block views or cause overshadowing and wind funnelling. The visual amenity will not be impacted as the works will have a similar form to the existing revetment as discussed in Section 6.3 of this report.</i></p>	✓



Section 14 (1) Clause:	Assessment	Works Compliance?
	<i>Section 6.6 of the report identifies that there is no impact to known Aboriginal cultural heritage places. Section 7 of the report specifies that there will be unexpected finds procedures in place to protect Aboriginal cultural heritage items that may be discovered during the works.</i>	
(b)	<p><b>Is satisfied that—</b></p> <ul style="list-style-type: none"> <li>(i) the development is designed, sited and will be managed to avoid an adverse impact referred to in paragraph (a), or</li> <li>(ii) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact,</li> <li>(iii) if that impact cannot be minimised—the development will be managed to mitigate that impact.</li> </ul> <p><i>The development cannot avoid all impacts, due to the fact that the works are to replace an existing structure. The works however have been designed to all relevant standards to minimise impacts. Section 7 of this report details the management measure proposed to mitigate the impacts from the works.</i></p>	✓
(c)	<p><b>Has taken into account the surrounding coastal and built environment, and the bulk, scale and size of the proposed development.</b></p> <p><i>The scale and bulk of the works have been designed to be closely aligned with the existing revetment as detailed in Section 6.3 of this report</i></p>	✓

Finally Division 5, Section 15 of the Coastal Management SEPP states that “development consent must not be granted to development on land within the coastal zone unless the consent authority is satisfied that the proposed development is not likely to cause increased risk of coastal hazards on that land or other land”.

Furthermore, development consent must also not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following:

1. The integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment, and
2. Coastal environmental values and natural coastal processes.

Tables 3 and 4 address these issues and the works are in accordance with these assessment provisions.

## 2.2.2 State Environmental Planning Policy (Infrastructure) 2007

SEPP (Infrastructure) 2007 aims to facilitate the effective delivery of infrastructure within NSW by public authorities. It does this by prescribing the infrastructure related works that may be undertaken without

development consent, although the public authority may still be required to obtain an approval, licence or permit under another Act, such as the Fisheries Management Act 1994.

Division 25, Clause 129 of SEPP (Infrastructure) 2007 - Waterway or foreshore management activities states that “development for the purpose of waterway or foreshore management activities may be carried out by or on behalf of a public authority without consent on any land”.

The proposed works could be considered as foreshore management activities under SEPP (Infrastructure) 2007. However, SEPP (Coastal Management) 2018 prevails over SEPP (Infrastructure) 2007. Under both SEPPs the proposal works can be assessed under Part 5 of the EP&A Act.

### 2.2.3 Shellharbour Local Environment Plan 2013

A primary aim of the Shellharbour LEP, as it relates to this project, is to protect, enhance and maintain significant landscapes with visual, scenic, historic, ecological or conservation value, including the Illawarra Escarpment, Lake Illawarra and the coastline, for the benefit of present and future generations. The land zoning for the Council area is detailed in the 2013 LEP (see **Figure 3**). As noted in **Section 2.1**, the site of the proposed works falls primarily on land zoned for public recreation (RE1).

The objectives of the land upon which the works are proposed are:

- To enable land to be used for public open space or recreational purposes.
- To provide a range of recreational settings and activities and compatible land uses.
- To protect and enhance the natural environment for recreational purposes.

SEPP Coastal Management legislation overrides the LEP, however, the proposed revetment works are considered consistent with the objectives of this zone.

### 2.2.4 Determining Authority

In accordance with Section 5.1 under Part 5 of the EP&A Act, the determining authority is defined as:

- *a Minister or public authority and, in relation to any activity, means the Minister or public authority by or on whose behalf the activity is or is to be carried out or any Minister or public authority whose approval is required in order to enable the activity to be carried out.*

Council is therefore a determining authority as the activity (construction of a rock revetment) is to be carried out by Council. As additional approvals are required from other public authorities (refer **Section 2.2.5**), these public authorities are also determining authorities. Under Section 5.2 of the EP&A Act, where approval of more than one determining authority is required, the Minister may nominate a determining authority to be the nominated determining authority in relation to the activity. In the case of this proposal, it is considered appropriate for Council, as a determining authority, to have prepared this REF and to consult with and coordinate all necessary approvals from other determining authorities. The proposed activity has therefore not been referred to the Minister for nomination of a single nominated determining authority.

### 2.2.5 Other Licences and Approvals

Relevant additional State Legislation that applies to the activity includes the following:

- *Protection of the Environment Operations Act 1997 (POEO Act).* Activities should be carried out in a manner which does not result in the pollution of waters.

- *Crown Lands Management Act 2016* – To undertake activities and work on Crown Land, a licence is required from DPIE (Crown Land). In this instance works fall within Council land. A licence will not be required from DPIE (Crown Land).
- *Biodiversity Conservation Act 2017* -The potential impact of the proposal on threatened species has been assessed. The assessment for this REF determined that there is not likely to be a significant effect on threatened species, populations and/or ecological communities listed in the NSW Fisheries Management Act or NSW Biodiversity Conservation Act, or their habitats from the proposed activities. Therefore, a species impact statement is not required.
- *Fisheries Management Act 1994* (FM Act) - Permits under Part 7 of the Act are required for dredging and reclamation, temporarily or permanently obstructing fish passage, and harming marine vegetation in all waters within the limits of the State. A Fisheries permit is required for the works. Council has sought a permit and a copy is included in **Appendix B**.
- *Water Management Act 2000* – Under the Water Act, approval is required to undertake controlled activities on waterfront land. However, the Water Management Regulation 2011 outlines a number of exemptions for controlled activities. Where a public authority is carrying out the controlled activity on or in waterfront land, approval from the Office of Water is not required.
- *Marine Estate Management Act 2014* and *Marine Estate Management Regulation 1999* – The Act declares and manages NSW marine parks. The Regulation outlines requirements for protection of various zones within marine parks. As the works are outside any Marine Park, no approvals are required.
- *National Parks and Wildlife Act 1974* (NPW Act) and *Amendment 2010* – Provides for protection of Aboriginal cultural heritage in NSW. DPIE administers the NPW Act and requires Aboriginal consultation to be undertaken in accordance with statutory requirements. Harm is permissible under an approved Aboriginal Heritage Impact Permit (AHIP). After considering the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (September 2010) an AHIP is not required for the works as no potential harm to Aboriginal sites has been identified.
- *Native Title Act 1993* – a native title claim covering the site was made by the South Coast People in 2017 but not awarded as yet. Council should discuss the project with Heritage NSW to confirm any legislative and consultative requirements under the Native Title Act.
- *Work Health Safety Act 2011* – no approval is required to remove asbestos under this act, however any soil suspected of containing asbestos should be inspected and the inspections should be by a competent person who has acquired through training, qualification or experience, the knowledge and skills to identify, investigate and assess asbestos and to develop appropriate risk management strategies, as per the NSW Government guideline on ‘Managing asbestos in or on soil, March 2014’.
- *Environment Act 1997* – the transportation and disposal of asbestos waste may trigger and approval and advice from the EPA should be sought.

This REF has been prepared in consultation with the relevant authorities (refer **Section 3**).

## 2.3 Commonwealth Legislation

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires that proposals for development or “actions” that have, will have, or are likely to have a significant impact on any matter of national environmental significance are to be referred to the Commonwealth Environment Minister for consideration and approval.

The EPBC Act identifies the following matters of national environmental significance:

- World heritage;

- National heritage;
- Wetlands of international importance;
- Listed threatened species and communities;
- Listed migratory species;
- Protection of the environment from nuclear actions;
- Marine environment.

As discussed in Section 6.8, a search of the Commonwealth EPBC Act (matters of national environmental significance) determined that 64 listed threatened species, 48 migratory threatened species and 3 listed threatened ecological communities are either known, likely or have potential to occur in the search area. A full list of these 'Matters of National Environmental Significance' is provided in **Appendix C**. Of this large list, only a small number have potential to be present at the site and all have a low likelihood of impact due to the nature and location of the works.

The proposed works, given that they closely match the footprint of the current works, would not have a significant impact as per the Significant Impact Guidelines 1.1 Matters of National Environmental Significance, on any of the above values, therefore, referral to the Commonwealth Minister for approval is not required.



### 3 Consultation

Consultation has been undertaken with the following State Government agencies:

- DPI (Coastal Systems Unit)
- DPIE (Biodiversity and Conservation);
- DPIE (Crown Land); and
- NSW Environment Protection Authority (EPA).

Advice from DPIE Crown Lands is that a licence is not required as the works fall entirely within Council owned land.

DPI Fisheries advised a Fisheries Permit would be required if a Crown Lands licence is not required. As the works do not fall on Crown Land, and a Crown Land licence is not required, a Fisheries Permit was required. A Fisheries Permit has been sought by Council and a copy is included in **Appendix B**.

Council contacted NSW EPA regarding licencing requirements for the works. NSW EPA advised:

- the proposed works (in particular rock crushing) would not be considered a scheduled activity so an EPA licence will not be required;
- in terms of dewatering, the NSW EPA does not issue a non-scheduled activity licence (or any form of written permission) to discharge water where there is a low likelihood of impact on waters and where pollution does not occur if the activity is carried out in a competent manner.
- Council must ensure that dewatering is undertaken in accordance with Section 120 of the Protection of the Environment Operations Act 1997.
- the REF should adequately assess potential impacts of discharges on the receiving environment. Effective pollution control equipment should be installed prior to the discharge, and pollution control equipment must be maintained in a proper and efficient manner.
- Council may also wish to consider monitoring and recording discharges to validate the effectiveness of pollution control equipment.
- the REF should consider including a noise impact assessment prepared in accordance with the NSW Industrial Noise Policy (2017) to assess the potential impacts of noise emissions on sensitive receivers and to ensure appropriate noise mitigation measures are implemented. This will also assist Shellharbour City Council in ensuring compliance with Section 140 of the Protection of the Environment Operations Act 1997.

RHDHV contacted the EPA in regard to asbestos management, the EPA advised that the contractor would need an environmental protection license to transport ACM. The EPA should be contacted by the contractor to ensure the correct licenses are in place prior to transporting ACM.

DPIE Biodiversity and Conservation reviewed the draft REF and the comments have been included.

## 4 Proposed Activity

### 4.1 Reason for the Activity

The Shellharbour CZMP (BMT WBM, 2018) includes an implementation action to 'assess and upgrade Warilla Seawall.' The revetment is required to fulfil recommendations in the CZMP and provide protection to public and private infrastructure. As per the detailed design and technical specification (SMEC 2018) the proposed development is intended to meet the following objectives:

- Ensure design satisfies current design practices, including design considerations relating to environmentally friendly seawalls, appropriate armour size, toe protection level and crest height;
- Protect the foreshore from storm erosion and long term recession;
- Minimise environmental and beach user impacts, and;
- Include public foreshore access.

## 4.2 Existing Structure

As described in **Section 1**, the foreshore land along the southern section of Warilla Beach was developed in the early 1950s. To mitigate against an eroding shoreline and the threat to private property and infrastructure, rock armour was dumped along the toe of the erosion scarp over two years from 1966. Council has maintained and extended the revetment north since 1966, typically in response to extreme weather. The existing revetment was not built to an acceptable engineering standard, as rock armour was placed in an adhoc manner as an emergency response measure.

Site observations by SMEC (2018) identified that the site was gently sloping towards the east. The foreshore directly west of the site is populated with residential dwellings with a good cover of grass. The rock revetment itself is made up of moderately to slightly weathered latite armour rock up to 2.5m in diameter. Some moderately weathered sandstone/siltstone armour rocks are present within the existing rock revetment. Representative photos of the site at various locations (chainages) along the foreshore are included in **Figures 4 - 7** below.



Figure 4: Existing seawall at chainage 0m



*Figure 5: Existing seawall at chainage 150m to 160m*



*Figure 6: Existing seawall at chainage 500m to 550m*





Figure 7: Existing seawall at chainage 580m showing unrestrained rock

### 4.3 Proposed Structure

It is proposed to reconstruct the existing rock revetment along Warilla Beach to current engineering standards and provisions of the 'Environmentally Friendly Seawalls' Guideline as appropriate. Detailed design of a revetment structure for the site has been undertaken by SMEC (2018), the detailed design drawings are provided in **Appendix A**. The design criteria and specifications for the proposed revetment are provided in drawing number 30032016-GE-002 revision 02, prepared by SMEC dated 13th December 2021. A 895m long rock revetment structure is proposed to replace the existing ad hoc revetment.

### 4.4 Construction Materials

Based on the detailed design prepared by SMEC (2018) the materials required for construction would include:

- Rock (approx. 30,000 tonnes)
  - Primary armour rock ( $M_{50}$ ): 2900kg ( $M_{50}$  Indicates the median rock size with 50% of rocks with a greater or lesser size)
  - Secondary armour rock ( $M_{50}$ ): 275kg
- Geotextile;
- Materials needed for ramp and stairs (steel reinforcement, steel for stairs, concrete); and,
- Various other miscellaneous materials.

The majority of the materials needed for construction of the revetment would be delivered to site by truck.

## 4.5 Works Schedule

Council has advised that the works will be undertaken in 30m sections. The works at each section will consist of a demolition stage and a construction stage. Council has advised that the full program of works is set to run from March 2022 until approximately October 2024. Where rock from the demolition stage is suitable, it will be crushed and reused where possible.

The demolition stage includes:

- Site establishment, including clearing, fencing and environmental control measures;
- Display traffic warning signs on the relevant access roads and pedestrian access signs adjacent to the pedestrian access points to notify beach users of restricted areas;
- Construct a temporary pedestrian detour, demolish the existing footpath (where required);
- Remove and stockpile soil from crest of the existing wall, separating out soil and rock;
- Remove existing rock as required, stockpile suitable rock for reuse and remove excess rock off site;
- crush existing suitable rock to achieve a product suitable for reuse
- Trim the face of the scarp to design specifications;
- Excavate the toe area of the wall and stockpile excavated material for use as a protection bund or provide other means of temporary protection against tide and mild wave action. Contractors might elect to temporarily protect the works during construction from the actions of waves/tides/groundwater etc. by various means, including use of sand bunds and/or re-positioning of existing rock, precast concrete barriers, sheet piling, and the like; and
- Crush existing suitable rock removed from the toe area to achieve a product suitable for reuse.

The construction stage includes:

- Place geotextile on trimmed surface;
- Place core layer;
- Place secondary layer;
- Place primary layer;
- Backfill crest of seawall. This could be existing material excavated from the crest area, crushed rock, or imported material;
- Sand excavated from the toe area to be placed back on the beach;
- Wash sand into voids in the lower rock revetment (below beach sand level); and
- Reinstate the beach with sand previously excavated, with screening of the sand as required.
- A temporary pumping system to remove groundwater during earthworks or use of other measures such as temporary sheeting to prevent water ingress may need to be adopted during the construction works.

## 4.6 Plant and Equipment

A range of plant and equipment would be utilised on the project, including but not limited to:

- Trucks (for delivery of construction materials and removal of the demolished structure not suitable for reuse);
- Excavator for rock works and earth works;
- Rock crusher;
- Positrack or small loader, or Moxy trucks, for transporting material onsite; and

- Miscellaneous equipment.

#### 4.7 Contractor's Working Area

The works will require three separate auxiliary areas for stockpiling, storing of plant and equipment and rock crushing. The largest, Auxiliary Area 1, will be in Strong Reserve to the north of the works area. Due to the volume of rock required and the space needed to stockpile it will also be the main site compound. Auxiliary Area 2, at 59 Little Lake Crescent, will be the secondary site compound, with a general storage yard, and a temporary access point to the beach over the seawall. Finally, Auxiliary Area 3 will be at the reserve at the end of Bucknell Street. This area will be used for a temporary access to the beach to undertake works and a delivery point for rock for the southern sections of the wall. The work area and auxiliary areas can be seen in **Figure 8** below.

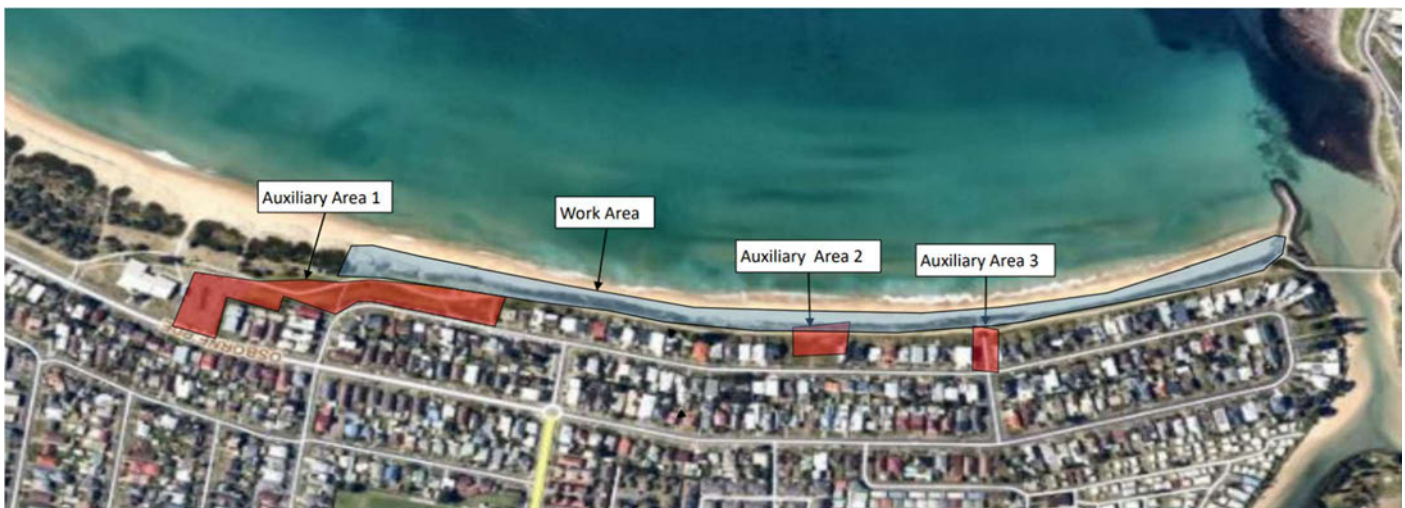


Figure 8: Warilla Beach showing the work area (blue) and the auxiliary areas (red).

It is thought that the Contractor would utilise land based plant and equipment and 'work the tide' as much as practicable to complete the project. However, to maximise productivity, minimise construction time, and minimise cost, it is expected the Contractor would construct temporary protection works against tide and wave action along the beach seaward of the work area. Any excavated sand utilised in these temporary works, e.g. sand bund, would be spread back on the beach after mechanical screening to remove any rock fragments and deleterious material.

The Contractor's work area and auxiliary areas would be fenced off and closed to the public during all construction activities.

#### 4.8 Haul Routes and Pedestrian Control

To undertake the works, materials such as rock, steel and concrete will need to be trucked to site from external sources, as well as trucked between the auxiliary areas and along the work area.

The Council's preferred haul route for the works is George Street and Osborne Parade (refer **Figure 9**). This is due to the fact that:

- George Street has existing centreline line marking which will provide additional delineation between oncoming traffic and prevent overtaking at key locations;
- George Street has existing edge line marking creating longitudinally delineated parking spaces;



- The intersection of George Street and Shellharbour Road is signalised;
- At the intersection of George Street and Shellharbour Road westbound straight and left turn movements are permitted. This is the direction of local quarries; and
- Truck movements between auxiliary sites will be along Little Lake Crescent as the most direct route.

Based on a review of local amenities and facilities in the area, no specific constraints to the haul route have been identified but it should be considered in more detail during the development of the Traffic Management Plan by the Contractor for the works (refer **Section 6.12** and **Section 7**).



Figure 9: Proposed haul routes.

The works will require the northern section of the footpath, from Bucknell Street to the Warilla-Barrack Point Surf Life Saving Club (SLSC) to be closed for the duration of the works. A diversion will be put in place that will direct foot traffic along Osborne Parade and onto Little Lake Crescent. Access to the SLSC will not be impacted. It is preferred that the footpath south of Bucknell Street is kept open due to the need for access to the foot bridge over the entrance to Little Lake.

Access along the beach seaward of the works would typically not be impacted but would be subject to surveillance by the Contractor.

#### **4.9 Working Hours**

Council has advised that the construction work hours for the project would be 7am to 6pm Monday to Friday, 7am to 2pm on Saturday, and no work on Sundays or Public Holidays.

#### **4.10 Restoration**

The site will be progressively cleared of debris (e.g. rock shards) at the completion of each 30 metre section of revetment or multiple adjacent 30 metre sections. At the completion of all works the site would be cleared of all surplus materials, temporary fences, temporary protection and the like and restored to not less than the pre-construction condition. A pre-construction dilapidation survey would be used as a basis of assessing the pre-construction condition of the site.

A post-construction dilapidation survey would be undertaken to ensure satisfactory restoration of the site. Any damage to the reserves, local roadways and other site features would be remediated as a requirement of the construction contract.

#### **4.11 Operational Management**

Following the construction of the proposed works at Warilla Beach, Council would be responsible for the ongoing management and maintenance of the revetment. The works should be identified in the appropriate asset management plan and managed in accordance with that plan. Operational management actions to ensure the ongoing performance of the works as well as maintenance of amenity and public safety would include inspection of the works following erosion events and implementation of rectification works if required.

Additionally, as the revetment has a proposed design life of 50 years, Council should procure a performance review from a suitably qualified independent coastal engineer a minimum of 3 years prior to the end of design life in order to ensure the works will continue to provide the necessary protection or otherwise carry out upgrading works as required.



## **5 Consideration of Alternatives**

Renewal of the existing seawall at Warilla Beach is recommended item in the Shellharbour CZMP (BMT, 2018). Alternatives for the site were considered as part of the development of the CZMP. In April 2020 Royal HaskoningDHV completed a Warilla Beach Cost Benefit Analysis (CBA) Coastal Hazard Assessment that analysed various options for the site. These options are discussed below.

### **5.1 Base Case**

The base case involves maintaining and repairing the revetment until maintenance becomes unfeasible, followed by removal of the structure once it is no longer practical or possible to maintain the integrity of the structure or effectively manage the contamination risks associated with the ACM. The Base Case includes nominal beach nourishment exercises every 10 years.

### **5.2 Option 1: Maintain, Repair and Make Safe**

Option 1 is as per the above Base Case but includes additional maintenance and repair costs incurred to extend the asset life and maintain public access. Option 1 includes periodic beach nourishment to deliver acceptable beach width for amenity purposes.

### **5.3 Option 2a: Construction of an engineer-designed revetment**

The existing revetment is replaced with a modern engineering equivalent replacement asset (MEERA) that meets modern work health and safety and engineering standards.

### **5.4 Option 2b: Construction of an engineer-designed revetment plus periodic beach nourishment**

Option 2b is as per Option 2a but with periodic beach nourishment to deliver acceptable beach width for amenity purposes.

### **5.5 Option 3a: Transitional Land Use**

Option 3a is as per the Base Case but includes provision for relocating services, infrastructure, redeveloping residential properties and the rehabilitation and repurposing of land when built assets are removed. Another key difference between the Base Case and Option 3a is that there is no beach nourishment component under Option 3a.

### **5.6 Option 3b: Transitional Land Use plus periodic beach nourishment**

As per Option 3a but with nominal beach nourishment exercises every 10 years

### **5.7 Justification of the Preferred Option**

In consultation with Council and in accordance with the recommendations from CZMP and cost benefit analysis (Royal Haskoning DHV 2020), the preferred option is to construct an engineer-designed revetment. The current seawall is approaching the stage where it is no longer practical or possible to maintain the integrity of the structure or effectively manage the contamination risks associated with the ACM. The proposed replacement seawall is designed to relevant current standards which will provide

asset protection from coastal hazards for the design life of the structure. Additionally, the revetment will encapsulate the identified ACM, reducing the risk of further contamination and providing further benefit to the community.

The rock revetment is intended to maintain current aesthetics and continuity along the beach rather than introducing a new foreshore treatment. This preferred option would achieve the required design life and design requirements. As part of this option the crushing of suitable rock and reusing it in the new revetment was chosen. Rock crushing was selected as it reduces waste, is cost effective and creates less truck movements,

By comparison, the base case provides no certainty around design life, as the current structure is not an engineered structure, and is demonstrating signs of degradation, and provides no mitigation of ACM issues, giving further weight to preferred option.

## 6 Description of Existing Environment, Impact Assessment, and Mitigation Measures

Under the Environmental Planning and Assessment Act 1979 Part 5, subdivision 2, part 5.5 determining authorities have a duty to consider environmental impact. The Environmental Planning and Assessment Regulation, Part 14, Division 1, s228 describes what factors must be considered concerning the impact of an activity on the environment. The following section describes the current site conditions and potential impacts of the project.

### 6.1 Coastal Processes

The coastal processes of interest to this investigation are water levels (including sea level rise predictions), wave conditions, and sediment transport processes.

#### 6.1.1 Site Conditions

##### Water Level

The water levels of interest for this site include the astronomical tide, storm tide and the predicted rise in mean sea level associated with climate change. The water level at the site is determined based on a combination of:

- Tidal fluctuation;
- Storm surge;
- Wave setup; and,
- Sea level rise.

The Warilla site lies to the south of Port Kembla which experiences semi-diurnal tides with a tidal range of 1.3 metres at spring tides. **Table 5** presents the published tidal planes for Port Kembla which is considered to be a representative of the tidal conditions at Warilla Beach.

*Table 5 Tidal Planes for Port Kembla (2018).*

Tidal Plane	2018 Water Level (m AHD)
Highest Astronomical Tide, HAT*	1.15
Mean High Water Springs, MHWS	0.65
Mean High Water, MHW	0.35
Mean Sea Level, MSL	0
Mean Low Water, MLW	-0.35
Mean Low Water Springs, MLWS	-0.65
Lowest Astronomical Tide, LAT*	-0.95

Storm tide is the term sometimes given to the total water level associated with the combination of the astronomical tide and storm surge from a storm event (e.g., East Coast Low). Storm surge itself is made up of two components: a rise in mean sea level due to low air pressure (inverted barometric pressure effect) and a rise in water level at the shoreline due to strong onshore winds (wind setup).

Wave setup is a further rise in water level inshore of the wave breaking zone due to the conversion of the kinetic energy of the waves to potential energy.

A 2% Annual Exceedance Probability (AEP) design elevated water level of 2.47m AHD was adopted by SMEC (2018) for this project, which includes astronomical tide, storm surge, wave setup, and 0.4m of sea level rise over a design life of 50 years.

### **Wave Conditions**

The wave climate at Warilla is influenced by both locally wind-generated sea and ocean swell. Sea describes wind generated waves where wind energy is still being transferred to the ocean. Swell describes wind generated waves that have travelled out of their generating area. Swell characteristically exhibits smoother, more regular, and uniform crests and a longer period than wind waves. In open coastal areas local sea waves are often superimposed on swell waves.

SMEC (2018) adopted a significant wave height ( $H_s$ ) of 2.24 metres and wave period of 10 to 12 seconds, representing a depth limited wave condition at a 10m plunging distance from the revetment toe. SMEC (2018) assumed a scoured beach profile to -1.0m AHD and a seabed slope of 1 in 20 (vertical : horizontal) for this assessment.

### **Currents**

Currents at Warilla Beach would be mainly driven by waves in the surf zone and swash zone. Currents could occur in a longshore or cross-shore direction. Currents in the surf zone would typically be around 0.5 m/s but could flow up to 2.5 m/s under large waves.

The currents are relatively minor in comparison to the loading resulting from the design wave condition. Accordingly, the design wave condition would govern the design of the revetment.

## **6.1.2 Potential Impacts**

There are a number of possible factors which could affect coastal processes during construction, in particular temporary works and excavations.

Earthworks will be required in the works, including excavation to remove existing rock and sand. The sand (and possibly rock) may be used to form bunds as temporary works for wave and tide protection during storms, or to create temporary slopes (ramps) to allow plant access to the beach. These earthworks will locally change beach profiles, but this will generally occur near the back of the beach. In addition, any temporary bund would not be constructed along the entire work area at the one time, but rather it would be constructed progressively. It may be necessary to replenish any temporary sand bund during the works subject to wave activity during a storm but any sand that is 'lost' from the bund offshore would remain in the active beach system. Any effects on coastal processes are considered to be generally localised in scale and in duration.

Weather and tide forecasts should be checked regularly during construction. If a significant storm event is predicted, all equipment and materials should be removed from the beach construction zone.

Following completion of the works the beach will be progressively restored to a natural profile.

The completed works are intended to provide coastal protection to assets and have been aligned and designed as much as practicable to minimise impacts on coastal processes and ongoing beach amenity.

The southern section of the rock revetment, from the existing groyne at the entrance to Elliot Lake-Little Lake to the access ramp opposite Bucknell Street, is designed to encapsulate asbestos containing material (ACM). The physical constraints presented by the existence of the ACM and the need for its encapsulation for safety reasons is such that the revetment extends seaward of the existing embankment along the southern section of the beach (refer typical cross section shown on Drawing No. 0200 in Appendix A). The distance the rock revetment extends onto the beach varies from 3 to 4m up to 6 to 7m, with an average distance of approximately 6m (refer to the four sheets of cross sections in Appendix A). The reduction in beach width would be offset by placement of the sand excavated to form the toe of the revetment onto the beach. The net long-term reduction in beach width along the southern section of the beach is estimated to be approximately 3 to 4m. The southern end of the revetment will be built into the existing groyne structure and as such will ensure that 'end effects' do not lead to undermining and failure of the structure at the southern end.

The northern section of the rock revetment, from the access ramp opposite Bucknell Street to the northern limit of the works, is approximately aligned with the existing embankment (refer typical cross section on Drawing No. 0200 and six sheets of cross sections in Appendix A). As such, there would not be expected to be any significant impact on coastal processes or beach amenity along this section of the beach due to the proposed works. The northern end of the revetment terminates north of the last beachfront property and as such any end effects would be accommodated within the foreshore reserve area. The revetment alignment has been slightly rotated at the northern end to facilitate a tie-in or return into the reserve.

The revetment would serve the following important functions:

1. Reduce coastal hazard risks associated with beach erosion and wave overtopping to property and infrastructure located landward of the revetment;
2. Reduce wave reflection from the revetment through design with an appropriate slope of the armour layer; and
3. Eliminate the safety risk from the existence of ACM.

## 6.1 Geology and Soils

### 6.1.1 Site Conditions

According to the published geology map, 1:250000 Wollongong Geological Series Sheet, the site is indicated to be underlain by Quaternary Aged Alluvium gravel, swamp deposits and sand dunes.

A geotechnical investigation was undertaken at the site by SMEC in June 2018 and comprised 2 test pits excavated near the beach access stairs adjacent to Bucknell Street. The geotechnical investigation indicated that the material at Warilla Beach is clean marine sand with buried armour rocks present. Within the rocks Asbestos Containing Material (ACM) was discovered between chainages 625m and 895m.

Results of particle size distribution (PSD) analysis indicated that the sand is fine to medium grained, pale brown to yellow-brown, with trace marine shells.

A search of the Sharing and Enabling Environmental Data (SEED) portal was undertaken for potential acid sulphate soils in the project area. An excerpt from the map is provided in **Figure 10**. The ASS risk maps indicate that there is a low risk of ASS materials in the beach landform (B) at Warilla Beach.

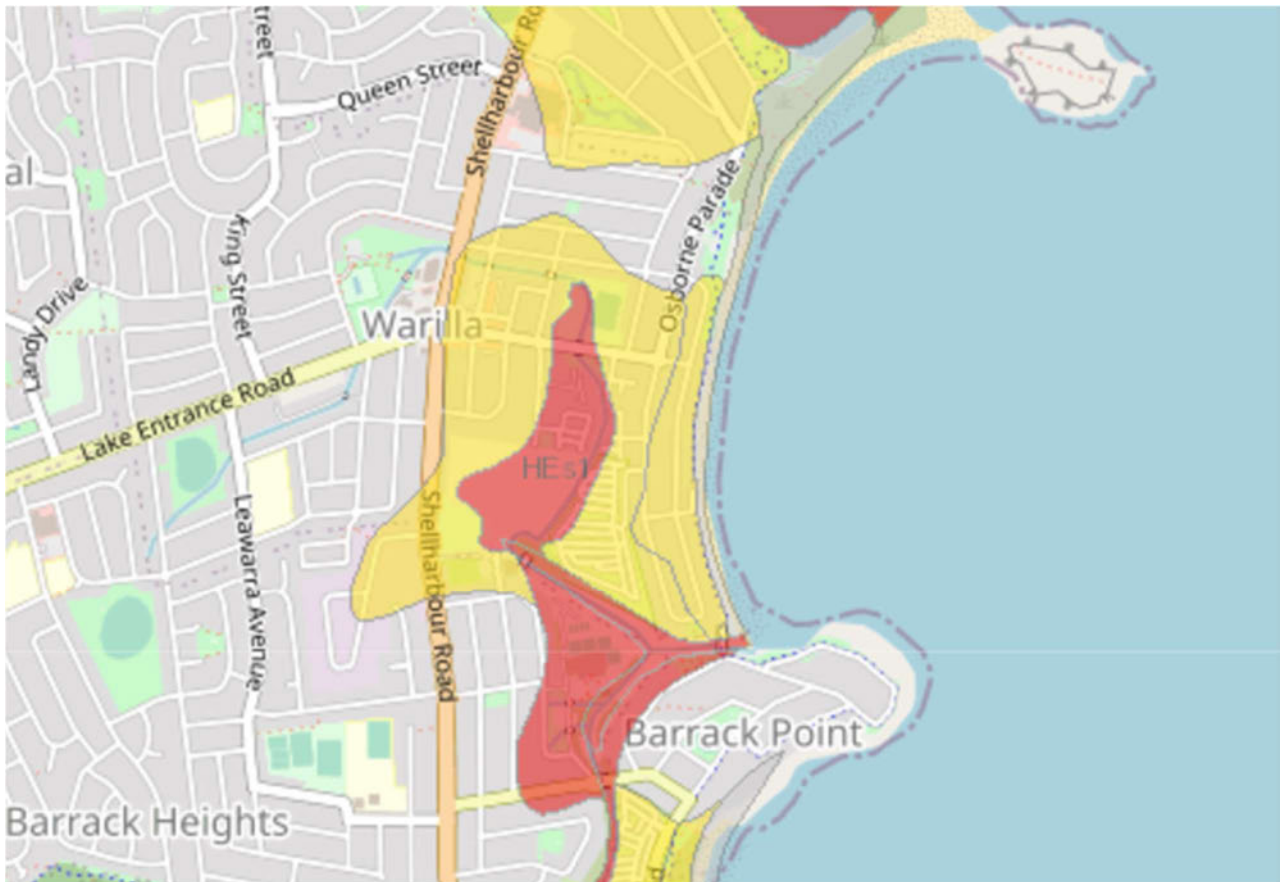


Figure 10: Warilla Acid Sulfate Soil Risk Map.

### 6.1.2 Potential Impacts

The sand and rock that will be disturbed during the works is uncontaminated and a natural material. In accordance with the principals of waste minimisation, and to reduce the volume of materials required to be imported to site, wherever possible the rock recovered during the works will be reused on site. No sand would be removed from the beach. Where ACM is discovered it is proposed to cap the existing material as opposed to its removal, due to the high cost and the potential for ACM to be further spread by attempting to remove and transport it.

The likelihood of encountering any unexpected material or areas of contamination other than asbestos is considered low. There is a low likelihood of disturbance of ASS and water quality impacts due to runoff. However, adoption of mitigation and control measures if this were to eventuate would still be advisable and these have been identified and presented in **Table 9**.

It is expected that most of the excavated material can be reused. However, if there is an excess of excavated material, it would be appropriately tested, classified, stored, transported, and disposed of at a licensed disposal facility.

There is potential that the works may uncover buried rock seaward of the footprint of the proposed works. If this does occur the rock will be either reused where suitable or removed from site where not suitable (Royal HaskoningDHV , 2021).



Should temporary sand bunds be employed these should be mechanically screened to remove rock fragments and deleterious material as part of the reinstatement of the beach.

Thorough washing of sand into the voids of the completed rock works should be undertaken to avoid the formation of sink holes.

The works to be undertaken on land include stockpiling of excavated material and stockpiling of construction material, which likely includes minor earth works. The Contractor would be required to take reasonable measures to prevent any disturbed soil from washing into waterways, including appropriate erosion and sediment controls.

No impacts from a geology and soils perspective are considered likely during operation of the revetment, where unexpected contamination is encountered (ASS, ACM etc.) an unexpected finds protocol should be utilised through the CEMP.

## **6.2 Landscape and visual impacts**

### **6.2.1 Site Conditions**

The site frontage is made up almost entirely of the existing seawall. Behind the seawall is a grassed area and footpath. The area beyond the footpath is predominantly residential. To the north there is a reserve that includes the Warilla-Barrack Point Surf Life Saving Club.

The rock revetment itself is made up of moderately to slightly weathered latite armour rock up to 2.5m in diameter. Some moderately weathered sandstone/siltstone armour rocks are also present within the existing rock revetment. Slumping of the revetment has occurred in some areas and vegetation can be observed growing over the revetment (refer **Photo 4 -7**).

At the southern extent of the site there is a groyne that protects the Elliott Lake entrance, further north there is a beach access ramp adjacent to Bucknell Street. The view from the site looking seawards is uninterrupted seascape.

### **6.2.2 Potential Impacts**

As noted in **Section 4.3**, it is proposed to adopt locally sourced rock and sand in the construction of the revetment so as to use similar material to the existing revetment. The rock revetment is intended to maintain aesthetics and continuity along the beach rather than introduce a new foreshore treatment.

Impacts to landscape are expected during the demolition and construction phases with the presence of workers, plant and associated works infrastructure (as required). Upon the completion of the works the site would be returned to pre-activity landscape conditions with the addition of low profile planting along the crest of the wall.

During the demolition and construction of the revetment the beach area would be heavily dominated by the works from a visual perspective. There would be various items of construction plant on the beach at different times (i.e. excavators and trucks), as well as fencing, excavations and stockpiles of sand and rock. Works should be timed so that sections of revetment adjacent to the most utilised areas (i.e. near the Surf Club) are worked on in off peak usage times during winter months where possible.

Overall, it is considered that the proposed works will result in a moderate to major visual impact during demolition and construction due to the presence of construction plant, materials and equipment. Once constructed, the structure will be a dominating feature in the landscape. Given the visual impact already created by the existing revetment structure, and the temporary nature of the works, the construction impact of the works is not considered significant. The proposed works once completed, could be considered a visual improvement to the ad-hoc existing revetment.

It is considered that maintaining a stable beach will provide a positive impact on the aesthetics of the area. The lower portion of the seawall would also be buried much of the time reducing the visual scale of the structure.

It is considered that the temporary visual impact on the beach and surrounds that is caused from demolition and construction of the revetment will be balanced by the protection of assets from coastal erosion.

Appropriate mitigation and control measures have been put forward for use during the construction phase in **Table 9**.

## **6.3 Water Quality**

### **6.3.1 Site Conditions**

The coastal water off Warilla Beach is considered to be of good quality with no obvious signs of pollution or contaminants.

The majority of waterside development in the study area is residential only. As such, likely contaminants will on the whole relate to diffuse stormwater discharges and litter / pollution from the use of the local area for recreation (i.e. beach use).

Other potential diffuse sources of pollution do not appear to be an issue for Warilla Beach. There is no agricultural land use in the catchment and no significant bank erosion sites. Warilla and surrounds do have areas that are mapped as high potential for ASS and excavation into and exposure of ASS can lead to acid runoff however there is a low risk of ASS materials in the beach landform.

The proposed works will cap the areas of the existing revetment that contain ACM this will reduce the risk of ACM being released to water and provide a benefit to water quality and reduce environmental health concerns.

### **6.3.2 Potential Impacts**

The Contractor may need to undertake dewatering of excavation areas as part of the work method. It would be a requirement of the construction contract that no turbid water would be permitted to flow into the sea from dewatering operations. If necessary, the water would be pumped to a soakage system at the back of the beach to allow any suspended matter to settle out.

It would also be a requirement of the construction contract that the construction equipment is in good condition, and that the Contractor maintain onsite environmental safeguards such as an emergency spill kit and procedures to contain and collect potential leakage and spillage of fuels, oils and greases from plant and equipment.



Rocks supplied to the site for use in the works would be checked to ensure that they did not contain any loose soil that could be washed off the rocks during rainfall.

Other potential impacts on water quality from the works are related to the following activities:

- There is potential for waste material from construction activities to enter the surrounding marine waters via wind action or stormwater. For example, litter and waste materials from site, and
- Movement and stockpiling of materials could lead to additional sediment entering marine waters if not handled and stored correctly. This would also include material adhered to excavator tracks and moved offsite during transit.

There is a low likelihood of disturbance of ASS and water quality impacts due to runoff are not expected.

All water quality issues would be temporary and confined to the construction period. It is anticipated that all of these impacts could be mitigated or avoided through a Construction Environmental Management Plan prepared with regard to standard construction site good practice, as detailed in **Table 9**.

As such, potential impacts on water quality during construction have been assessed as being limited and of low risk.

Following construction, the permanent works would not be expected to have any significant impact on water quality. The works would be partially buried below beach level the majority of the time and when exposed comprise essentially inert materials.

## **6.4 Air Quality**

### **6.4.1 Site Conditions**

Existing air quality at the site is presumed to have low levels of pollutants, such as particulate matter and oxides, owing to its location away from major industrial and/or commercial areas in Port Kembla. A Regional Air Quality Index is calculated by DPIE at Illawarra and is generally rated as 'Good'.

The main source of air pollution in Warilla comes from the use of vehicles. Other sources of pollution which affect air quality include, house wood-fires (in winter) and bush fires (in summer). There are no major point sources of local air pollution surrounding the proposed works. The most likely sources of pollution are from passing road vehicles.

### **6.4.2 Potential Impacts**

The proposed works would have a minimal effect upon air quality, which would be limited to the duration of the construction works. The main pollutants emitted will be those associated with the operation of equipment. Truck movements and rock crushing may also potentially result in dust generation across the site. This would be mitigated by use of dust suppressing water sprays if required.

It is expected that any potential air quality impacts would be effectively mitigated through the control measures listed in **Table 9**.

The operation of the revetment would not influence the ambient air quality.

## 6.5 Aboriginal Heritage

### 6.5.1 Site Conditions

A search for was conducted via:

- National Native Title Register; and
- NSW Office of Environment and Heritage - Aboriginal Heritage Information Management System (AHIMS).

As noted in **Section 2**, the search of the National Native Title Tribunal register of Native Title Claims indicates a native title claim was awarded to the South Coast People in 2017.

The AHIMS search did not identify any sites within the proposed works. However, a number of sites are located nearby within Warilla, with two being roughly 150m to the South as shown in **Figure 11** below.

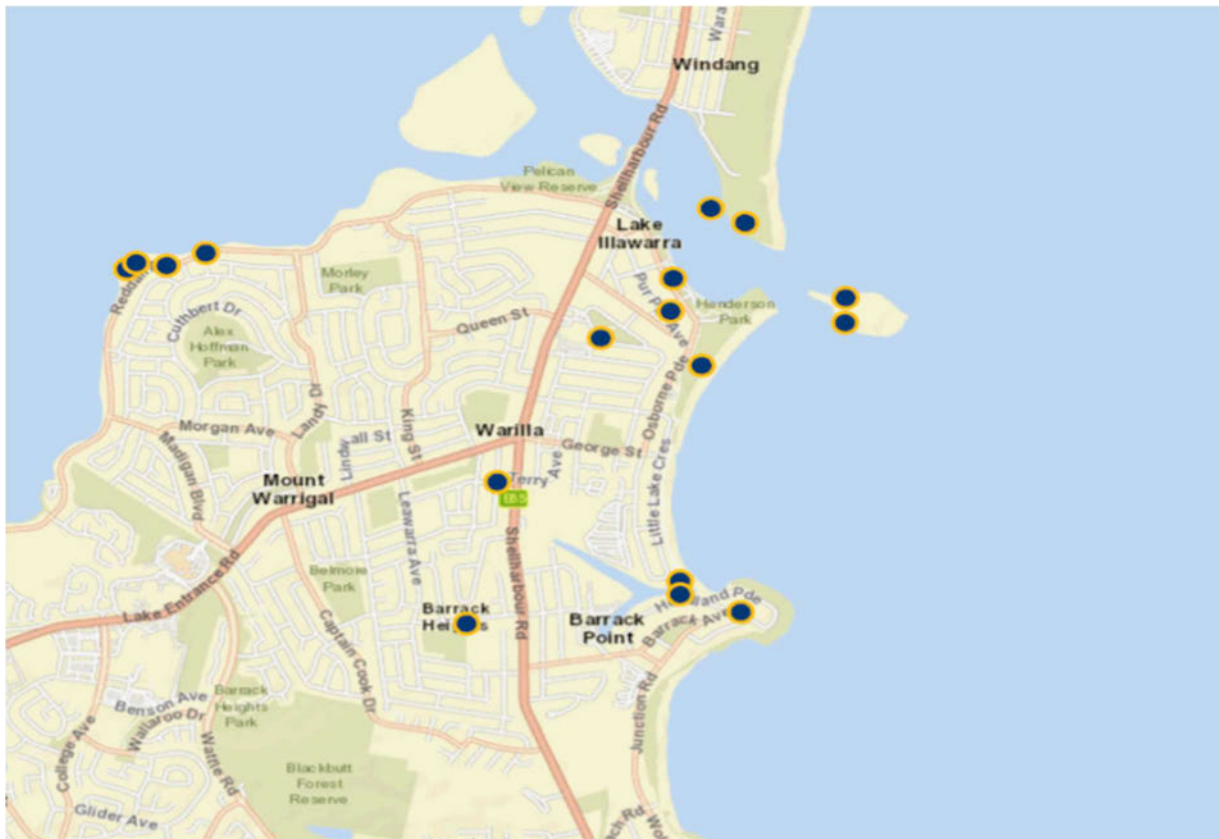


Figure 11: AHIMS search results.

### 6.5.2 Potential Impacts

The proposed works do not impact on any known sites, however, there may be unknown artefacts in the locality. As such, due diligence needs to be applied to ensure that there is no disturbance to registered or unknown Aboriginal sites or artefacts at the site. It is an offence to destroy, damage, deface, conceal, remove or otherwise interfere with a relic. It is also an offence not to report the finding of a relic.

The Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (September 2010) has been reviewed in considering the potential for harm to Aboriginal objects as a result of this project. It is considered that no permit under the National Parks and Wildlife Act 1974 is required as potential for harm is negligible.

As detailed in Section 7, in the event of any artifacts being uncovered during the works, works will cease, the Council project team will be notified and The Department of Premier and Cabinet – Heritage NSW will be contacted for further direction.

## 6.6 Non Aboriginal Heritage

### 6.6.1 Site Conditions

A search for heritage items was conducted through:

- Council LEP Heritage Map (2011);
- NSW State Heritage Register; and,
- Commonwealth Heritage List.

The Council LEP 2013 heritage schedule and NSW State Heritage registers identified the following two items of local heritage significance near the site as shown in **Figure 12** below:

- Pine tree at 103 Osborne Parade, Warilla; and,
- The pine trees at Elliott Park.

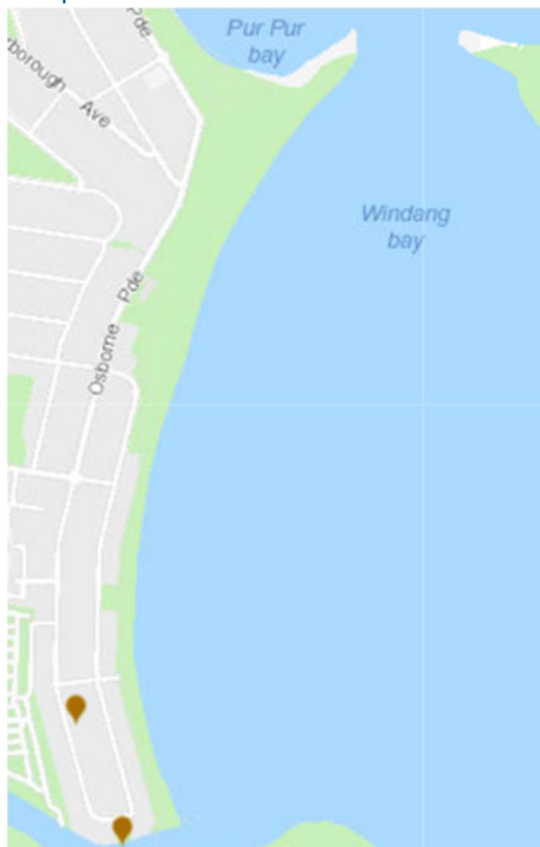


Figure 12: Heritage items adjacent to site shown as brown points.

### 6.6.2 Potential Impacts

None of the heritage items are within the works footprint or auxiliary areas. The heritage items would not be impacted by construction of the proposed works.

There would be no non -Aboriginal heritage impacts during operation of the revetment.

## 6.7 Ecology

### 6.7.1 Site Conditions

Warilla Beach forms a typical sandy beach habitat in a coastal suburban landscape. In the area of the proposed revetment, the landward zone of the beach is principally the existing seawall with vegetation growing over it and with mowed reserve land behind the crest of the seawall. Aquatic vegetation is not apparent in the surf zone.

There are some faunal species with gulls and other birds being readily apparent, alongside polychaetes and smaller sand burrowing crabs.

The beach is a highly active zone, dominated by the tides and waves, and recreational use, and consequently of low to moderate ecological value.

A desktop study has also been undertaken of available information and included searches of several online databases:

- NSW Atlas of NSW Wildlife database (<http://www.bionet.nsw.gov.au/>);
- *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool (<http://www.environment.gov.au/erin/ert/epbc/index.html>); and
- Department of Planning, Industry and Environment (DPIE) Threatened Species Database (<http://www.environment.nsw.gov.au/threatenedspeciesapp/>).

A walkover of the site identified no species or habitats of note in the immediate area.

### 6.7.2 Potential Impacts

The proposed works are expected to cause limited to negligible impacts on coastal ecology. Given the limited ecological value of the area the works are unlikely to have a significant impact.

A search of the 'NSW BioNet Atlas of NSW Wildlife' provided by the DPIE was undertaken. The search area, centred on the project site, comprised the minimum 10km x 10km. The search resulted in 57 threatened species records – 5 species of flora and 52 faunal species (refer **Appendix C**). A variety of terrestrial and marine-based species are identified. The nature of the project and the dynamic environment in which the works are proposed to be undertaken makes many of the records irrelevant in terms of potential impact. For this reason, a closer examination of the records provided for the project site and surrounds was completed (refer **Figure 13**).

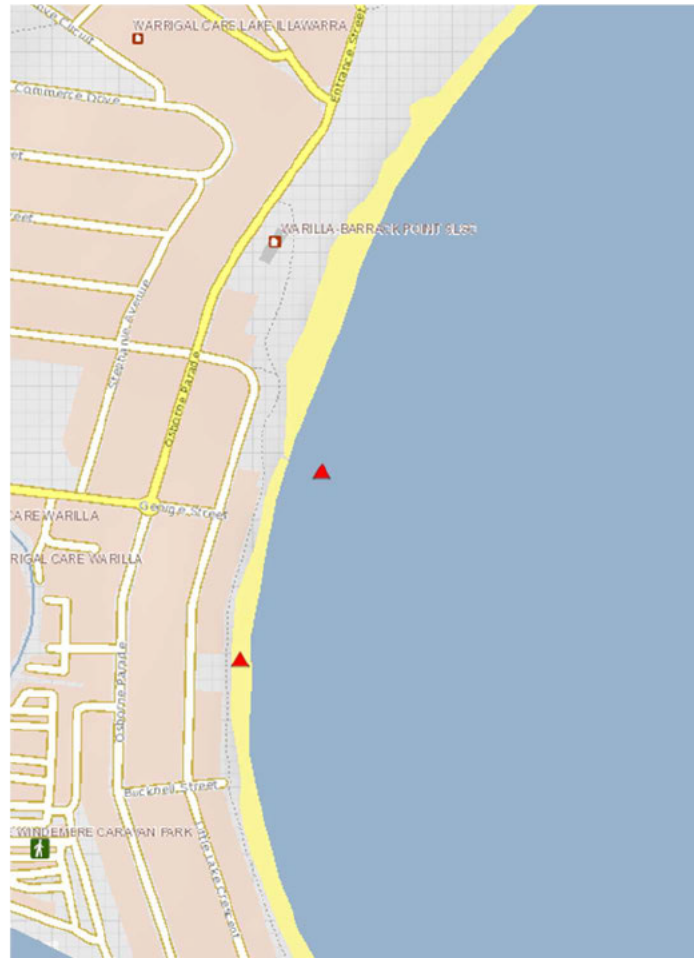


Figure 13: Locations of BioNet search results for the project site and close proximity.

The records contained at the project site and immediate vicinity are listed in Table 6.

Table 6: Species recorded on BioNet in close proximity to the project site

Species	Likelihood of Impact
Regent Honey Eater ( <i>Anthochaera phrygia</i> )	Low
Australian Fur Seal ( <i>Arctocephalus pusillus doriferus</i> )	Low

The Regent Honey Eater typically inhabits woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and sheoaks. The Regent Honeyeater feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Being a developed beach and foreshore area, the site does not represent the type of habitat that the Regent Honey Eater would use for nesting or feeding and it is likely the sighting was of an individual passing through the area. As such the works are unlikely to have an impact on this species.

Similarly, the Australian Fur Seal Prefers rocky parts of islands with flat, open terrain when not foraging in the ocean. The work area does not represent habitat where the Australian Fur Seal would feed or inhabit. As such the works are unlikely to have an impact on this species.



Timing works in cooler months would reduce potential conflict with turtles and nesting shorebirds, as well as other bird species that may utilise the dune environment for nesting.

A search of the Commonwealth EPBC Act (matters of national environmental significance) determined that 64 listed threatened species, 48 migratory threatened species and 3 listed threatened ecological communities are either known, likely or have potential to occur in the search area. A full list of these 'Matters of National Environmental Significance' is provided in **Appendix C**. Of this large list, only a small number have potential to be at the site and all have a low likelihood of impact due to the nature and location of the works.

There is no indication that the site may contain protected fauna or protected native plants pursuant to the *Fisheries Management Act 1994*. A NSW Fisheries Permit is required for the works (refer **Section 2.2.3**).

Revegetation of the area immediately landward of the revetment would be undertaken at the completion of construction involving turfing and possibly some low planting.

The project's impact on flora and fauna during construction and operation is considered negligible. The use of appropriate mitigation and control measures to avoid and ameliorate any impacts on coastal ecology have been identified and presented in **Table 9**.

## 6.8 Noise

### 6.8.1 Site Conditions

The acoustic environment surrounding the site is influenced by road traffic, recreational users, and ocean waves. The closest sensitive receivers to construction noise relevant to the proposed works sites are the Warilla-Barrack Point Surf Life Saving Club and residences along Little Lake Crescent, west of the works area.

Overall, given that the site has a strong coastal recreational basis (i.e. beach and foreshore users), the background noise levels are considered to be low to moderate (i.e. during the summer period in particular).

The closest sensitive receivers to the proposed works are the residences located along Little Lake Crescent, immediately adjacent to the beach, situated less than 20m from the revetment alignment. Lake Windemere Caravan Park is located approximately 200m from the proposed works. Potential commercial sensitive receivers are located over 500m west of the proposed site.

A noise area category for the site (category R2<sup>1</sup>) has been adopted to describe the background noise environment. Existing noise levels within the residential areas for R2 would be approximately 45 dB(A), 40 dB(A) and 35 dB(A) for day, evening and night times respectively. These noise levels are considered to be reflective of those likely to be experienced at residences for this project.

The Interim Construction Noise Guideline (DECC, 2009) provides noise management levels for construction work. Noise management levels differ depending on the type of sensitive receiver that may

<sup>1</sup> Definitions as per TfNSW Construction Noise and Vibration Guideline (August 2016)

R1 - Rural/suburban - Areas with negligible transportation or very limited local traffic, typically light vehicles only. 100m or more from the road.

be affected and the time of day that the work is being carried out. According to the Interim Construction Noise Guideline (ICNG), for residential receivers, construction noise levels should be managed with the aim of not exceeding the noise affected level, which is the Rating Background Level (RBL) plus 10dB(A) during standard working hours or the RBL plus 5dB(A) outside of standard working hours (refer to Table 7). Where construction noise is predicted to exceed the noise affected level, all reasonable and feasible mitigation measures should be applied. The highly noise affected level is 75 dB(A) as nominated by ICNG. Where construction noise is predicted to reach this level, respite periods for very noisy work may be required. The contractor should consider these levels and mitigation measures and include them in the CEMP for the works.

Table 7: Noise Management Levels at Residences

Time of Day	Noise Management Level (NML) LA <sub>eq</sub> (15 mins)
Recommended standard construction hours Monday – Friday: 7am to 6pm Saturday: 8am to 1pm	Noise affected RBL + 10 dB(A)
	for Warilla the NML is estimated to be 45 + 10 = 55 dB(A)
	Highly noise affected NML as set by ICNG 75 dB(A)
No work on Sundays or Public holidays	
Outside of Recommended Standard Hours	Noise affected RBL + 5 dB(A)
	for Warilla the NML is estimated to be 45 + 5 = 50 dB(A)

The daytime noise management level for the residential receptors is calculated to be 55 dB(A). The highly noise affected level represents the point above which there may be strong community reaction to noise. The highly noise affected level for the project is 75 dB(A) as set by ICNG. As noted above, where construction noise is predicted to reach this level, respite periods for very noisy work may be required.

### 6.8.2 Potential Impacts

Council has specified that construction activity on site would be undertaken during the following normal working hours:

- Monday to Friday 7am to 6pm
- Saturday 7am to 2pm
- No work on Sundays or Public Holidays

Any variation to the above hours by the contractor would require the approval of Council, which would only be considered having regard to any potential for noise impacts on the surrounding residential amenity.

R2 - Suburban/urban - Areas with low density transportation. Typically local traffic, light vehicles, intermittent traffic flow.

R3 – Urban - Areas with medium density transportation or some commerce or industry. Typically traffic is moving from one area to another (light & heavy vehicles) with heavy peak hour traffic movement. May be on or close to bus route/ light rail.

The proposed construction activities would involve excavation, rock placement and rock crushing. Excavation would be in sand and there would be no excavation into bedrock involving use of rock hammers, for example. Other construction activities would be consistent with those commonly encountered on residential and commercial building sites. Rock crushing has the highest potential for noise generation.

Impacts from noise would be restricted to standard work hours for the duration of works. Mitigation measures are outlined in **Section 7**. While noise impacts will be temporary, the estimated works timeline is a long duration of more than 1 year, although it may not be continuous. Management of noise will require close consultation and liaison with the community. It is recommended a Noise Management Plan be prepared for the works.

Typical noise levels generated from these main activities (SWL LAeq (dB(A))) are shown in **Table 818**. The TfNSW noise estimator was used to determine the predicted noise levels at the nearest sensitive receptors assuming a line of sight to the receiver. The results are summarised in **Table 818**.

Table 81: Predicted Noise Levels at Nearest sensitive receptors

Plant	SWL LAeq(dB(A))	SPL (dB(A))				
		Residences (10m)	Residences (20m)	Residences (50m)	Residences (100m)	Commercial area (500m)
Rock Crusher	118	84	80	72	67	48
Excavation of soil and rock	110	72	66	56	50	30

The noise level estimates indicate that the construction activities will impact surrounding sensitive receivers. Estimates indicate that rock crushing is likely to exceed the highly noise affected management level (75 dB(A)) at residences within 50m. Noise mitigation measures have been identified in **Section 7** to minimise noise impacts however further measures may need to be provided for local residences to minimise impacts particular as more people are now working from home. Further measures may include individual briefings, alternative timing of noisy work and respite periods. Noise impacts would be restricted to standard work hours and would be confined to the construction phase of the project.

Other proposed machinery for activities determined to be high noise emitters (excavating and placement of rock) are expected to exceed the daytime noise management level receptors (55 dB(A)) for residences within 50m.

As the revetment is proposed to be constructed in 30m sections, residences immediately adjacent to the 30m section of active construction work and those residences immediately adjacent to the rock crushing area will be impacted the most.

The receptors most likely to be affected are the residences in close proximity to the works. Other receptors, such as beach users would also potentially experience temporary noise issues noting the impacts will be over a long duration due to the timeline for the works estimated to take more than a year. Rock crushing is a high impact activity and poses a high risk of creating noise issues, however rock

crushing would be a shifting activity and not continuous, so the sensitive receivers should not be subjected to prolonged high noise activities for the entire duration of the works.

Potential noise impacts to terrestrial and aquatic fauna are considered to be negligible.

Whilst there is no avoiding noise impacts at construction sites, there are standard construction good practice noise safeguards and mitigation measures that would be expected on site, as outlined in **Section 7** and **Table 9**. With those measures in place, it is anticipated that noise impacts during the works would be acceptable to local receptors given the necessary requirements for the works.

There would be no noise impacts from the revetment following completion of the construction works.

## **6.9 Waste Management**

### **6.9.1 Site Conditions**

Waste inputs in this area would most likely be confined to that left by recreational users of the beach and reserve, storm water discharges and flotsam/jetsam deposited on incoming tides / waves. Garbage bins were identified at a number of points in the area and would be emptied as part of Council's waste collection services.

Overall, the site appeared to have very low levels of litter or waste.

### **6.9.2 Potential Impacts**

The proposed works may generate the following waste during construction:

- Rock unsuitable for reuse; and
- General construction waste.

Materials that could be reused or recycled would be separately identified, stockpiled, and transported by road to a recycling facility. Materials not suitable for recycling would be transported by road to a licensed waste facility or in accordance with EPA waste classifications and requirements.

As noted in **Section 6.2**, excavated material is likely to comprise clean sand that could be used in bunds during the works to temporarily protect the works. At the completion of the works any excess sand should be placed seaward of the works to reinstate the beach and meet future storm erosion demand. The sand should be screened for rubble, rock fragments and other deleterious material which should not be left seaward of the revetment.

Any existing rock on the beach uncovered from historical revetment works would be removed where not suitable for reuse. Rock which satisfies the technical specifications would be reused in the rock revetment.

The removal of general construction waste from site is a normal construction contract requirement, progressively and at completion. The replacement revetment structure once constructed would not generate waste at the site. It is recommended that standard construction site good practice is adhered to, as detailed in **Table 9**.

## **6.10 Public Access and Safety**

### **6.10.1 Site Conditions**

The majority of use of the site is recreational. This includes beach users (i.e. swimming, sunbathing, fishing etc.), picnicking and sightseeing. People can access the beach at multiple informal points along the foreshore and can make their way along the beach and egress at, similarly, multiple informal points. There is formal beach access in the form of a ramp and stairs at the southern end of the site adjacent to Bucknell Street. A public footpath runs along the length of the works area behind the crest of the existing seawall.

### **6.10.2 Potential Impacts**

The foreshore and beach area would be transformed during the construction activity. There would be various items of construction plant on site such as excavators, as well as open excavations and stockpiles of rock.

Appropriate safety precautions would be taken during the construction of the works, such as incorporation of security fencing and construction barrier fencing, to ensure public and worker safety. It would be a requirement of the construction contract that the Contractor employ persons to control vehicular and pedestrian movements on adjacent roads, within car park and footpath areas and on the beach, as required to ensure safety.

During construction of the revetment, the active 30 m section of construction would result in a section of the beach which would become unusable by the public for the period of the works in the area. Alongshore beach access would be retained where safe to do so and be controlled by the Contractors staff.

The means of access to the beach across the rock revetment once constructed would be provided by retention of the existing concrete stairs, reconstruction of the existing concrete ramp, and provision of a number of lightweight suspended stairs (number and location of stairs to be established through community consultation).

In summary, while there may be some temporary inconvenience to beach users during the construction period, such inconvenience will be short term and is considered acceptable to attain the longer-term benefits of the works.

The works have been situated as far landward as practicable. Following construction, all access to the beach and along the footpath will be restored, plus additional beach access would be provided by the installation of a number of lightweight suspended stair structures.

There would be positive benefits to public access and safety due to the improved protection afforded to the landward infrastructure.

## **6.11 Traffic**

### **6.11.1 Site Conditions**

The local roads around the works area primarily service the surrounding residential community. As described in Section 4.8, the preferred haul route for the works is George Street and Osborne Parade. This is due to the fact that:



- George Street has existing centreline line marking which will provide additional delineation between oncoming traffic and prevent overtaking at key locations;
- George Street has existing edge line marking creating longitudinally delineated parking spaces;
- The intersection of George Street and Shellharbour Road is signalised; and
- At the intersection of George Street and Shellharbour Road westbound straight and left turn movements are permitted. This is the direction of local quarries.
- The haul routes do pass by a local school, the contractor should take into account peak times at the school zones and take this into account in traffic management planning for the project.

### 6.11.2 Potential Impacts

Impacts to the surrounding community and environment may be expected from the generation of additional traffic on surrounding roads and the associated traffic noise. Temporary disturbances to traffic conditions may occur as vehicles associated with the works arrive/depart site. No road closures are required to accommodate the proposed works.

It is expected that any impacts would be limited to Shellharbour Road, George Street, Little Lake Crescent and Osborne Parade, with lesser impacts expected at other nearby roadways.

Based on a review of local amenities and facilities in the area, no specific constraints to the haul route have been identified but it should be considered in more detail during the development of the Traffic Management Plan by the Contractor for the works (refer **Section 7**).

The Contractor's working area would be agreed with Council and fenced off and closed to the public during all construction activities. Due to occupation of public land, and use of public roads, the Contractor would need to provide a traffic management plan for approval.

The impacts from these traffic movements would be managed through adoption of the mitigation measures outlined in **Table 9**.

There would be no traffic impacts during operation of the revetment.

## 7 Recommended Mitigation and Control Measures

It is recommended that a site-specific Construction Environmental Management Plan (CEMP) is prepared by the construction Contractor and approved by Council prior to commencement of construction. The Contractor would implement the CEMP during construction and would be responsible for selecting appropriate control measures for the potential impacts identified in the REF.

The following **Table 9** identifies the recommended mitigation and control measures that should be put in place to avoid or ameliorate the potential impacts of the replacement works, as discussed in **Section 6**.

Table 9 Proposed Environmental Safeguards and Mitigation Measures

Environmental Safeguard and/or Mitigation Measure
<b>Geology and Soils</b>
1. Rock recovered during the works should be reused where possible.
2. Any excess excavated sands should be placed in front of the revetment to nourish the beach.
3. Where ACM is discovered it should be capped in accordance with an Asbestos Management Plan for the site
<b>Coastal Processes</b>
4. A temporary sand bund should be used on the seaward side of the works during construction using sand excavated from the beach, or similar measures, to provide a level of protection to the works area against storms
5. Weather and tide forecasts should be checked regularly during construction. If a significant storm event is predicted, all equipment and materials should be removed from the beach construction zone.
<b>Landscape and Visual</b>
6. Impacted areas (i.e. for access, storage and site works) should be returned to pre-construction conditions where possible.
7. Revegetation should be undertaken where possible to reinstate visual aesthetics in line with surrounding and pre-construction landscape. Low profile planing is proposed in the design plans to enhance the landscape, ensure planting is undertaken in line with the design plans.
8. The construction site should be kept tidy and in an orderly fashion at all times to minimise visual impacts to local residents.
<b>Coastal Ecology</b>
9. All construction works should be undertaken by suitably qualified and experienced Contractor(s) to reduce the risk of error and accidental environmental damage.
10. Workers should be informed of their obligations and possible offences under the NSW National Parks and Wildlife Act and Australian Environmental Protection and Biodiversity Conservation Act with respect to threatened and migratory species.
11. To avoid impacts on coastal ecology, machinery or workers should avoid work below the MHWL as much as is possible.
12. The Works should minimise the destruction of flora and interference with fauna.
13. Works should be timed in cooler months where possible to reduce potential conflict with turtles and nesting shorebirds, as well as other bird species that may utilise the dune environment for nesting.

Environmental Safeguard and/or Mitigation Measure
14. Contractor should cease work activities and notify Council if fauna species are observed to persistently occupy areas in the immediate vicinity of work zone.
15. If native fauna is injured, immediate contact should be made with a wildlife rescue service or a veterinary surgeon.
Water and Sediment Quality
16. A construction management plan should be prepared by the contractor that addresses ways in which pollution of the site by fuel and oil will be avoided. This should include protocols for equipment maintenance, storage of fuel and other chemicals and materials, and refuelling procedures.
17. Where possible, refuelling should be done off site. However, if refuelling on site is required, due care shall be taken to avoid spilling fuel and a tray shall be used to catch any accidentally spilt fuel. Plant refuelling/servicing activities to be completed on-land and away from the ocean.
18. Industry standards and pollution prevention regulations should be adhered to during refuelling, transfer, storage and handling of hazardous materials.
19. Contractor should ensure that all plant is maintained in good working order with regular servicing.
20. Spill response kits should be maintained onsite for use as required by trained Contractor personnel.
21. No major maintenance of equipment should be undertaken on-site.
22. Timing of works should be planned to avoid, where possible, periods of high rainfall or during storm/wind warnings. Where this is not possible, preparation and tidying should occur around the worksite to reduce the potential for contamination.
23. Weather and tide forecasts should be checked regularly during construction. Where flooding or inundation is forecast to the any work area, all equipment and materials should be removed from the beach construction zone or appropriately secured above expected water levels in the area.
24. Stockpiles should be located on flat ground at least 5 metres away from areas subject to run-off and away from established flow paths (e.g. drains, gutters, etc.). The height of the stockpiles should not exceed 2 metres, unless stockpiles are suitably protected from wind erosion. The Contractor should protect temporary stockpiles with appropriate sediment control measures to prevent sediment loss.
25. Tracking of sediment from the construction site via construction equipment onto the road should be minimised. The Contractor should be required to clean any machinery in a designated washdown area to prevent tracking of sediment off site. A road sweeper should be employed if required.
26. Washout of trucks and cleaning of construction equipment and/or vehicles should not be undertaken in locations that permit flow of untreated wastewater directly to the open drainage system or beach.
27. Watering or covering of earthworks, stockpiles and the like should be undertaken to minimise dust emissions. Water should be applied at rates that suppresses dust but does not create runoff.
28. All trucks transporting rock and fill materials should be covered where dust could be generated.
29. Appropriate controls should be used when working near the beach to capture any materials that may be produced by the construction works and to prevent them entering the marine environment.
30. If storage on-site of hazardous substances is required, then effective bunding should be used in construction areas.

Environmental Safeguard and/or Mitigation Measure
31. Appropriate site and project inductions/training detailing potential water quality impacts and relevant construction measures and spill and emergency response procedures should be used.
32. Any dewatering activity should not involve direct discharge of water to the sea. Use of a temporary sump, soakaway or the like should be incorporated in a sandy area at the back of the beach.
<b>Air Quality</b>
33. All plant used by the Contractor should be in good operating condition and free of excessive emissions.
34. All equipment would be required to meet emission control compliance regulations.
35. All plant, equipment and vehicles should not idle for extended periods of time; they should be switched off if not in operation.
36. Weather and tide forecasts should be checked regularly during construction. Works should not be carried out during strong winds or in weather conditions where high levels of dust or airborne particulates are likely;
37. Adjacent sensitive receivers would be advised to shut windows prior to the start of works that would potentially generate dust emissions.
38. Uncovered or stockpiled materials that may lead to the generation of dust or windblown should be covered or watered down.
39. Public roads and sealed areas should be kept free of soil/dust through sweeping.
<b>Noise and Vibration</b>
40. Beach users and surrounding residences and businesses should be notified of the proposed works and hours of operation.
41. A Council contact should be provided for the works in the event of any complaints.
42. The Contractor should prepare a Noise Management Plan for the proposed works.
43. Works should be undertaken during the specified construction hours. However, on occasion works may be required outside of these hours to meet the tide conditions and to allow for the works to be delivered on time. Where works are required outside of the standard hours, approval of Council should be obtained and notification should be provided to local residents by Council.
44. Works should be undertaken in the non-peak visitor and recreation periods if possible (i.e. during winter months).
45. Plant should be turned off when not in use (e.g. not left idling).
46. Instructions should be issued to the Contractor that appropriate silencers are to be fitted on all plant and equipment where possible.
47. Noisy plant and equipment should be oriented away from sensitive receivers where possible.
48. Broadband reversing alarms or similar (and if available) should be used as an alternative to a traditional beeper reversing alarm for vehicles permanently on site.
49. The use of horns and alarms should be minimised.
50. High vibration methods should be substituted with lower vibration methods where possible.



Environmental Safeguard and/or Mitigation Measure
<b>Traffic Management</b>
51. Beach users and surrounding residences, businesses and schools should be notified of the proposed works and hours of operation;
52. The Contractor should prepare a Traffic Management Plan for the proposed works.
53. The Contractor should take all precautions to ensure that roads and thoroughfares used by it are not damaged as a result of the Works. If damage to roads and thoroughfares occurs, the Contractor should rectify to preconstruction standards.
54. The Contractor should utilise materials sourced locally wherever possible to limit the use of public roads for long distance hauling of bulk construction materials.
<b>Public Access and Safety</b>
55. Prior to commencement of works, boundaries of the construction area and access points should be marked with temporary barrier fencing. The fencing should be monitored daily by the site supervisor, be immediately repaired or replaced if necessary and should be removed when construction is completed.
56. Machinery should only access the defined work sites via clearly defined routes.
57. Pedestrian access near to or within the Works area should not be permitted over the duration of the works. Where normal construction fencing cannot be practically used (i.e. on the beach) then star pickets and parawebbing, or similar, and clear and obvious signage should be employed.
58. The community should be notified of construction activities and provided with a mechanism (e.g. phone number) for any complaints to be submitted.
59. Signage should be installed to inform community of the construction activities (locations, working hours, duration of works).
60. Workers and plant drivers should always maintain awareness of beach users.
61. Sand should be washed into the voids of the rock toe to avoid formation of sink holes.
<b>Waste Management</b>
62. All waste generated during the construction activities should be contained appropriately before removal and disposal off-site to prevent it from entering the marine environment.
63. Excavated materials should be reused on site where suitable or disposed of to a licensed waste facility.
64. Any sand bund employed during construction should, at completion of the works, be screened for rubble, rock fragments and other deleterious material which should not be left seaward of the revetment. Sand should be spread to achieve a natural beach profile.
65. The Contractor shall prepare an Emergency Response Plan and train employees in the use of equipment, chemicals, and protective clothing and the application of the Emergency Response Plan.
<b>Heritage</b>
66. All relevant staff and contractors are to be trained regarding their statutory obligations and responsibilities under the Heritage Act 1977 and NPWS Act 1974, through the site induction and toolbox talks in the event suspected historical cultural material is uncovered.



Environmental Safeguard and/or Mitigation Measure
67. Council should discuss the project with Heritage NSW to confirm any legislative and consultative requirements under the Native Title Act.
68. In the event that any potential archaeological finds / items are uncovered during construction works, the Contractor must notify the Council Project Manager immediately and cease works until further instruction. Heritage NSW should be notified for advice on how to proceed.

## 8 Environmental Factors Considered

### 8.1 Consideration of Factors in Clause 228 of the EP&A Regulation

Clause 228 of the *EP&A Regulation 2000* provides a list of factors that must be considered in determining the likely impacts of an activity on the natural and built environment and therefore the necessity for an EIS.

Following review of the Clause 228 factors outlined below, the proposed works are not considered to result in significant detrimental environmental impacts. Therefore, it is concluded that an EIS is not required, and this REF is considered an appropriate environmental assessment.

Clause 228 Factors	Significant Impact
a. Any environmental impact on a community?	no
b. Any transformation of a locality?	no
c. Any environmental impact on the ecosystems of the locality?	no
d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?	no
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?	no
f. Any impact on the habitat of protected fauna (within the meaning of the <i>National Parks and Wildlife Act 1974</i> )?	no
g. Any endangering of any species of animal, plant or other form of life whether living on land, in water or in the air?	no
h. Any long term effects on the environment?	no
i. Any degradation of the quality of the environment?	no
j. Any risk to the safety of the environment?	no
k. Any reduction in the range of beneficial uses of the environment?	no
l. Any pollution of the environment?	no
m. Any environmental problems associated with the disposal of waste?	no
n. Any increased demands on resources (natural or otherwise) that are or are likely to become in short supply?	no
o. Any cumulative environmental effect with other existing or likely future activities?	no
p. Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?	no

## 8.2 Consideration of Matters of National Environmental Significance

Matters of National Environmental Significance must be considered under the environmental assessment provisions of the EPBC Act. No matters of National Environmental Significance would be impacted by the proposed works, as set out below.

a. Any environmental impact on a world heritage property?	no
b. Any Environmental Impact on a National Heritage place?	no
c. Any Environmental Impact on Ramsar Wetlands of international importance?	no
d. Any environmental impact on Commonwealth listed threatened species and ecological communities?	no
e. Any environmental impact on Commonwealth listed migratory species?	no
f. Does any part of the project involve a nuclear action?	no
g. Any environmental impact on the Commonwealth marine environment?	no
h. Any impact on Commonwealth land?	no

## 9 Conclusion

Council is seeking to demolish and reconstruct the existing rock revetment structure at Warilla Beach. This REF is a written statement prepared for Council that considers the impact of the proposed rock revetment on the natural and built environment, and the proposed methods of mitigating or ameliorating any adverse effects.

The works do not require development consent and fall under Part 5 of the EP&A Act.

For the proposed works, Council is considered to be a determining authority as the activity is to be carried out by Council. Other determining authorities and required approvals include DPI Fisheries Permit.

Potential impacts primarily relate to coastal processes, visual impact, noise, amenity and traffic, and all have been addressed by this REF. The works are required to provide protection to assets but have been aligned and designed to minimise impacts on coastal processes. Although the construction works are estimated to be for a long duration, in general, given the localised and temporary nature of the works, it is expected that the project would have few adverse impacts on the surrounding environment, typically of a low to moderate level during construction. Of particular importance will be adoption and implementation of noise mitigation measures during the construction works. The constructed structure will be the dominating feature in the landscape but it is considered that the visual impact on the beach and surrounds will be balanced by the protection of assets from coastal erosion. In addition, the reconstructed revetment would have an improved visual appearance compared to the existing adhoc structure. Beach access would be enhanced by the works through provision of additional access points. Issues with ACM within the existing structure would be resolved. Where potential environmental impacts have been identified, control measures have been recommended.

## 10 Certification

### Assessor Declaration

This Review of Environmental Factors provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposal.

I have considered all environmental impacts and safeguards to the best of my knowledge and have sought advice where required

<b>Name:</b>	[REDACTED]
<b>Position title:</b>	Senior Specialist, Environmental Approvals
<b>Company name:</b>	Haskoning Australia Pty Ltd
<b>Date:</b>	26/11/2021

### Environment Officer Sign Off

<b>Name:</b>	[REDACTED]
<b>Position title:</b>	Senior Coastal Advisor
<b>Date:</b>	14/03/2022
<b>Action to be taken</b>	<input type="checkbox"/> Return for alterations <input checked="" type="checkbox"/> Elevate for determination
<b>Signature</b>	[REDACTED]

### Determining Authority Declaration and Approval

I have examined this review of environmental factors and accept it on behalf of Council.

<b>Name:</b>	[REDACTED]
<b>Position title:</b>	Acting Group Manager - Asset Strategy
<b>Council:</b>	Shellharbour City Council
<b>Date:</b>	15/03/2022
<b>Signature</b>	[REDACTED]



## 11 References

- BMT WBM. (2018). *Shellharbour Coastal Zone Management Plan*.
- Couriel, E., Alley, K., & Modra, B. (2012). *OEH NSW Tidal Planes Analysis 1990 - 2010 Harmonic Analysis*. Manly Hydraulics Laboratory Report Number MHL2053.
- Department of Environment and Climate Change and Water. (2010). *Coastal Risk Management Guide: Incorporating sea level rise benchmarks in coastal risk assessments*. NSW Government.
- Jacobs, R. (2016). *NSW Ocean and River Entrance Tidal Levels Annual Summary 2015-2016*. Manly Hydraulics Laboratory Report Number MHL2475.
- NSW Office of Environment and Heritage. (2015). *Floodplain Risk Management Guide - Modelling the Interaction of Catchment Flooding and Oceanic Inundation in Coastal Waterways*.
- Royal HaskoningDHV . (2021). *Warilla Seawall Design Review*.
- Royal HaskoningDHV. (2020). *Warilla Beach Cost Benefit Analysis Coastal Hazard Assessment*.
- SMEC . (2018). *WARilla Beach Rock Revetment Concept Design Report*.
- SMEC. (2018). *Warilla Rock Revetment Upgrade Geotechnical Investigation*.
- SMEC. (2019). *Visual Inspection Report, Warilla Rock Revetment*.

## Appendix A - Detailed design drawings

# WARILLA BEACH - ROCK REVETMENT

## WARILLA, NSW, 2528




LOCALITY PLAN  
NTS

DRAWING NUMBER	DRAWING DESCRIPTION
30032016-GE-0001	LOCALITY PLAN AND DRAWING INDEX
30032016-GE-0002	GENERAL NOTES - SHEET 1 OF 2
30032016-GE-0003	GENERAL NOTES - SHEET 2 OF 2
30032016-GE-0100	SITE PLAN
30032016-GE-0101	SOUTHERN ROCK REVETMENT - GENERAL ARRANGEMENT PLAN - SHEET 1 OF 6
30032016-GE-0102	SOUTHERN ROCK REVETMENT - GENERAL ARRANGEMENT PLAN - SHEET 2 OF 6
30032016-GE-0103	NORTHERN ROCK REVETMENT - GENERAL ARRANGEMENT PLAN - SHEET 3 OF 6
30032016-GE-0104	NORTHERN ROCK REVETMENT - GENERAL ARRANGEMENT PLAN - SHEET 4 OF 6
30032016-GE-0105	NORTHERN ROCK REVETMENT - GENERAL ARRANGEMENT PLAN - SHEET 5 OF 6
30032016-GE-0106	NORTHERN ROCK REVETMENT - GENERAL ARRANGEMENT PLAN - SHEET 6 OF 6
30032016-GE-0200	ROCK REVETMENT - TYPICAL CROSS SECTIONS
30032016-GE-0201	ACCESS RAMP - CIVIL PLAN & LONGITUDINAL SECTION
30032016-GE-0202	ACCESS RAMP - CROSS SECTIONS
30032016-GE-0203	ACCESS RAMP - STRUCTURAL PLAN & DETAILS
30032016-GE-0204	STAIRCASE - CIVIL PLAN & LONGITUDINAL SECTION
30032016-GE-0205	STAIRCASE - CIVIL CROSS SECTIONS
30032016-GE-0206	STAIRCASE - STRUCTURAL PLAN & LONGITUDINAL SECTION
30032016-GE-0207	STAIRCASE - SECTIONS & DETAILS
30032016-GE-0300	SOUTHERN ROCK REVETMENT - CROSS SECTIONS SHEET 1 OF 4
30032016-GE-0301	SOUTHERN ROCK REVETMENT - CROSS SECTIONS SHEET 2 OF 4
30032016-GE-0302	SOUTHERN ROCK REVETMENT - CROSS SECTIONS SHEET 3 OF 4
30032016-GE-0303	SOUTHERN ROCK REVETMENT - CROSS SECTIONS SHEET 4 OF 4
30032016-GE-0304	NORTHERN ROCK REVETMENT - CROSS SECTIONS SHEET 1 OF 6
30032016-GE-0305	NORTHERN ROCK REVETMENT - CROSS SECTIONS SHEET 2 OF 6
30032016-GE-0306	NORTHERN ROCK REVETMENT - CROSS SECTIONS SHEET 3 OF 6
30032016-GE-0307	NORTHERN ROCK REVETMENT - CROSS SECTIONS SHEET 4 OF 6
30032016-GE-0308	NORTHERN ROCK REVETMENT - CROSS SECTIONS SHEET 5 OF 6
30032016-GE-0309	NORTHERN ROCK REVETMENT - CROSS SECTIONS SHEET 6 OF 6

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				PROJECT DIRECTOR	G BENDELL																																								
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REVISION  
IN PROGRESS



GENERAL

- ROCK REVETMENT DESIGN CRITERIA:  
DESIGN WAVE Hs = 2.3m, T-1,0m = 10.9s  
DESIGN LIFE = 50 YEARS
- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL OTHER WORKING DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE CONSTRUCTION. ALL DISCREPANCIES SHALL BE REFERRED TO THE SUPERINTENDENT BEFORE PROCEEDING WITH THE WORK.
- DURING CONSTRUCTION THE CONTRACTOR (AS PRINCIPAL CONTRACTOR) SHALL BE RESPONSIBLE FOR MAINTAINING THE STRUCTURE IN A STABLE CONDITION AND ENSURING NO PART SHALL BE DAMAGED UNDER CONSTRUCTION ACTIVITIES.
- CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND SAFETY OF THE TEMPORARY WORKS AND CHECKING PERMANENT STRUCTURES FOR CONSTRUCTION AND TEMPORARY LOADS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE IMPLEMENTATION OF EROSION AND SEDIMENT CONTROL MEASURES DURING CONSTRUCTION.
- THE SITE (INCLUDING ALL ACCESS ROUTES) SHALL BE LEFT IN CLEAN AND TIDY CONDITION TO THE SATISFACTION OF THE SUPERINTENDENT ON COMPLETION OF WORKS.
- WORKMANSHIP, MATERIALS AND TOLERANCES TO BE IN ACCORDANCE WITH THE SPECIFICATIONS, AND RELEVANT STANDARDS AUSTRALIA CODES EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.
- ALL LEVELS ARE EXPRESSED IN METRES TO AHD. ALL DIMENSIONS RELEVANT TO THE SETTING OUT OF THE WORK SHALL BE VERIFIED BY THE CONTRACTOR BEFORE CONSTRUCTION PROCEEDS.
- THE APPROVAL OF A SUBSTITUTION SHALL BE SOUGHT FROM THE SUPERINTENDENT BEFORE INCORPORATION INTO THE WORK.
- CONTRACTOR TO LOCATE ALL SERVICES PRIOR TO COMMENCEMENT OF WORK.
- ANY SECTIONS OF FOOTPATH DAMAGED DURING CONSTRUCTION IS TO BE REINSTATED BY THE CONTRACTOR.

ROCK ARMOUR CLASS AND GRADING

- REFER TO THE SPECIFICATION.
- A REFERENCE SET OF FIVE STONES SHALL BE PREPARED FOR THE ARMOUR LAYER PRIOR TO FIRST QUARRY LOAD OUT. THE REFERENCE SET SHALL BE USED FOR SUBSEQUENT VISUAL COMPARISON AND SHALL BE KEPT AT THE CONSTRUCTION SITE AT ALL TIMES.
- NOT MORE THAN 5% OF ROCKS SHALL HAVE A RATIO OF MAXIMUM DIMENSION TO MINIMUM DIMENSION OF GREATER THAN 3:1.
- RELATIVE DENSITY OF ROCK SHALL BE A MINIMUM OF 2.6 (SATURATED SURFACE DRY).
- MATERIAL SHALL BE PLACED SO THAT THE DISTRIBUTION OF ROCKS WITHIN ANY 5m x 5m AREA CONFORMS WITH THE ROCK GRADING BASED ON M<sub>50</sub> AND ROCK COUNT.
- ROCK SHALL COMPLY WITH THE FOLLOWING GRADING.

CLASS 1 ROCK ARMOUR	MASS (kg)	M <sub>MIN</sub>	M <sub>15</sub>	M <sub>50</sub>	M <sub>85</sub>	M <sub>MAX</sub>
	MIN	1000	1800	2700	3500	3800
	TARGET	1500	2000	2900	3800	4500
	MAX	2000	2300	3200	5000	6000
CLASS 2 ROCK ARMOUR	MASS (kg)	M <sub>MIN</sub>	M <sub>15</sub>	M <sub>50</sub>	M <sub>85</sub>	M <sub>MAX</sub>
	MIN	1350	2350	3350	4100	4450
	TARGET	2000	2600	3650	4600	5300
	MAX	2500	2900	4000	6000	7000
UNDERLAYER	MASS (kg)	M <sub>MIN</sub>	M <sub>15</sub>	M <sub>50</sub>	M <sub>85</sub>	M <sub>MAX</sub>
	MIN	70	160	300	475	575
	TARGET	130	200	365	550	700
	MAX	190	250	440	800	1000
CORE	DIAMETER (mm)	D <sub>Nmin</sub>	D <sub>N15</sub>	D <sub>N50</sub>	D <sub>N85</sub>	D <sub>NMax</sub>
	MIN	50	75	125	155	170
	MAX	95	115	150	185	200

QUALITY OF ARMOUR ROCK MATERIAL

- REFER TO THE SPECIFICATION.
- ARMOUR ROCK SHALL BE EITHER IGNEOUS OR METAMORPHIC IN ORIGIN AND IS DENSE, SOUND, RESISTANT TO ABRASION AND FREE OF CRACKS, CLEAVAGE PLANES, SEAMS AND OTHER DEFECTS WHICH WOULD RESULT IN BREAKDOWN OF THE STONE IN THE ENVIRONMENT OF THE SITE OF THE WORKS.
- ANY STONE WHICH WILL UNDERGO PHYSICAL CHANGE CAUSING SPALLING, WEATHERING OR FRACTURING IN THE ENVIRONMENT OF THE SITE WILL NOT BE ACCEPTABLE.

ROCK PLACEMENT

- REFER TO THE SPECIFICATION.
- THE CONTRACTOR SHALL SUPPLY A METHOD STATEMENT DETAILING ITS PROPOSED METHOD OF ROCK PLACEMENT AND CONTROL TO ENSURE THE REVETMENT IS CONSTRUCTED IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATION.
- ROCK IS TO BE PLACED IN LAYERS TO THE MINIMUM THICKNESS SHOWN ON THE DRAWINGS.
- END DUMPING OF ROCK IS PROHIBITED.
- THE CONTRACTOR WILL BE SOLELY RESPONSIBLE FOR DETERMINING SATISFACTORY ROCK PLACEMENT TECHNIQUES TO ENSURE ROCK IS PLACED TO LINE, LEVEL AND WITHIN TOLERANCE.
- THE METHOD OF PLACING ROCK SHALL PRODUCE A DENSE, EVENLY DISTRIBUTED ROCK BLANKET WITH A MINIMUM OF VOIDS AND SHALL ENSURE THE MAXIMUM INTERLOCK BETWEEN ADJACENT ROCKS AND LAYERS.
- INDIVIDUAL ROCKS SHALL BE MOVED TO A NON-MOVING STABLE POSITION IN CONTACT WITH THREE OTHER ROCKS.

LAYER PLACEMENT TOLERANCES

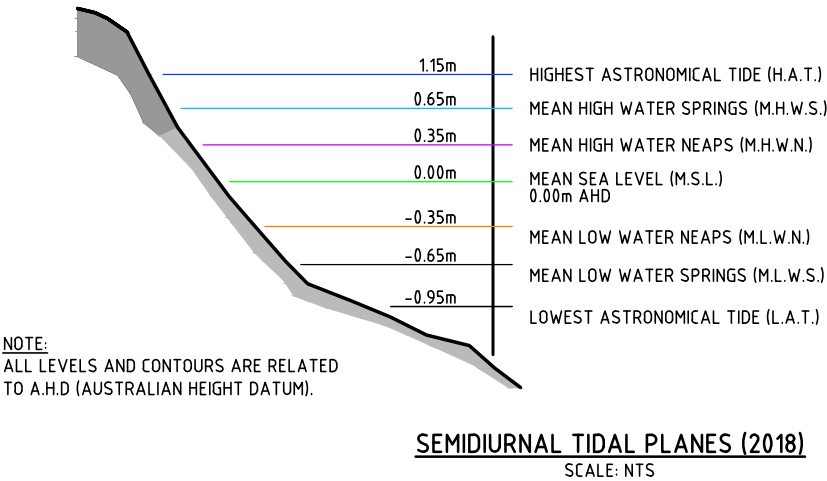
- REFER TO THE SPECIFICATION.
- ROCK IS TO BE PLACED IN LAYERS TO THE MINIMUM THICKNESS SHOWN ON THE DRAWINGS.
- THE SLOPE OF THE ROCK LAYERS SHALL NOT VARY BY MORE THAN 10° FROM THE SPECIFIED SLOPE.
- TOLERANCE ON TO CONSECUTIVE MEAN MEASURE PROFILES SHALL NOT BE NEGATIVE.
- NOT WITHSTANDING ANY ACCUMULATION OF POSITIVE TOLERANCES ON UNDERLYING LAYERS, THE THICKNESS SHALL NOT BE LESS THAN 95% OF THE NOMINAL THICKNESS.

TEST PANEL

- REFER TO THE SPECIFICATION.
- A 10 METRE TEST PANEL SHALL BE CONSTRUCTED AT COMMENCEMENT OF WORKS.

GEOTEXTILE AND GEOTECHNICAL

- REFER TO THE SPECIFICATION.
- GEOTEXTILE FABRIC TO BE 1200R (NON WOVEN STAPLE FIBRE) WITH MINIMUM 500mm OVERLAP AT JOINTS OR SUITABLE APPROVED EQUIVALENT.
- THE CONTRACTOR SHALL DEVELOP SUITABLE STRATEGIES AND METHODS FOR REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL INCLUDING ACID SULPHATE SOIL AND SOFT MATERIAL BELOW THE ROCK REVETMENT. ADDITIONAL TOE ARMOUR SHALL BE PLACED TO FORM A STABLE FOUNDATION.
- CONTRACTOR TO UNDERTAKE ITS OWN ASSESSMENT OF SLOPE AND ROCK REVETMENT STABILITY PRIOR TO CONSTRUCTION BASED ON PROPOSED PLANT AND CONSTRUCTION TECHNIQUES
- 'AS-CONSTRUCTED' ROCK REVETMENT DRAWINGS ARE NOT AVAILABLE.



CONCRETE

- REFER TO THE SPECIFICATION.
  - ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION AND THE CURRENT VERSIONS OF FOLLOWING STANDARDS INCLUDING AMENDMENTS.
- |         |         |         |         |
|---------|---------|---------|---------|
| -AS3600 | -AS1012 | -AS2399 | -AS3583 |
| -AS3610 | -AS1141 | -AS2350 | -AS3799 |
| -AS1379 | -AS1478 | -AS2758 | -AS4997 |
| -AS3972 | -AS2349 | -AS3582 | -AS2159 |
- CONCRETE SHALL NOT BE PLACED FROM A HEIGHT OF MORE THAN 2m FROM THE POUR FACE.
  - CONCRETE APPLICATION, FINISHES AND CURING SHALL BE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION.
  - SIZE OF CONCRETE ELEMENTS DO NOT INCLUDE THE THICKNESS OF APPLIED FINISHES.
  - NO PENETRATIONS , CHASES, OR EMBEDMENT OF PIPES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE. PIPES OR CONDUITS SHALL NOT BE PLACED WITHIN THE CONCRETE COVER TO REINFORCEMENT.
  - ALL EDGES AND RE -ENTRANT CORNERS TO BE PROVIDED WITH A 20X20mm CHAMFER, U.N.O.
  - CONCRETE TO BE USED IN EACH ELEMENT OF THE WORK SHALL BE OF THE GRADE SHOWN BELOW UNLESS STATED OTHERWISE ON THE DRAWINGS. THE GRADE DESIGNATION SPECIFIES THE REQUIRED 28 DAYS STRENGTH.

ELEMENT	CONCRETE GRADE	CHARACTERISTIC COMP. STRENGTH F'C (MPa)	MIN. COVER COMPACTION (mm)	EXPOSURE CLASSIFICATION
CAST INSITU STAIRS AND ACCESS RAMP	S50	50	65 - SOFFIT, SIDE AND TOP COVER.	SOFFIT, SIDE & TOP : C2

- THE GRADE DESIGNATION SPECIFIES THE REQUIRED CHARACTERISTIC CYLINDER STRENGTH (MPa) AT 28 DAYS. REFER TECHNICAL SPECIFICATION FOR CONCRETE MIX REQUIREMENTS.
  - THE CLEAR COVER TO REINFORCEMENT IS DERIVED BASED ON 20mm MAXIMUM AGGREGATE SIZE FOR ALL ELEMENTS.
- ALL CONCRETE SHALL BE CAST IN THE DRY AND SEA WATER MUST BE KEPT OFF THE FORMS IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION.
  - CONCRETE FINISHES SHALL BE IN ACCORDANCE WITH THE SPECIFICATION AND AS3610 AND GENERALLY AS FOLLOWS:
    - UNDERGROUND SURFACES PERMANENTLY OBSCURED FROM VIEW CLASS 4
    - ALL OTHER EXPOSED SURFACES (U.N.O) CLASS 2

HOLD POINTS

- REFER TO THE SPECIFICATION.

SURVEY

- DESIGN BASED ON SURVEY BY AUSTRALIAN UAV DATED 04.12.17
- SURVEY TO BE GROUND TRUTHED PRIOR TO CONSTRUCTION BY CONTRACTOR.
- ALL LEVELS ARE IN METRES TO AUSTRALIAN HEIGHT DATUM.

DATUMS

TIDAL PLANES	AUSTRALIAN HEIGHT DATUM (AHD)	LOWEST ASTRONOMICAL TIDE (LAT)
HIGHEST ASTRONOMICAL TIDE (HAT)	1.15	2.10
MEAN HIGH WATER SPRINGS (MHWS)	0.65	1.60
MEAN HIGH WATER NEAPS (MHWN)	0.35	1.30
MEAN SEA LEVEL (MSL)	0.00	0.95
MEAN LOW WATER NEAPS (MLWN)	-0.35	0.60
MEAN LOW WATER SPRINGS (MLWS)	-0.65	0.30
LOWEST ASTRONOMICAL TIDE (LAT)	-0.95	0.00
#DATA SOURCE: AUSTRALIAN NATIONAL TIDE TABLES 2018		

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	01	05.11.2021	ISSUED FOR REVIEW	02	AF	DRAFTER	H MORROW		 Member of the Surbana Jurong Group © ABN 47 065 475 149 LEVEL 2, 6-8 REGEND STREET WOLLONGONG, NSW, 2500 PH 02 4243 4400 SMC PROJECT No 30032016							
	02	13.12.2021	ISSUED FOR TENDER	03	AF	DRAFTING CHECK	N PHILLIPS									
						DESIGNER	A FOLAN									
						DESIGN CHECK	S KNIGHT									
						PROJECT MANAGER	A FOLAN									
						PROJECT DIRECTOR	G BENDELL									

150 mm ON ORIGINAL  
A1  
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

REINFORCEMENT

- 1. RL, SL, L - DENOTES GRADE D500L WIRE MESH TO AS/NZS 4671  
N - DENOTES GRADE D500N HOT ROLLED DEFORMED BARS TO AS/NZS 4671  
R - DENOTES GRADE R250N HOT ROLLED PLAIN BARS TO AS/NZS 4671  
SS, R - DENOTES GRADE 316 STAINLESS STEEL PLAIN BARS TO ASTM A 955/A 955M
- 2. EXPOSED STEEL SHALL BE CLEANED TO EQUIVALENT CONDITIONS A 2.5 IN ACCORDANCE WITH AS1627.4 AND THE TECHNICAL SPECIFICATION TO REMOVE ALL RUST AND SCALE BY WATER OR GRIT BLASTING.
- 3. WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS. THESE WELDS SHALL DEVELOP THE FULL STRENGTH OF THE REINFORCING ELEMENT U.N.O.
- 4. REINFORCEMENT SPACING NOT SHOWN SHALL BE TAKEN AS EQUAL.
- 5. REINFORCING BARS SHOWN ON THESE DRAWINGS ARE DIAGRAMMATIC ONLY.
- 6. BARS SHOWN MAY REPRESENT MORE THAN ONE LENGTH AND/OR PROFILE.
- 7. BARS MAY NOT BE SHOWN IN TRUE POSITION FOR CLARITY. ALL HOOKS, BENDS AND COGS ARE STANDARD AND SHALL BE IN ACCORDANCE WITH AUSTRALIAN STANDARD AS3600.
- 8. REINFORCEMENT SHALL BE SUPPORTED ON CONCRETE BLOCKS WITH THE SAME STRENGTH OR APPROVED PLASTIC BAR CHAIRS.
- 9. ALL REINFORCEMENT TIES SHALL BE TURNED AWAY FROM THE SURFACE.
- 10. LAP SPLICES TO ALTERNATE AND IF MORE THAN 50% OF REINFORCEMENT AREA IS LAPPED IN ANY SECTION. THE SPLICE LENGTHS GIVEN IN TABLE BELOW SHALL BE INCREASED BY 30%.
- 11. LAP LENGTHS SHALL BE AS TABULATED BELOW AND SHALL COMPLY WITH AS3600 UNLESS SHOWN OTHERWISE ON THE DRAWINGS.

BAR DIAMETER	MIN. LAP LENGTH
12	360
16	480
20	600
24	750

FORMWORK

- 1. ALL FORMWORK SHALL COMPLY WITH AS3610 AND THE SPECIFICATION.
- 2. FORMWORK SHALL DESIGNED AND CONSTRUCTED BY THE CONTRACTOR IN ACCORDANCE WITH AS3610 -1995.
- 3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STRUCTURAL SUFFICIENCY OF ALL FORMWORK.
- 4. FORMWORK TO INTERNAL AND EXTERNAL SURFACES SHALL BE CLASS 2.

STEELWORK

- 1. THE STEEL WORKS INCLUDE THE STRUCTURAL FASTENERS FOR THE HANDRAILS.
- 2. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE SPECIFICATION AND THE CURRENT VERSIONS OF THE FOLLOWING STANDARDS INCLUDING AMENDMENTS.

-AS4100	-AS4671	-AS1796
-AS1627.4	-AS4997	-AS1554
-AS1553	-AS3679.1	

- 3. ALL STAINLESS STEEL BOLTS, NUTS AND WASHERS INCLUDING HOLD DOWN BOLTS SHALL BE GRADE 316 AND IN ACCORDANCE WITH ISO 3506 UNLESS SPECIFICALLY NOMINATED OTHERWISE ON THE DRAWINGS.
- 4. ALL BOLT HOLES SHALL BE 2mm LARGER THAN THE NOMINAL BOLT DIAMETER EXCEPT WHEN SLOTTED OR OVERSIZE HOLES ARE SHOWN ON THE STRUCTURAL STEEL DETAILS. ALL HOLES SHALL COMPLY WITH CLAUSE 14.3.5 OF AS 4100. PLATE WASHERS SHALL BE PROVIDED WHERE REQUIRED BY CLAUSE 14.3.5.
- 5. USE A NICKEL BASE LUBRICANT OR NICKEL IMPREGNATION TAPE ON THE THREADS OF ALL STAINLESS STEEL BOLTS BEFORE ASSEMBLY.
- 6. ALL STAINLESS STEEL FASTENERS SHALL BE FITTED WITH A STAINLESS STEEL 'NYLOC' NUT AND LOCK NUT AND STAINLESS STEEL WASHER UNDER NUT.
- 7. ALL STAINLESS STEEL SHALL BE CLEANED, DESCALED AND PASSIVATED IN ACCORDANCE WITH ASTM 380.
- 8. ALL DISSIMILAR METAL THREADED CONNECTIONS SHALL HAVE 'DURALAC' ANTI-CORROSIVE JOINTING COMPOUND APPLIED BY BRUSH IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.
- 9. ALL DISSIMILAR METALS SHALL BE ISOLATED INCLUDING CONTACT WITH CONCRETE VIA SUITABLE NEOPRENE WASHERS AND BEARING PADS.

CEMENT MORTAR AND GROUT

- 1. ALL GROUT AND MORTAR SHALL BE MADE FROM MARINE GRADE CEMENT AND AS PER THE TECHNICAL SPECIFICATION.
- 2. GROUT SHALL BE 20 MPa CEMENT MORTAR FROM 1:3 CEMENT MORTAR MIXTURE WITH SUFFICIENT WATER ADDED TO GIVE IT A PLASTIC LIKE TEXTURE THAT WILL RETAIN ITS SHAPE AND NOT FLOW LIKE A LIQUID.

DESIGN CRITERIA

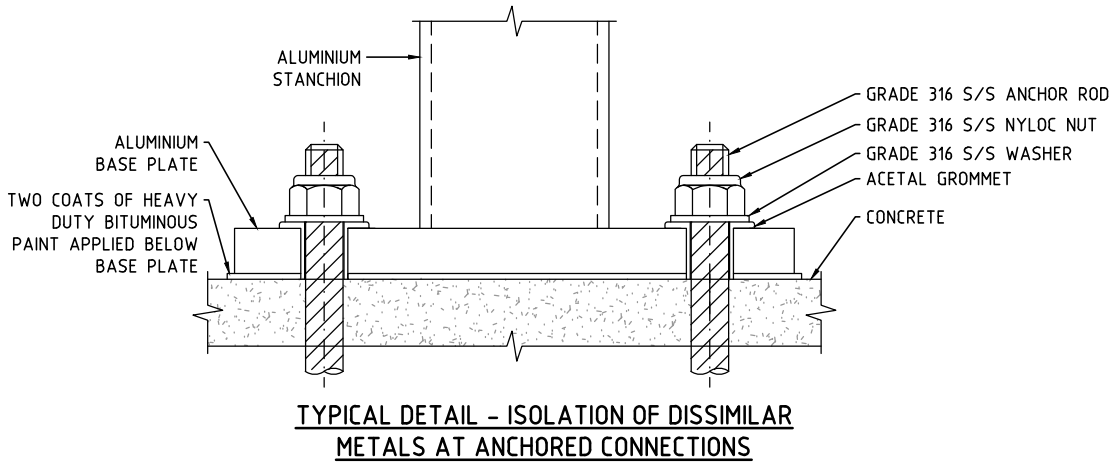
- 1. THE DESIGN IS IN ACCORDANCE WITH THE AUSTRALIAN STANDARDS
  - AS 1170.1 DEAD AND LIVE LOADS AND COMBINATIONS
  - AS3600 CONCRETE STRUCTURES -AS 4100 STEEL STRUCTURES
  - AS 4997 GUIDELINES FOR THE DESIGN OF MARITIME STRUCTURES
- 2. DESIGN LIFE: 50 YEARS
- 3. ACCESS RAMP DESIGN:
  - STANDARD: G TABLE 3.1 AS/NZS 1170.1
  - DISTRIBUTED LOAD: 5 KPa
  - POINT LOAD: 31 kN
- 4. STAIRS DESIGN
  - LANDINGS AND STRINGERS:
    - STANDARD: C3 TABLE 3.1 AS/NZS 1170.1
    - DISTRIBUTED LOAD: 5 KPa
    - POINT LOAD: 4.5 kN
  - HANDRAILS:
    - STANDARD: C3 TABLE 3.3 AS/NZS 1170.1
    - DISTRIBUTED LOAD: 0.75 kN/m
    - POINT LOAD: 0.6 kN

PROPRIETARY PRODUCTS

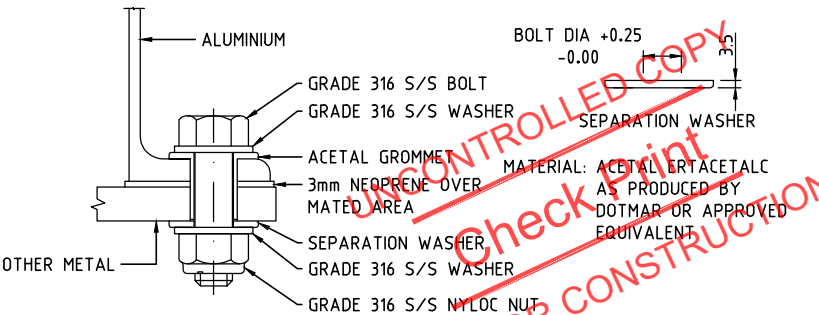
- 1. ALL THE PROPRIETARY PRODUCTS SHALL BE INSTALLED IN ACCORDANCE WITH THE SUPPLIER SPECIFICATIONS.

ALUMINIUM

- 1. ALUMINIUM WORKS INCLUDE THE HANDRAILS. MARINE GRADE ALUMINIUM SHALL BE USED.
- 2. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE SPECIFICATION AND THE CURRENT VERSIONS OF THE FOLLOWING STANDARDS INCLUDING AMENDMENTS
  - AS 1664
- 3. ALL WELDING SHALL BE IN ACCORDANCE WITH AS/NZS 1665.
- 4. ALUMINIUM SHALL BE ELECTRICALLY ISOLATED FROM A DIRECT CONTACT WITH DISSIMILAR METAL.
- 5. ALUMINIUM SHALL BE ISOLATED FROM DIRECT CONTACT WITH CONCRETE SURFACES.




TYPICAL DETAIL - ISOLATION OF DISSIMILAR METALS AT ANCHORED CONNECTIONS

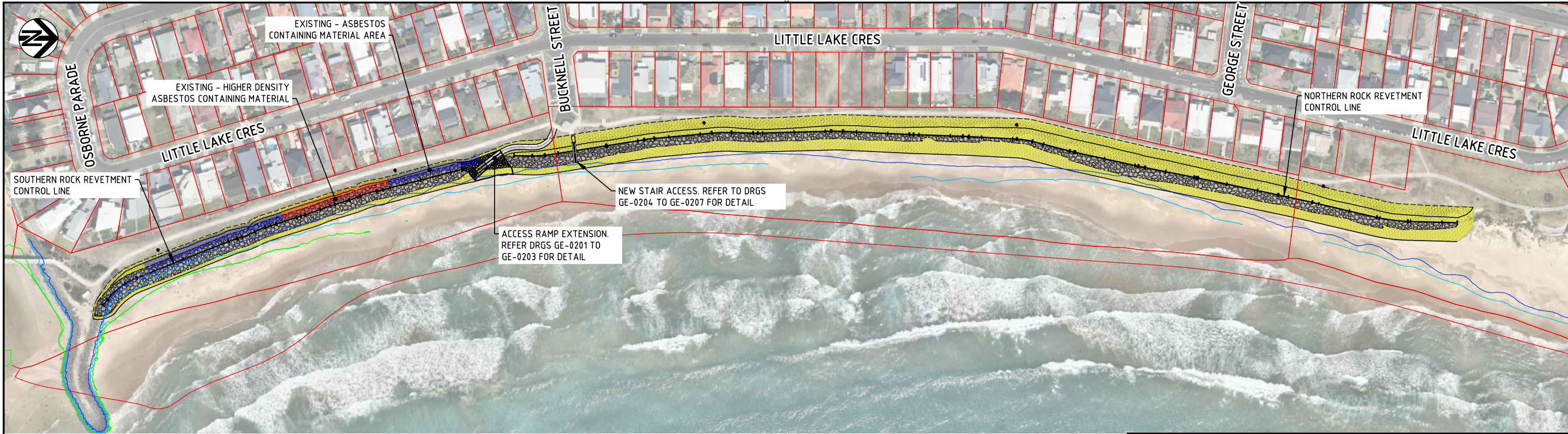


TYPICAL DETAIL - ISOLATION OF DISSIMILAR METALS AT BOLTED CONNECTIONS

ISSUED FOR TENDER

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						DESIGNER	A FOLAN
						DESIGN CHECK	S KNIGHT
						PROJECT MANAGER	A FOLAN
						PROJECT DIRECTOR	G BENDELL
REVISION IN PROGRESS							
SCALES AT A1 SIZE DRAWING				DESIGNER			
				 Member of the Surbana Jurong Group © ABN 47 065 475 149 LEVEL 2, 6-8 REGEND STREET WOLLONGONG, NSW, 2500 PH 02 4243 4400 SMEC PROJECT No 30032016			
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				SCALE N/A			
				PHASE REVIEW			
				PROJECT / DRAWING No. 30032016-GE-0003			
				REVISION 02			





SITE PLAN  
SCALE 1:1250

LEGEND:

- PROPOSED SIGNAGE
- CADASTRAL BOUNDARY
- CONTROL LINE
- ROCK REVETMENT
- EXPOSED FOOTPRINT
- SAND BACKFILL
- ACCESS RAMP
- HIGHER DENSITY ASBESTOS CONTAINING MATERIAL (ACM) REFER TO CLEARSafe ENVIRONMENTAL SOLUTIONS REPORT (2017)
- ACM IMPACTED AREA REFER TO CLEARSafe ENVIRONMENTAL SOLUTIONS REPORT (2017)

TIDE LEGEND

- HIGHEST ASTRONOMICAL TIDE 1.15m AHD (3.83m LAT)
- MEAN HIGH WATER SPRING 0.65m AHD (2.87m LAT)
- MEAN SEA LEVEL 0.00m AHD (1.83m LAT)

CONTROL LINE SETOUT TABLE - SOUTHERN ROCK REVETMENT							
TYPE	CHAINAGE	EASTING	NORTHING	LEVEL	BEARING	LENGTH	RADIUS
IP	0.000	304507.754	6173698.699	5.000	309°05'28.94"		
TC	4.627	304504.162	6173701.617	5.000	309°05'28.94"		
IP	16.223	304494.963	6173709.091	5.000		23.192	45.536
CT	27.819	304490.575	6173720.102	5.000	338°16'19.92"		
TC	91.154	304467.128	6173778.937	5.000	338°16'19.92"		
IP	94.054	304466.053	6173781.635	5.000		5.801	45.536
CC	96.954	304465.329	6173784.448	5.000	345°34'15.89"		
IP	102.998	304463.817	6173790.325	5.000		12.087	-54.464
CC	109.042	304461.049	6173795.725	5.000	332°51'19.71"		
IP	112.526	304459.456	6173798.831	5.000		6.968	45.536
CT	116.010	304458.355	6173802.144	5.000	341°37'22.76"		
TC	123.539	304455.982	6173809.290	5.000	341°37'22.76"		
IP	130.397	304453.820	6173815.798	5.000		13.715	495.536
CT	137.254	304451.838	6173822.363	5.000	343°12'31.51"		
TC	142.980	304450.184	6173827.845	5.000	343°12'31.51"		
IP	148.048	304448.719	6173832.701	5.000		10.136	-104.464
CC	153.116	304446.790	6173837.392	5.000	337°38'57.83"		
IP	158.071	304444.904	6173841.979	5.000		9.909	95.536
CT	163.025	304443.504	6173846.736	5.000	343°35'32.29"		
TC	172.864	304440.724	6173856.174	5.000	343°35'32.29"		
IP	176.422	304439.718	6173859.592	5.000		7.116	-54.464
CC	179.980	304438.275	6173862.849	5.000	336°06'23.55"		
IP	185.488	304436.033	6173867.910	5.000		11.015	45.536
CC	190.995	304435.069	6173873.360	5.000	349°57'58.20"		
IP	193.105	304434.701	6173875.438	5.000		4.220	-54.464
CT	195.215	304434.173	6173877.483	5.000	345°31'35.33"		
IP	247.384	304421.135	6173927.996	5.000	345°31'35.33"		

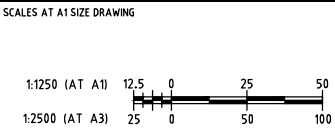
CONTROL LINE SETOUT TABLE - NORTHERN ROCK REVETMENT

TYPE	CHAINAGE	EASTING	NORTHING	LEVEL	BEARING	LENGTH	RADIUS
IP	0.000	304412.332	6173961.243	5.000	1°22'10.34"		
TC	11.623	304412.609	6173972.863	5.000	1°22'10.34"		
IP	15.729	304412.708	6173976.977	5.000		8.212	-50.000
CT	19.836	304412.132	6173981.052	5.000	351°57'32.32"		
IP	28.408	304410.933	6173989.540	5.000			
TC	59.518	304406.037	6174020.262	5.000	350°56'40.02"		
IP	59.520	304406.036	6174020.264	5.000		0.003	30.000
CT	59.521	304406.036	6174020.265	5.000	350°57'02.85"		
TC	84.112	304402.168	6174044.550	5.000	350°57'02.86"		
IP	87.363	304401.657	6174047.762	5.000		6.503	100.000
CT	90.615	304401.355	6174051.001	5.000	354°40'36.07"		
TC	127.502	304397.933	6174087.729	5.000	354°40'36.07"		
IP	133.778	304397.350	6174093.986	5.000		12.553	100.000
CT	140.054	304397.555	6174100.267	5.000	1°52'07.50"		
TC	153.965	304398.008	6174114.170	5.000	1°52'07.50"		
IP	155.460	304398.057	6174115.665	5.000		2.990	-50.000
CT	156.955	304398.016	6174117.160	5.000	358°26'31.98"		
TC	203.891	304396.740	6174164.079	5.000	358°26'31.98"		
IP	207.627	304396.639	6174167.815	5.000		7.471	100.000
CT	211.362	304396.816	6174171.548	5.000	2°43'21.28"		
TC	253.804	304398.832	6174213.942	5.000	2°43'21.28"		
IP	255.194	304398.898	6174215.330	5.000		2.780	-200.000
CT	256.584	304398.945	6174216.719	5.000	1°55'34.34"		
TC	288.092	304400.004	6174248.209	5.000	1°55'34.34"		
IP	290.017	304400.069	6174250.134	5.000		3.851	200.000
CT	291.943	304400.171	6174252.057	5.000	3°01'46.11"		
TC	322.718	304401.797	6174282.789	5.000	3°01'46.11"		
IP	327.690	304402.061	6174287.771	5.000		9.945	50.000
CT	332.663	304403.304	6174292.603	5.000	14°25'33.55"		
TC	357.353	304409.455	6174316.514	5.000	14°25'33.55"		
IP	359.162	304409.905	6174318.266	5.000		3.618	-100.000
CT	360.971	304410.292	6174320.033	5.000	12°21'11.16"		
TC	402.260	304419.126	6174360.366	5.000	12°21'11.16"		
IP	404.417	304419.587	6174362.474	5.000		4.315	-200.000
CT	406.575	304420.003	6174364.591	5.000	11°07'00.88"		
TC	438.655	304426.189	6174396.069	5.000	11°07'00.88"		
IP	439.892	304426.427	6174397.283	5.000		2.474	200.000
CT	441.129	304426.681	6174398.494	5.000	11°49'32.46"		
TC	493.472	304437.408	6174449.726	5.000	11°49'32.46"		
IP	504.655	304439.699	6174460.672	5.000		22.365	1000.000
CT	515.838	304442.235	6174471.564	5.000	13°06'25.68"		
TC	558.088	304451.817	6174512.713	5.000	13°06'25.68"		
IP	568.176	304454.112	6174522.573	5.000		20.177	-100.000
CT	578.265	304454.385	6174532.692	5.000	1°32'47.30"		
IP	609.841	304455.238	6174564.256	5.000	1°32'47.30"		

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	02	13.12.2021	ISSUED FOR TENDER	03	AF	DRAFTING CHECK	N PHILLIPS
						DESIGNER	A FOLAN
						DESIGN CHECK	S KNIGHT
						PROJECT MANAGER	A FOLAN
						PROJECT DIRECTOR	G BENDELL

REVISION IN PROGRESS



DESIGNER

 **SMEC**

Member of the Surlana Jurong Group

© ABN 47 065 475 149  
LEVEL 2, 6-8 REGEND STREET  
WOLLONGONG, NSW, 2500  
PH 02 4243 4400

SMEC PROJECT No 30032016

CHECK PRINT

PRELIM ☐ FINAL ☐

INITIAL DATE

DISCIPLINE

DISCIPLINE

DISCIPLINE

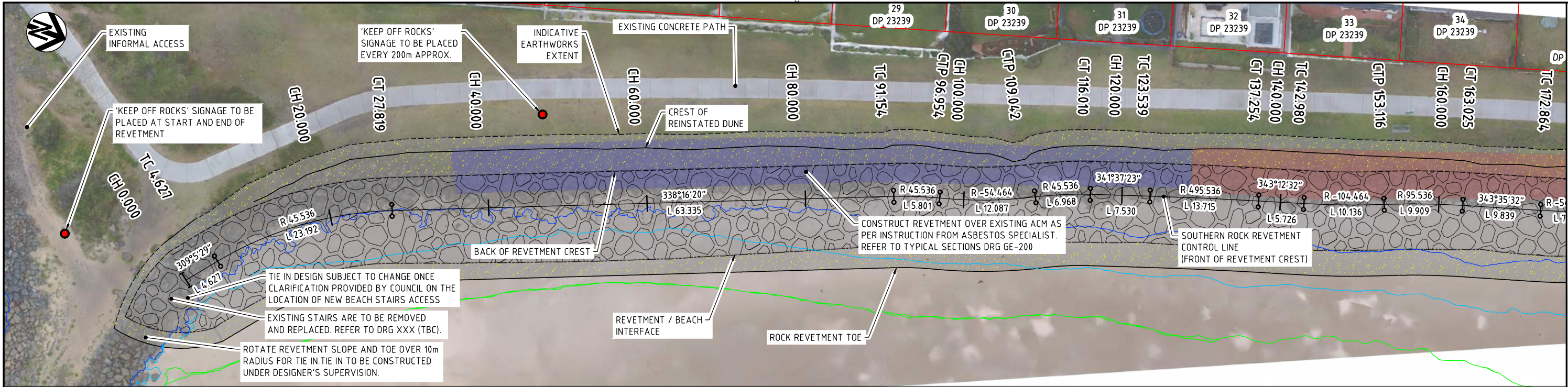
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BACKDRAFTED/CORRECTED

CONFIRMED

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WARILLA, NSW, 2528			
SITE PLAN			
SCALE	PHASE	PROJECT / DRAWING No.	REVISION
AS SHOWN	REVIEW	30032016-GE-0100	02

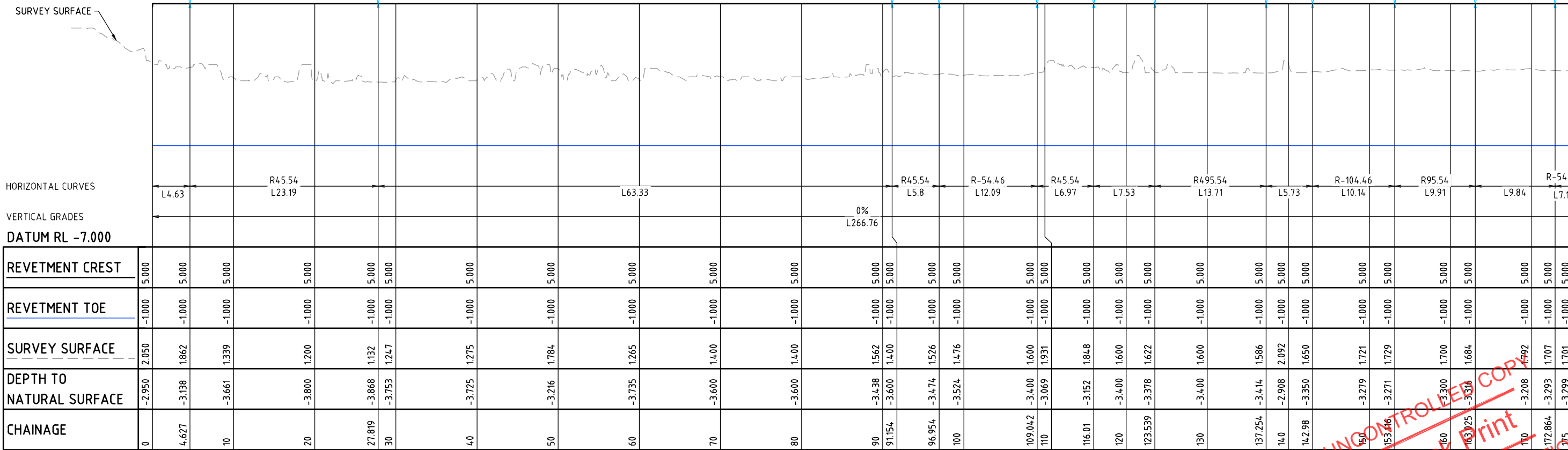




**NOTES**

- REFER TO DRG GE-0100 FOR LEGEND

**SOUTHERN ROCK REVETMENT  
GENERAL ARRANGEMENT PLAN**  
SCALE: 1:250

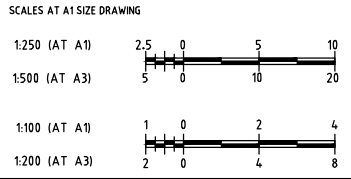


**SOUTHERN ROCK REVETMENT CONTROL LINE - LONGITUDINAL SECTION**  
A1 HORZ SCALE 1:250  
A1 VERT SCALE 1:100

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						DESIGNER	A FOLAN
						DESIGN CHECK	S KNIGHT
						PROJECT MANAGER	A FOLAN
						PROJECT DIRECTOR	G BENDELL

REVISION  
IN PROGRESS



DESIGNER

**SMEC**

Member of the Surlana Group

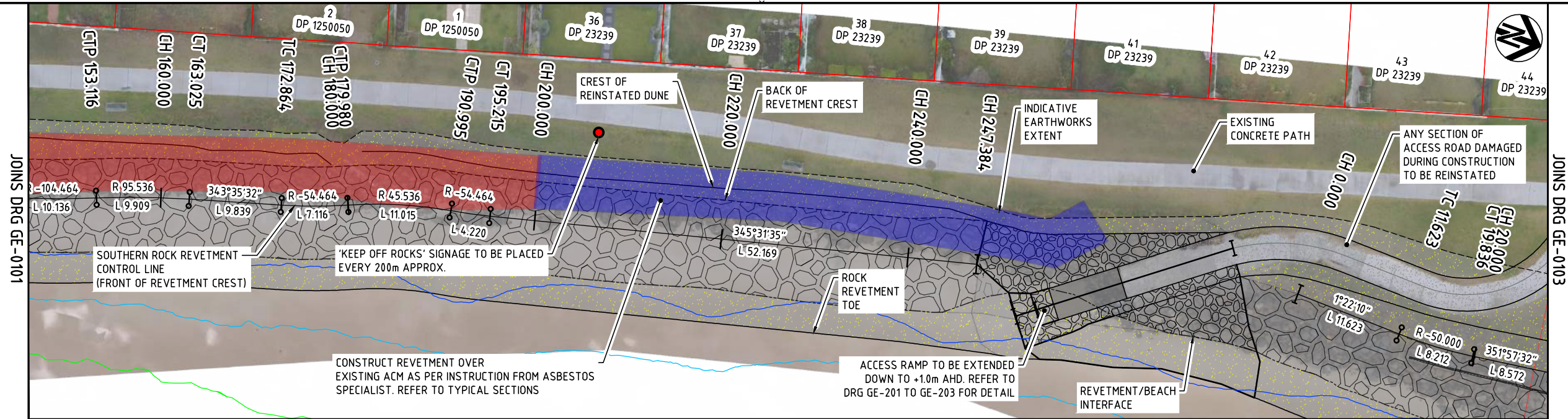
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WOLLONGONG, NSW, 2500  
PH 02 4243 4400  
SMEC PROJECT No 30032016

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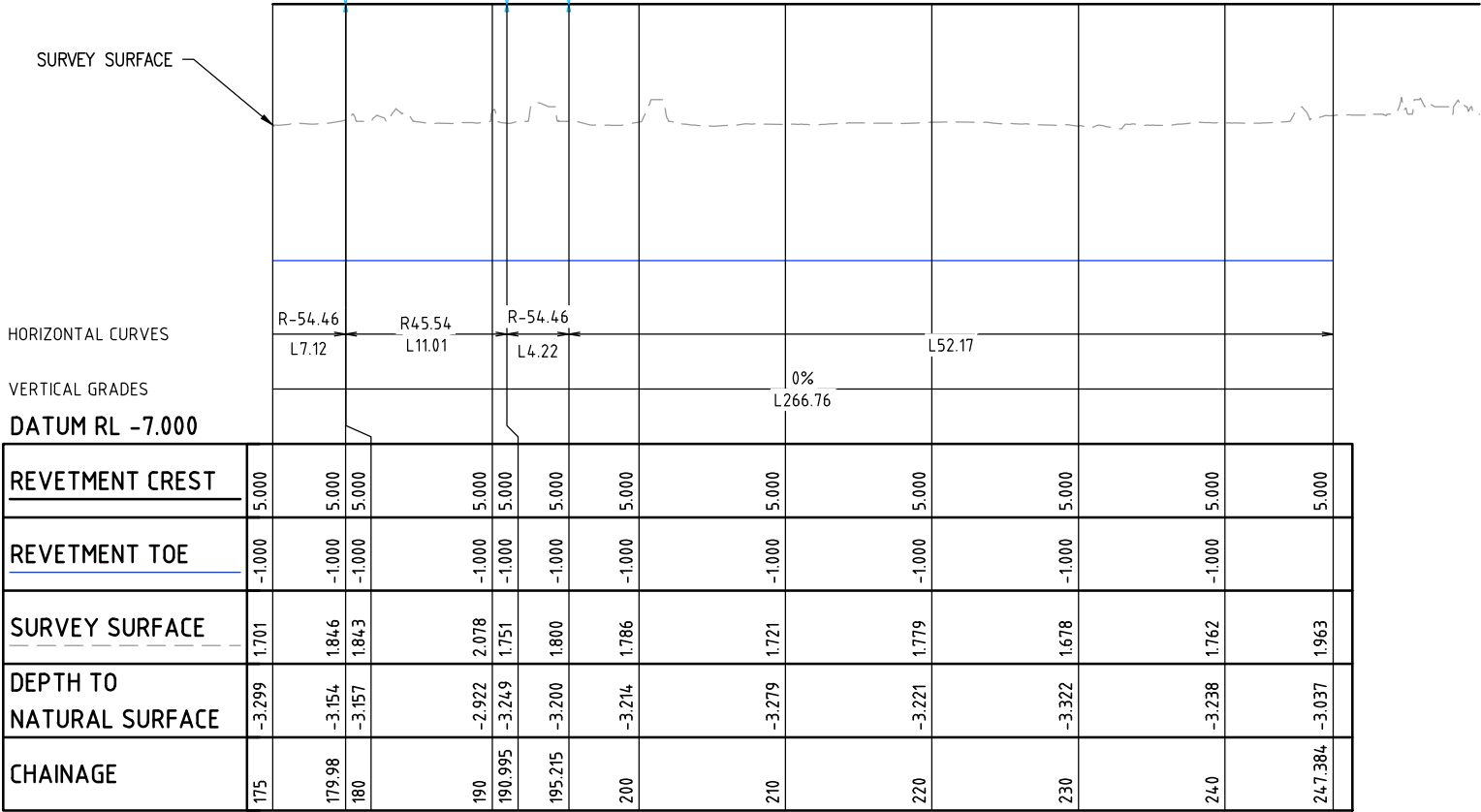
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SCALE	PHASE	PROJECT / DRAWING No.		REVISION	
AS SHOWN	REVIEW	30032016-GE-0101		02	





SOUTHERN ROCK REVETMENT  
GENERAL ARRANGEMENT PLAN  
SCALE: 1:250

NOTES  
• REFER TO DRG GE-0100 FOR LEGEND



SOUTHERN ROCK REVETMENT CONTROL LINE - LONGITUDINAL SECTION  
A1 HORZ SCALE 1:250  
A1 VERT SCALE 1:100

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				02	13.12.2021	ISSUED FOR TENDER

REVISION IN PROGRESS

DESIGNER	J FARGHER
DRAFTING CHECK	N PHILLIPS
DESIGNER	A FOLAN
DESIGN CHECK	S KNIGHT
PROJECT MANAGER	A FOLAN
PROJECT DIRECTOR	G BENDELL

SCALES AT A1 SIZE DRAWING

1:250 (AT A1)  
1:500 (AT A3)  
1:100 (AT A1)  
1:200 (AT A3)

2.5 0 5 10  
5 0 10 20  
1 0 2 4  
2 0 4 8

SMC  
Member of the Surbana Jurong Group  
© ABN 47 065 475 149  
LEVEL 2, 6-8 REGEND STREET  
WOLLONGONG, NSW, 2500  
PH 02 4243 4400  
SMC PROJECT No 30032016

CHECK PRINT  
PRELIM INITIAL DATE  
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BACKDRAFTED/CORRECTED  
CONFIRMED

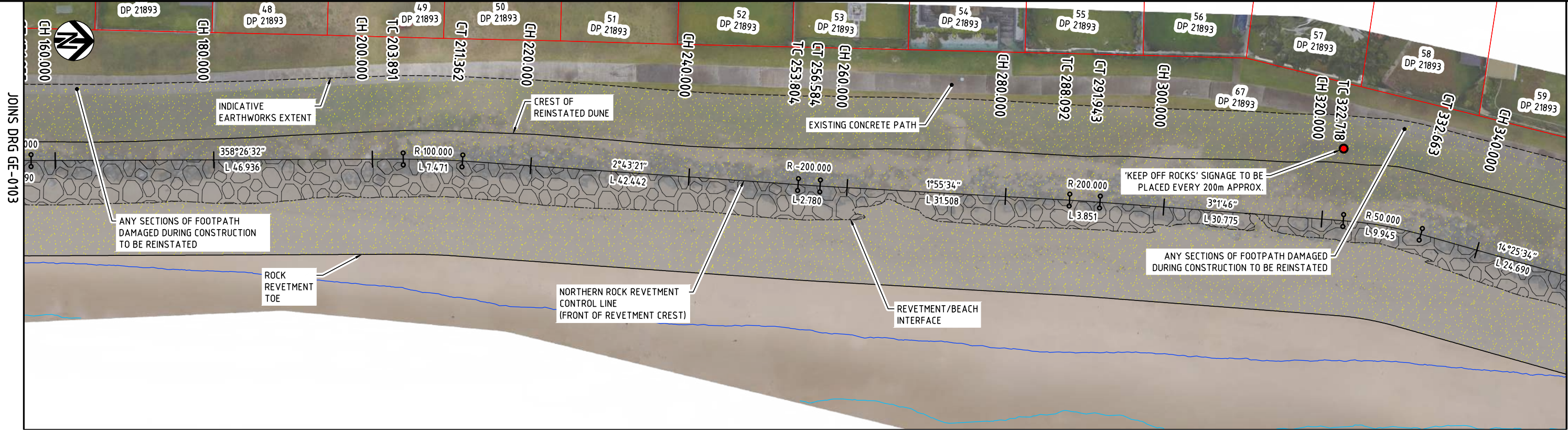
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WARILLA, NSW, 2528  
SOUTHERN ROCK REVETMENT  
GENERAL ARRANGEMENT PLAN  
SHEET 2 OF 6

SCALE AS SHOWN  
PHASE REVIEW  
PROJECT / DRAWING No. 30032016-GE-0102  
REVISION 02





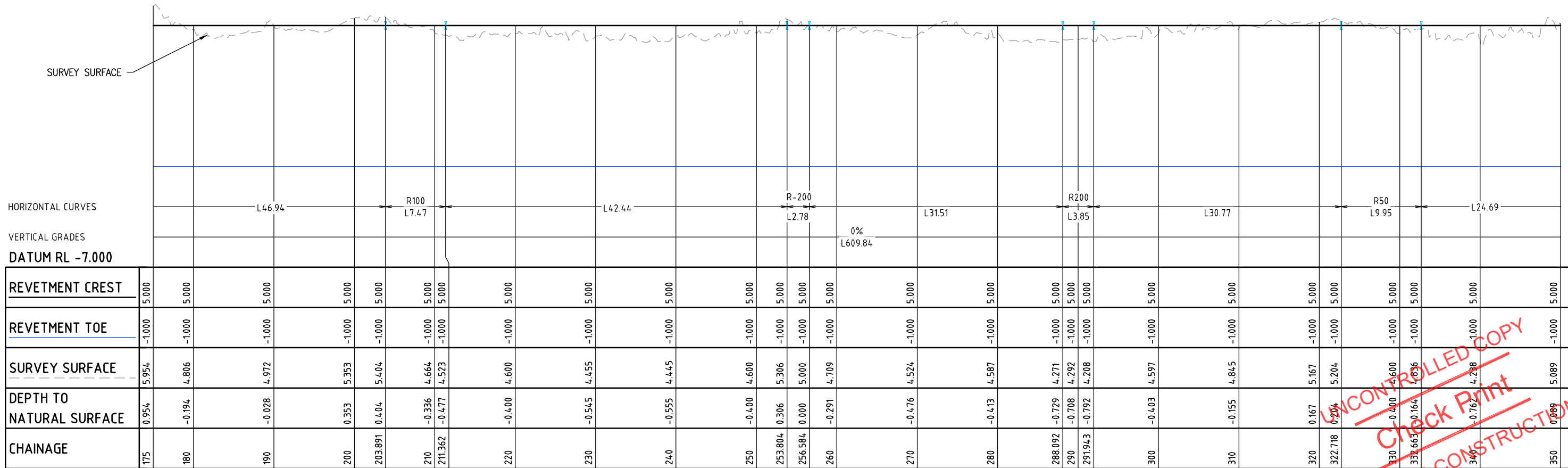




**NOTES**

- REFER TO DRG GE-0100 FOR LEGEND

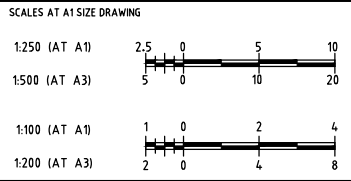
**NORTHERN ROCK REVETMENT  
GENERAL ARRANGEMENT PLAN**  
SCALE: 1:250



**NORTHERN ROCK REVETMENT CONTROL LINE - LONGITUDINAL SECTION**  
A1 HORZ SCALE 1:250  
A1 VERT SCALE 1:100

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				02			
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				AF			
				TITLE			
				DRAFTER		J FARGHER	
				DRAFTING CHECK		N PHILLIPS	
				DESIGNER		A FOLAN	
				DESIGN CHECK		S KNIGHT	
				PROJECT MANAGER		A FOLAN	
				PROJECT DIRECTOR		G BENDELL	

REVISION  
IN PROGRESS

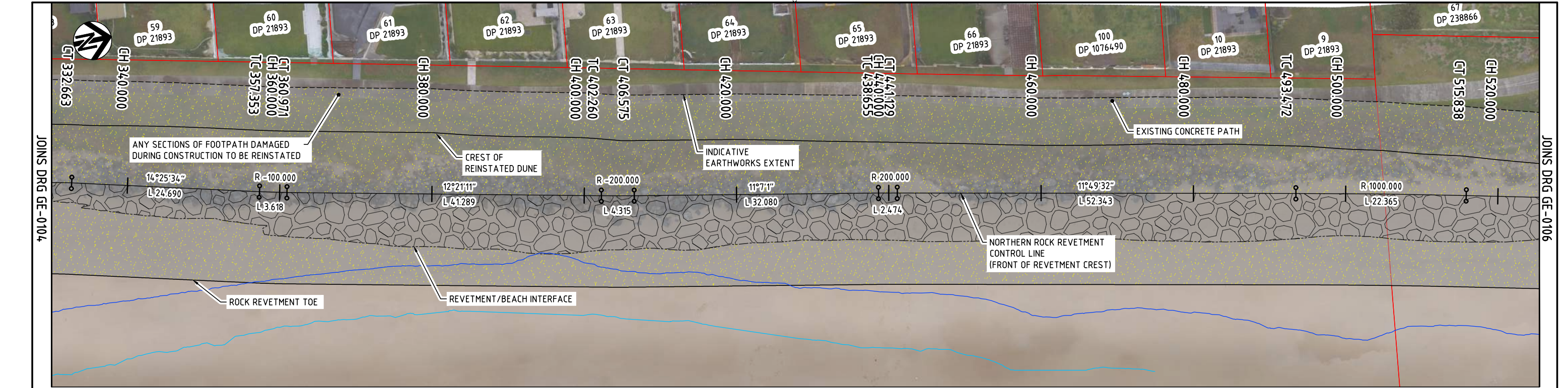


**ISSUED FOR TENDER**

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DISCIPLINE			
BACKDRAFTED/CORRECTED			
CONFIRMED			

PROJECT TITLE WARILLA BEACH - ROCK REVETMENT WARILLA, NSW, 2528 NORTHERN ROCK REVETMENT GENERAL ARRANGEMENT PLAN SHEET 4 OF 6			
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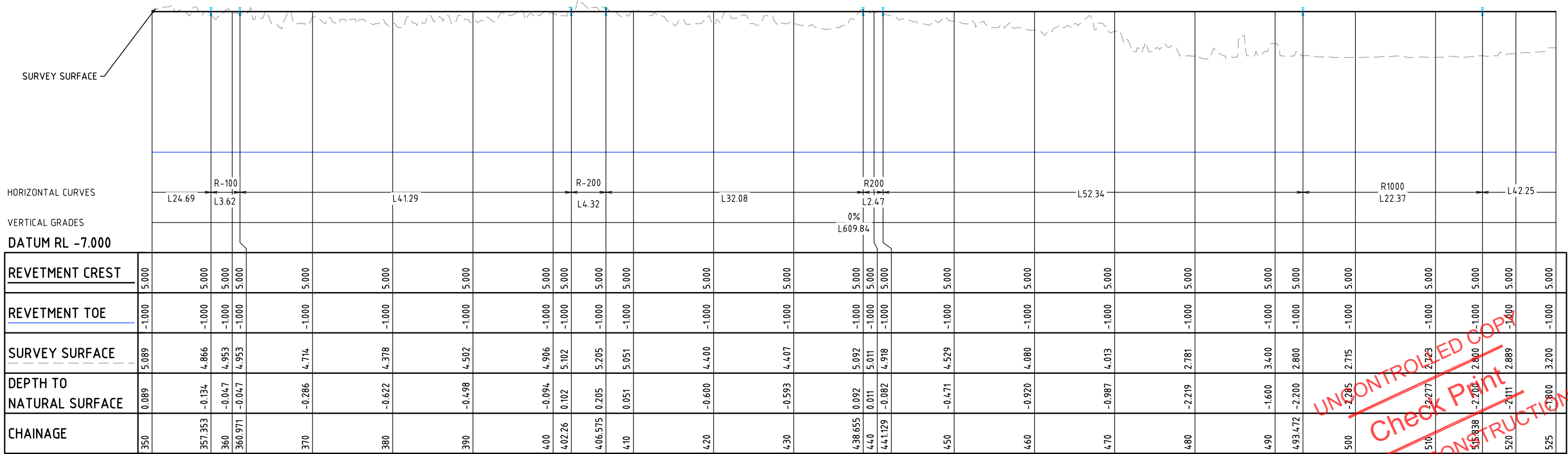




**NOTES**

- REFER TO DRG GE-0100 FOR LEGEND

**NORTHERN ROCK REVETMENT  
GENERAL ARRANGEMENT PLAN**  
SCALE: 1:250

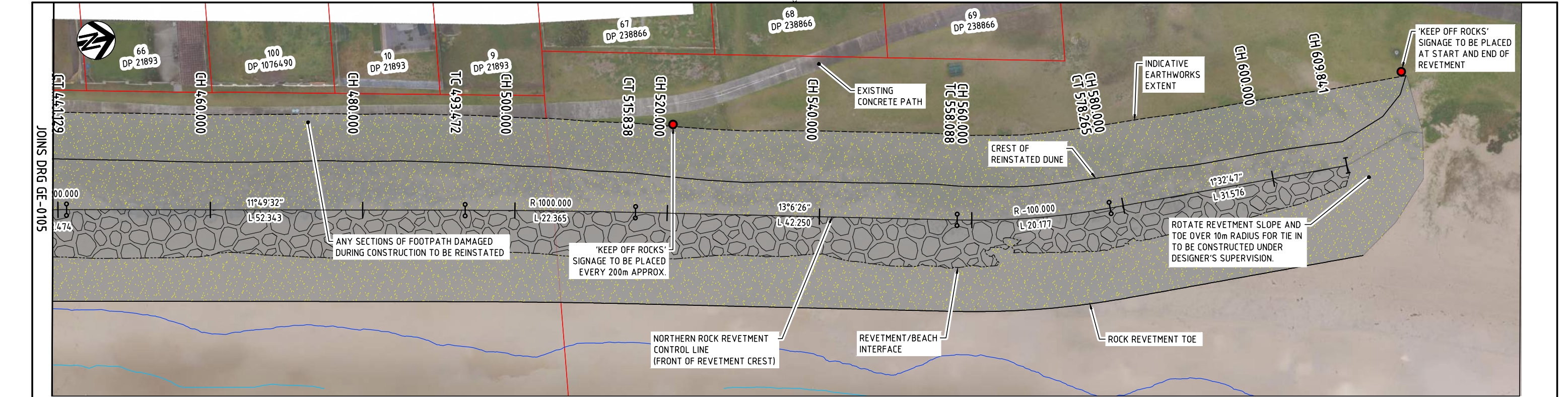


**NORTHERN ROCK REVETMENT CONTROL LINE - LONGITUDINAL SECTION**  
A1 HORZ SCALE 1:250  
A1 VERT SCALE 1:100

150 mm ON ORIGINAL

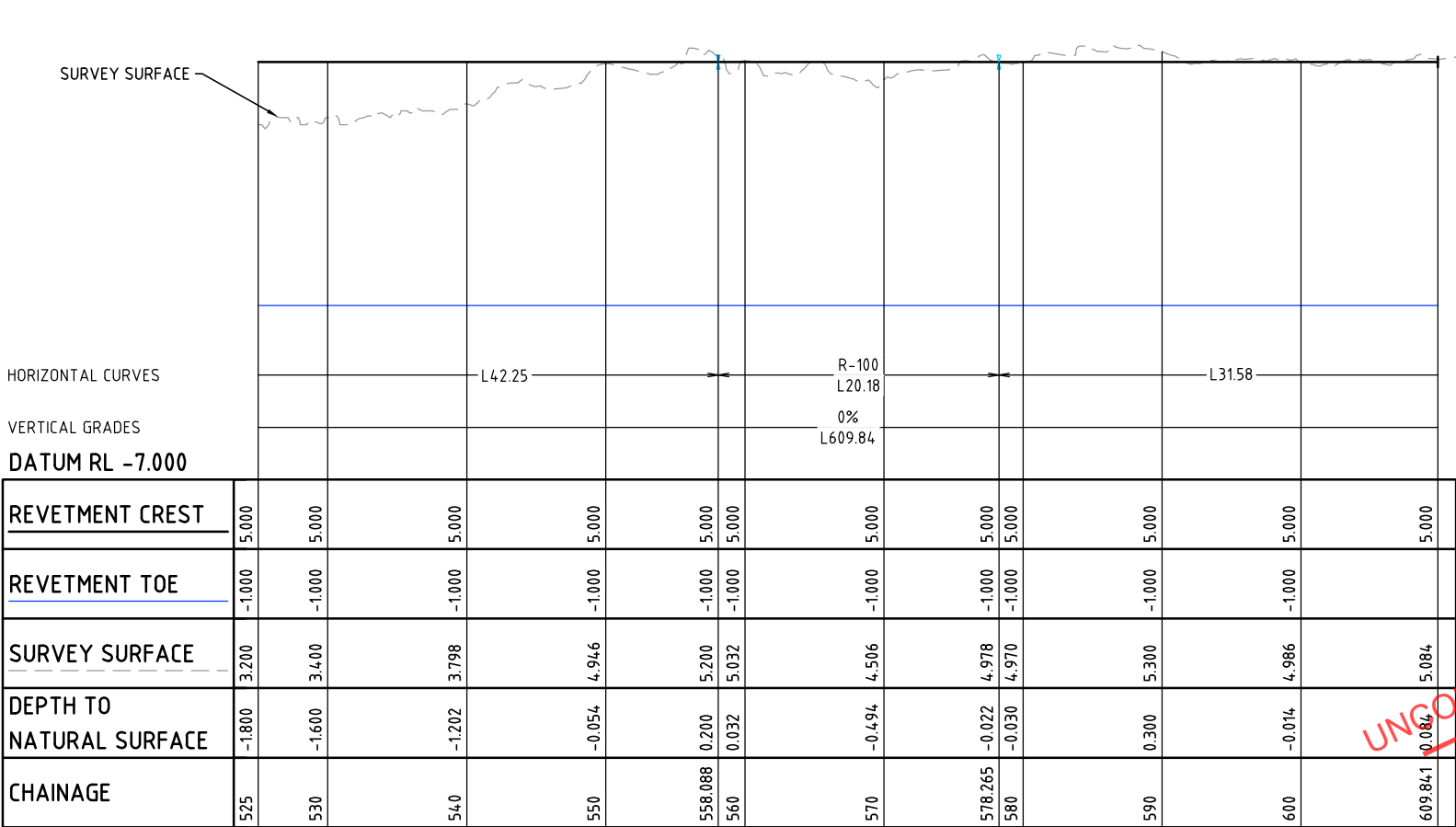
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	02	13.12.2021	ISSUED FOR TENDER						DRAFTING CHECK		
	REVISION IN PROGRESS			DESIGNER							
				DESIGN CHECK							
				PROJECT MANAGER							
								PROJECT DIRECTOR			





NORTHERN ROCK REVETMENT  
GENERAL ARRANGEMENT PLAN  
SCALE: 1:250

NOTES  
• REFER TO DRG GE-0100 FOR LEGEND



NORTHERN ROCK REVETMENT CONTROL LINE - LONGITUDINAL SECTION  
A1 HORZ SCALE 1:250  
A1 VERT SCALE 1:100

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150 mm ON ORIGINAL  
A1

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02

DATE  
05.11.2021  
13.12.2021

AMENDMENT / REVISION DESCRIPTION  
ISSUED FOR REVIEW  
ISSUED FOR TENDER

WVR No.  
02  
03

APPROVAL  
AF  
AF

TITLE  
DRAFTER  
DRAFTING CHECK  
DESIGNER  
DESIGN CHECK  
PROJECT MANAGER  
PROJECT DIRECTOR

NAME  
J FARGHER  
N PHILLIPS  
A FOLAN  
S KNIGHT  
A FOLAN  
G BENDELL

SCALES AT A1 SIZE DRAWING

1:250 (AT A1)  
1:500 (AT A3)  
1:100 (AT A1)  
1:200 (AT A3)

DESIGNER  
SMEC  
Member of the Surbana Jurong Group  
© ABN 47 065 475 149  
LEVEL 2, 6-8 REGEND STREET  
WOLLONGONG, NSW, 2500  
PH 02 4243 4400  
SMEC PROJECT No 30032016

CHECK PRINT

PRELIM  
INITIAL  
DATE

FINAL  
DATE

PROJECT TITLE  
WARILLA BEACH - ROCK REVETMENT  
WARILLA, NSW, 2528  
NORTHERN ROCK REVETMENT  
GENERAL ARRANGEMENT PLAN  
SHEET 6 OF 6

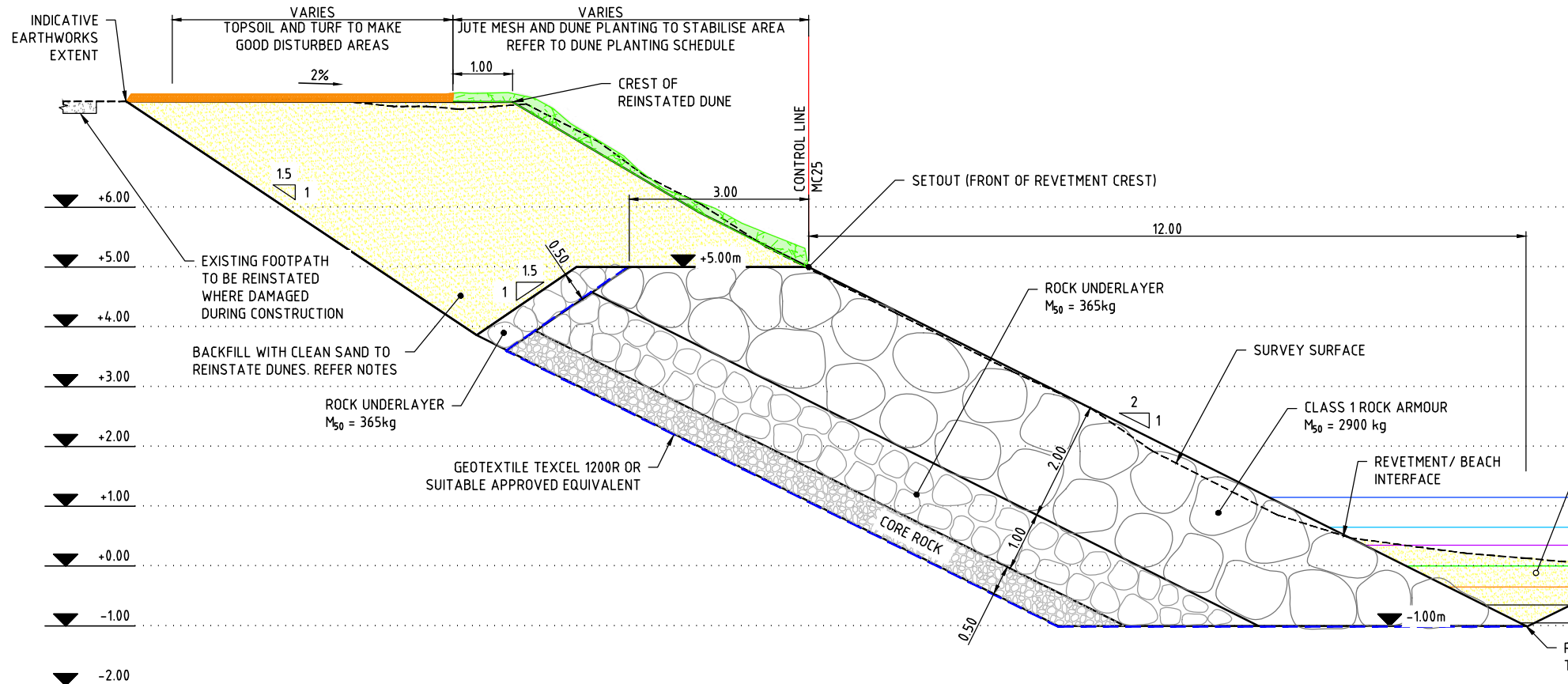
SCALE  
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PHASE  
REVIEW

PROJECT / DRAWING No.  
30032016-GE-0106

REVISION  
02

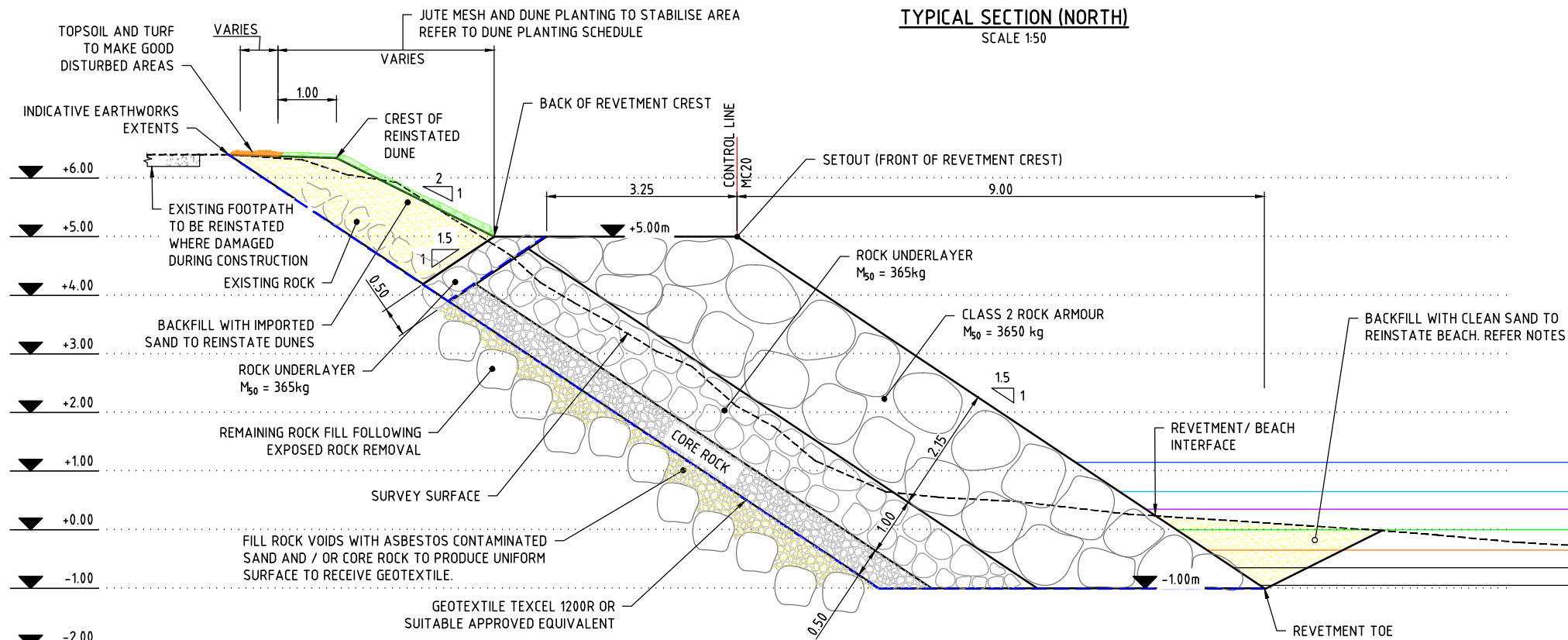
REVISION  
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DUNE PLANTING SCHEDULE							
CODE	BOTANIC NAME	COMMON NAME		INSTALL SIZE	DENSITY	MIX %	QTY
CAN ras	CANAVALLIA ROSEA	COASTAL JACK-BEAN	10cm (h)	TUBESTOCK	2/m <sup>2</sup>	15%	1,283
CAR gla	CARPOBROTUS GLAUCESCENS	PIGFACE	10cm (h)	TUBESTOCK	4/m <sup>2</sup>	15%	2,565
EIN has	EINADIA HASTATA	RED BERRY SALT BUSH	70cm (h)	TUBESTOCK	2/m <sup>2</sup>	10%	855
SPI ser	SPINIFEX SERICEUS	COAST SPINIFEX	20cm (h)	TUBESTOCK	4/m <sup>2</sup>	30%	5,130
THE aus	THEMEDA AUSTRALIS	KANGAROO GRASS	60cm (h)	TUBESTOCK	4/m <sup>2</sup>	30%	5,130
NOTE: PLANT SPECIES IN GROUPINGS OF 20-30 OF THE SAME SPECIES						TOTAL	14,963

+1.15m AHD (HAT)	▼
+0.65m AHD (MHWS)	▼
+0.35m AHD (MHWN)	▼
+0.00m AHD (MSL)	▼
-0.35m AHD (MLWN)	▼
-0.65m AHD (MLWS)	▼
-0.95m AHD (LAT)	▼

TYPICAL SECTION (NORTH)  
SCALE 1:50



TYPICAL SECTION (SOUTH)  
SCALE 1:50

#### CONSTRUCTION METHOD - SOUTHERN ROCK REVELMENT

- CONSTRUCTION METHOD SUBJECT TO ASBESTOS CONSULTANT REVIEW AND APPROVAL.
- REMOVE EXISTING EXPOSED ROCK WITH ROCK GRAB UNDER SUPERVISION AND DIRECTION OF ASBESTOS CONSULTANT.
- CONTROL LINE AND DESIGN SURFACE SUBJECT TO CHANGE. SUBJECT TO AMOUNT OF ROCK THAT CAN BE SAFELY REMOVED AS APPROVED BY ASBESTOS CONSULTANT.
- ANY ASBESTOS CONTAMINATED SAND DISTURBED DURING ROCK REMOVAL MUST BE PLACED OVER THE RESULTING FORMATION AND HYDRAULICALLY COMPACTED INTO THE UNDERLYING ROCK VOIDS PRIOR TO LAYING THE GEOTEXTILE.
- ANY REMAINING ROCK VOIDS WITHIN THE RESULTING FORMATION MUST BE FILLED WITH CORE ROCK TO PRODUCE A UNIFORM SURFACE TO RECEIVE GEOTEXTILE.
- CONSTRUCT REVELMENT.

#### DUNE AND BEACH REINSTATEMENT

- THE CONTRACTOR MUST REUSE ALL EXISTING DUNE AND BEACH SAND MATERIAL EXCAVATED ON SITE TO REINSTATE THE DUNE AND BEACH PROFILE FOLLOWING REVELMENT CONSTRUCTION. THE EXPOSED DUNE ABOVE +4.0m MUST BE BACKFILLED WITH IMPORTED SAND ONLY AND HAVE A MINIMUM THICKNESS OF 0.5m.
- EXCAVATED SAND MUST BE SIEVED TO REMOVE ALL LARGER ROCK AND DEBRIS UP TO 20mm PRIOR TO BE BEING INCORPORATED INTO DUNE AND BEACH REINSTATEMENT WORKS.
- ROCK FROM DEMOLITION OF THE EXISTING ROCK REVELMENT THAT IS UNSUITABLE FOR INCORPORATION INTO THE REVELMENT MAY BE INCORPORATED INTO THE DUNE REINSTATEMENT WORKS. ANY ROCK INCORPORATED INTO THE DUNE REINSTATEMENT WORKS MUST BE COVERED WITH A MINIMUM OF 500mm SAND.
- SAND MUST BE HYDRAULICALLY COMPACTED INTO THE ROCK REVELMENT TO FILL THE ROCK VOIDS UNDER THE REINSTATEMENT DUNE AND BEACH PROFILE.
- ANY AREAS WHERE SAND HAS BEEN CONTAMINATED WITH ROCK OR DEBRIS MUST BE SIEVED TO REMOVE ALL LARGER ROCK AND DEBRIS UP TO 20mm TO A DEPTH OF AT LEAST 1m.

+1.15m AHD (HAT)	▼
+0.65m AHD (MHWS)	▼
+0.35m AHD (MHWN)	▼
+0.00m AHD (MSL)	▼
-0.35m AHD (MLWN)	▼
-0.65m AHD (MLWS)	▼
-0.95m AHD (LAT)	▼

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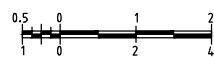
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						DESIGNER	A FOLAN
						DESIGN CHECK	S KNIGHT
						PROJECT MANAGER	A FOLAN
						PROJECT DIRECTOR	G BENDELL


REVISION  
IN PROGRESS

SCALES AT A1 SIZE DRAWING

1:50 (AT A1)  
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DESIGNER

**SMEC**

Member of the Surlana Jurong Group

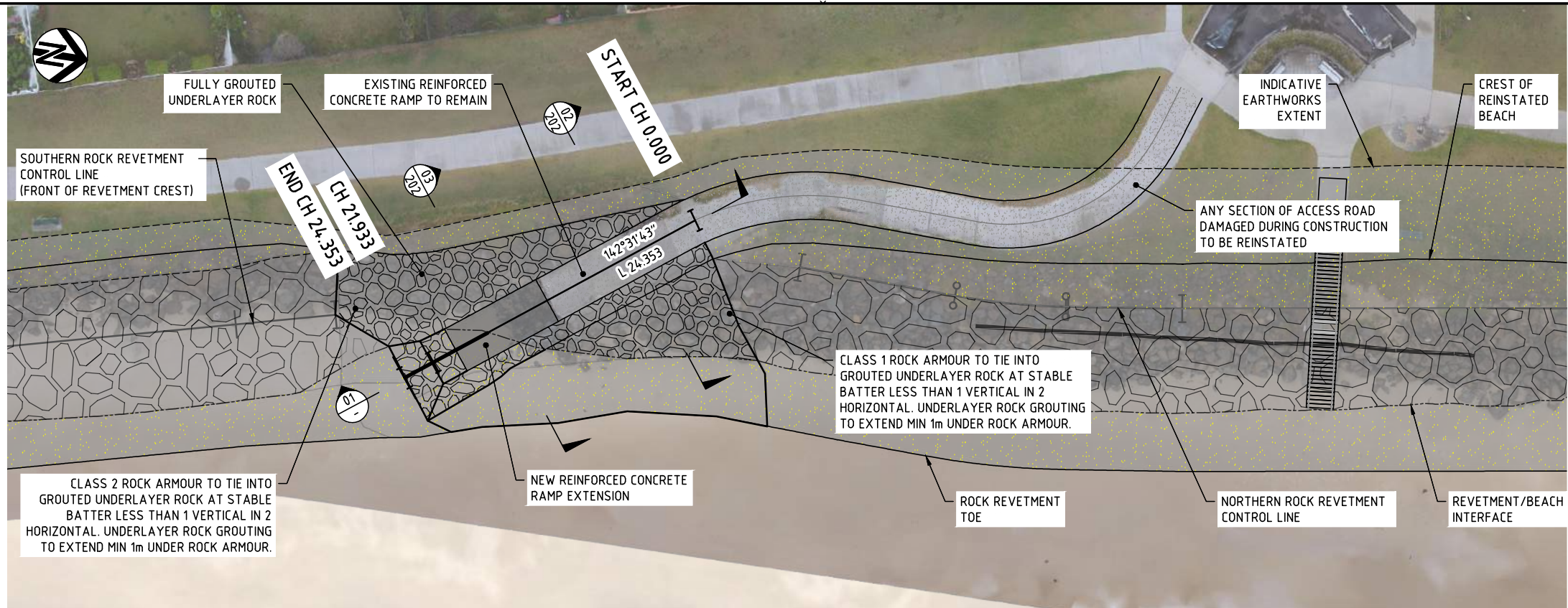
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LEVEL 2, 6-8 REGEND STREET  
WOLLONGONG, NSW, 2500  
PH 02 4243 4400

SMEC PROJECT No 30032016

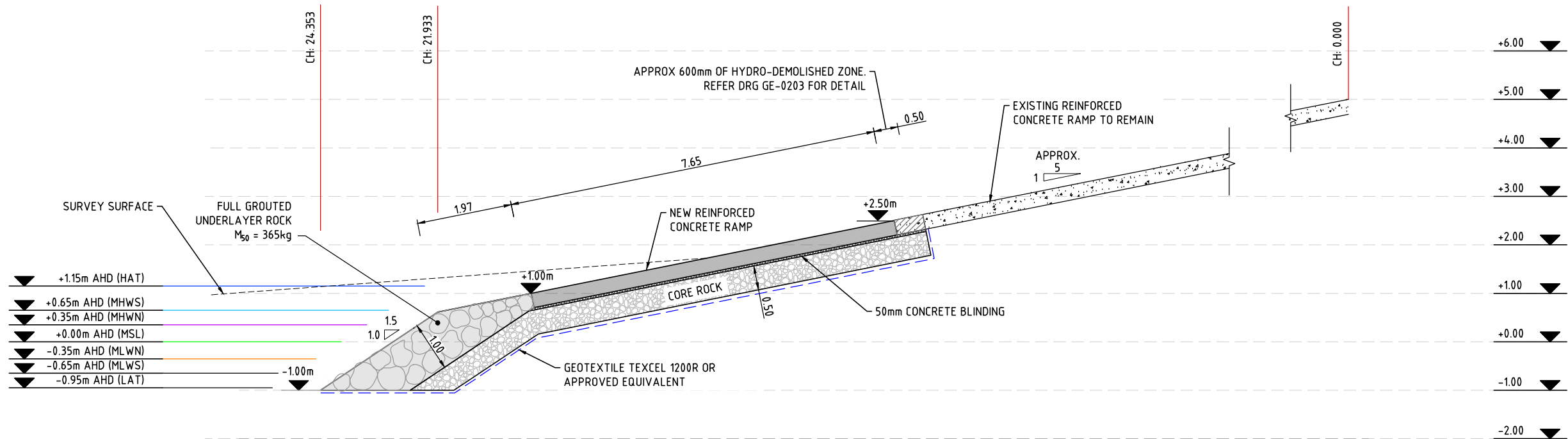
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CONFIRMED					

PROJECT TITLE				WARILLA BEACH - ROCK REVELMENT WARILLA, NSW, 2528 ROCK REVELMENT TYPICAL CROSS SECTIONS			
SCALE	PHASE	PROJECT / DRAWING No.	REVISION				
AS SHOWN	REVIEW	30032016-GE-0200	02				





ACCESS RAMP - CIVIL PLAN  
SCALE 1:200



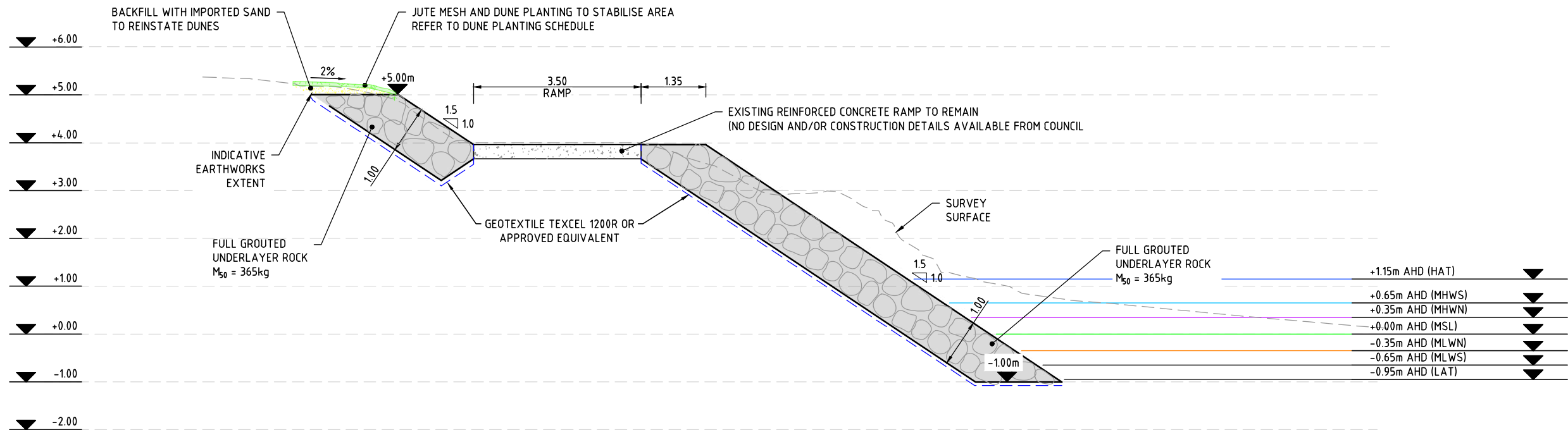
SECTION 01  
SCALE 1:50

CONTROL LINE SETOUT TABLE - ACCESS RAMP					
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IP	21.933	304423.458	6173935.665	0.613	142°31'43.25"
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UNCONTROLLED COPY  
Check Print  
NOT FOR CONSTRUCTION

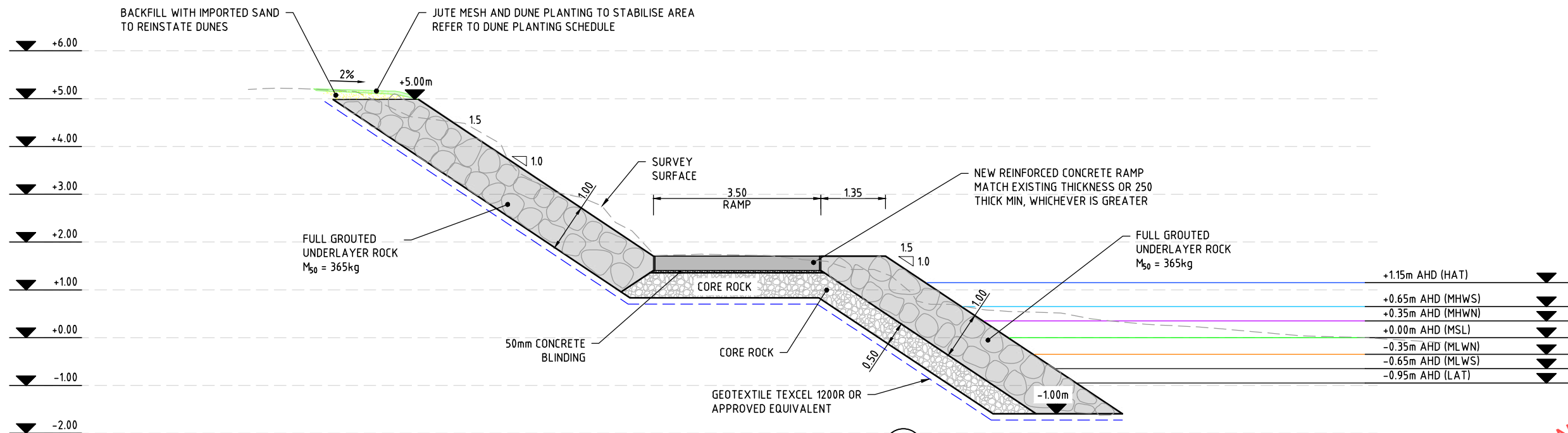
ISSUED FOR TENDER

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			02	13.12.2021	ISSUED FOR TENDER	03
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			APPROVAL	TITLE	NAME	
			AF	DRAFTER	H MORROW	
			AF	DRAFTING CHECK	N PHILLIPS	
				DESIGNER	A FOLAN	
				DESIGN CHECK	S KNIGHT	
				PROJECT MANAGER	A FOLAN	
				PROJECT DIRECTOR	G BENDELL	
			SCALES AT A1 SIZE DRAWING			
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			1:100 (AT A3) 1 2 4			
			1:200 (AT A1) 2 4 6 8			
			1:400 (AT A3) 4 8 12 16			
			DESIGNER			
			SMEC			
			Member of the Surbana Jurong Group			
			© ABN 47 065 475 149			
			LEVEL 2, 6-8 REGEND STREET			
			WOLLONGONG, NSW, 2500			
			PH 02 4243 4400			
			SMEC PROJECT No 30032016			
			CHECK PRINT			
			PRELIM INITIAL DATE			
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			BACKDRAFTED/CORRECTED			
			CONFIRMED			
			PROJECT TITLE			
			WARILLA BEACH - ROCK REVETMENT			
			WARILLA, NSW, 2528			
			ACCESS RAMP			
			CIVIL PLAN & LONGITUDINAL SECTION			
			SCALE	PHASE	PROJECT / DRAWING No.	REVISION
			AS SHOWN	REVIEW	30032016-GE-0201	02



TYPICAL SECTION - EXISTING ACCESS RAMP

02  
0201



TYPICAL SECTION - ACCESS RAMP EXTENSION

03  
0201

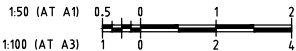
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ISSUED FOR TENDER

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V:\_Vault\Projects\30032016\CAD\DWG\01_GE_General\30032016-GE-0202.dwg				15 Dec 2021		09:04:24	
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	02	13.12.2021	ISSUED FOR TENDER			DRAFTING CHECK	N PHILLIPS
						DESIGNER	A FOLAN
						DESIGN CHECK	S KNIGHT
						PROJECT MANAGER	A FOLAN
						PROJECT DIRECTOR	G BENDELL

REVISION  
IN PROGRESS

SCALES AT A1 SIZE DRAWING



DESIGNER

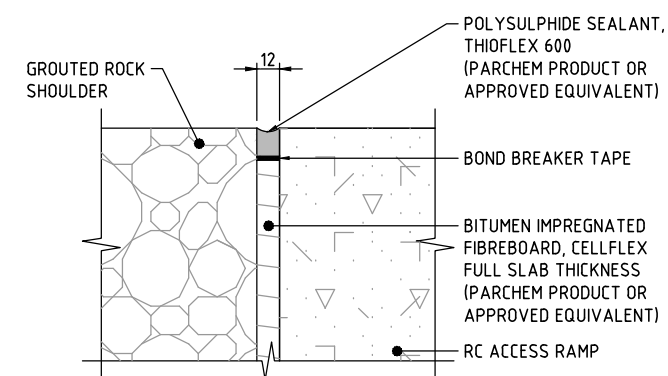


CHECK PRINT

DISCIPLINE	PRELIM	FINAL
DISCIPLINE	INITIAL	DATE
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BACKDRAFTED/CORRECTED		
CONFIRMED		

PROJECT TITLE			
WARILLA BEACH - ROCK REVETMENT WARILLA, NSW, 2528 ACCESS RAMP CROSS SECTIONS			
SCALE	PHASE	PROJECT / DRAWING No.	REVISION
AS SHOWN	REVIEW	30032016-GE-0202	02



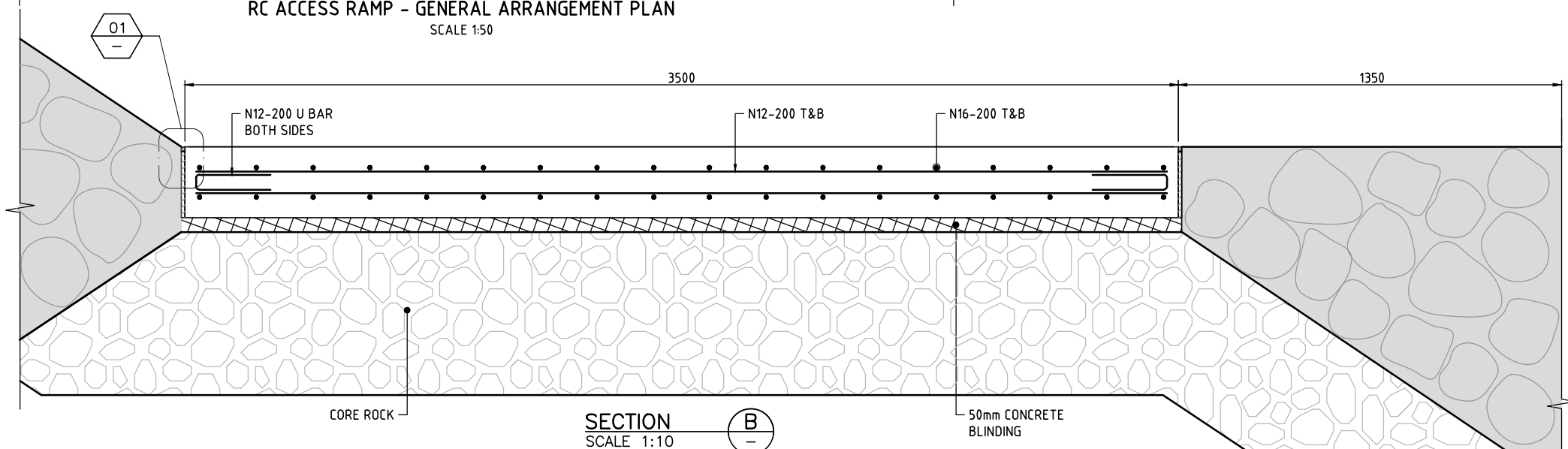


DETAIL

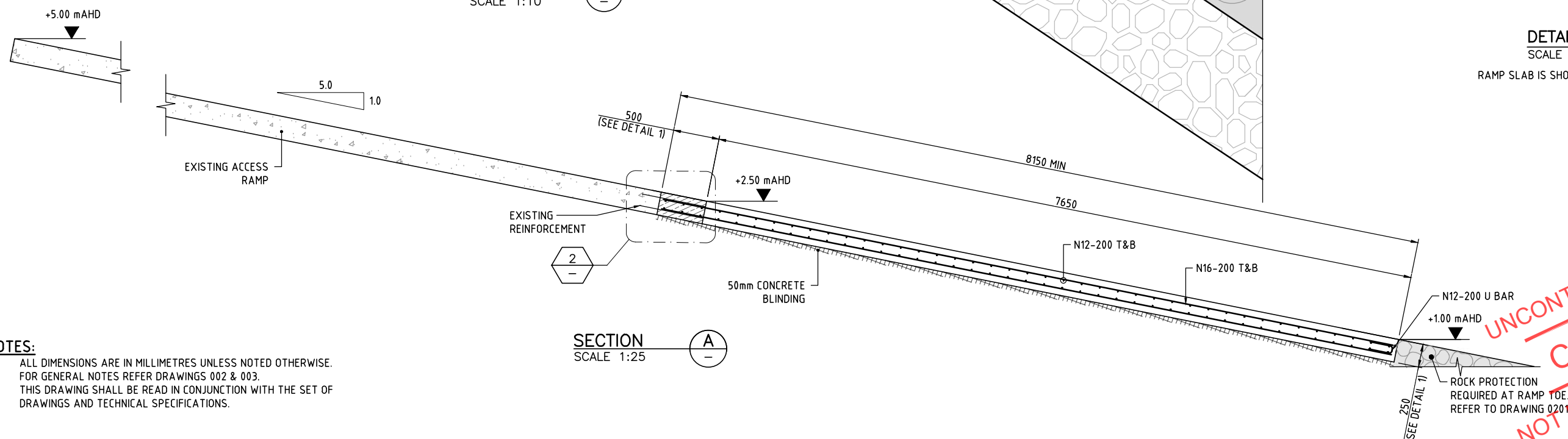
SCALE 1:2

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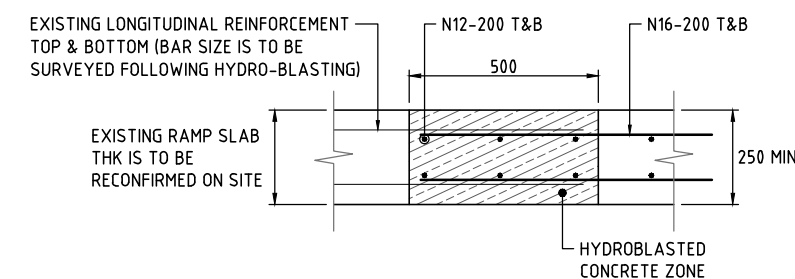
SECTION B  
SCALE 1:10 —




SECTION A  
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SCALE 1:25

**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. FOR GENERAL NOTES REFER DRAWINGS 002 & 003.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE SET OF DRAWINGS AND TECHNICAL SPECIFICATIONS.



DETAIL   
SCALE 1:10

RAMP SLAB IS SHOWN HORIZONTAL FOR CLARITY

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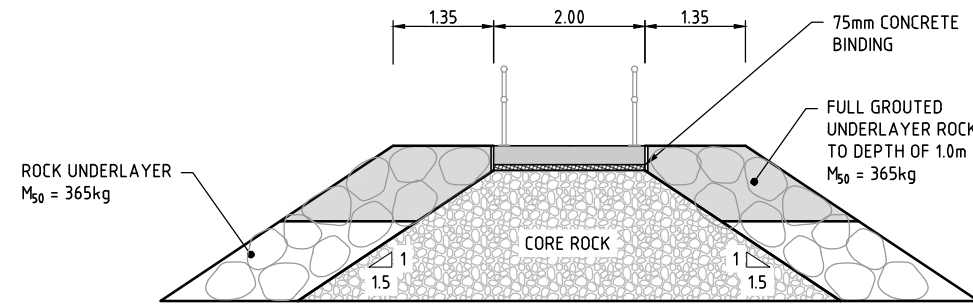
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REQUIRED AT RAMP TOE.  
REFER TO DRAWING 0201

## ISSUED FOR TENDER

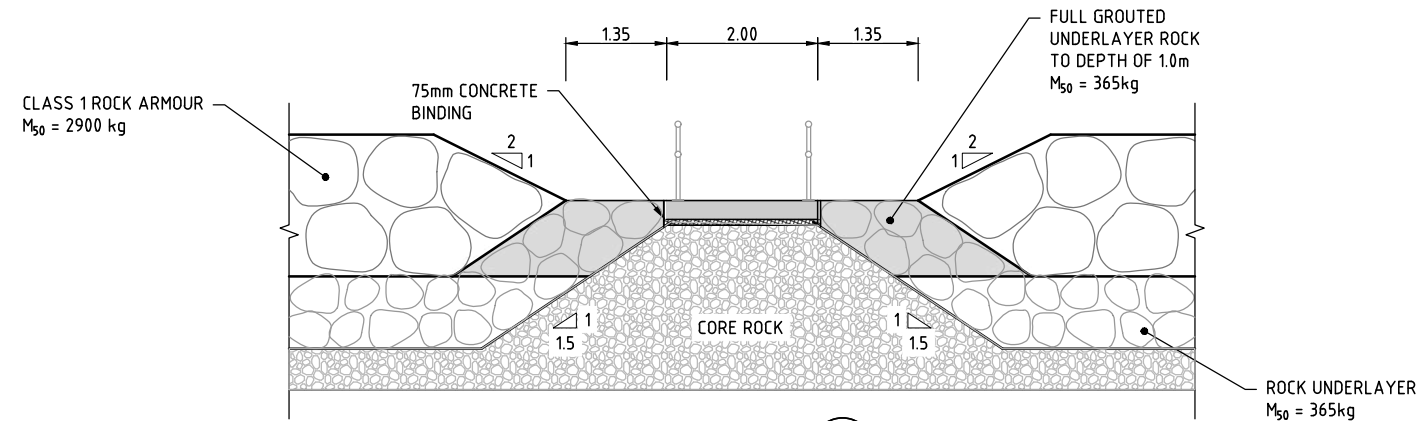
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							AF	DRAFTER	J BARRERRA																			
							AF	DRAFTING CHECK	N PHILLIPS																			
						DESIGNER	R HEGARTY																					
						DESIGN CHECK	S HASHEMI																					
						PROJECT MANAGER	A FOLAN																					
						PROJECT DIRECTOR	G BENDELL																					
				SCALES AT A1 SIZE DRAWING																								
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				1:100 (AT A3) 1 0 2 4																								
				DESIGNER																								
				 <b>SMEC</b> Member of the Surbana Jurong Group © ASB 47 065 475 149 LEVEL 2, 6-8 REGEND STREET WOLLONGONG, NSW. 2500 PH 02 4243 4400 SMEC PROJECT No 30032016																								
				<div><div>CHECK PRINT</div><div>PRELIM <input type="checkbox"/> FINAL <input type="checkbox"/> INITIAL DATE</div><table><tr><td>DISCIPLINE</td><td></td><td></td></tr><tr><td>DISCIPLINE</td><td></td><td></td></tr><tr><td>DISCIPLINE</td><td></td><td></td></tr><tr><td>DISCIPLINE</td><td></td><td></td></tr><tr><td>DISCIPLINE</td><td></td><td></td></tr><tr><td>BACKDRAFTED/CORRECTED</td><td></td><td></td></tr><tr><td>CONFIRMED</td><td></td><td></td></tr></table></div>				DISCIPLINE			DISCIPLINE			DISCIPLINE			DISCIPLINE			DISCIPLINE			BACKDRAFTED/CORRECTED			CONFIRMED		
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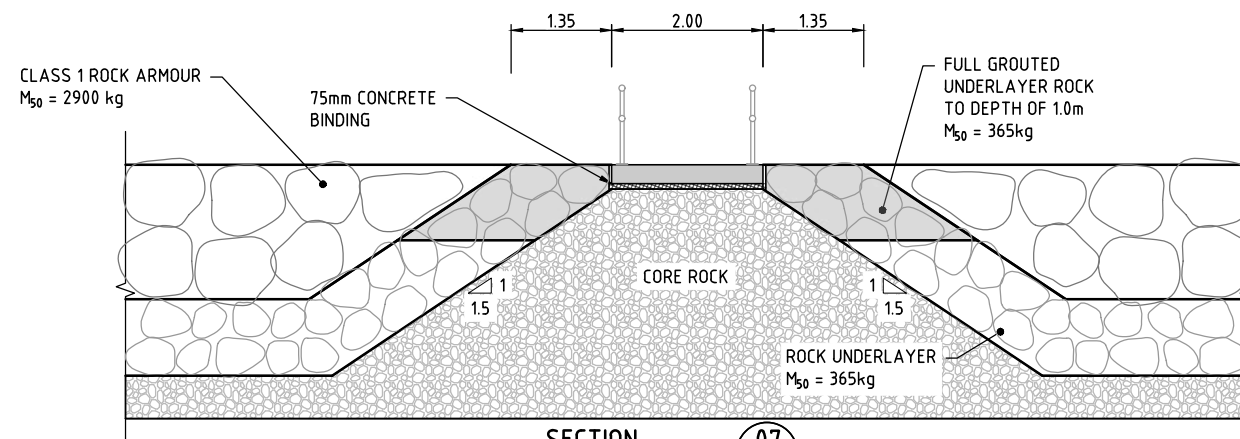




SECTION 05  
SCALE 1:50  
204



SECTION 06  
SCALE 1:50  
204



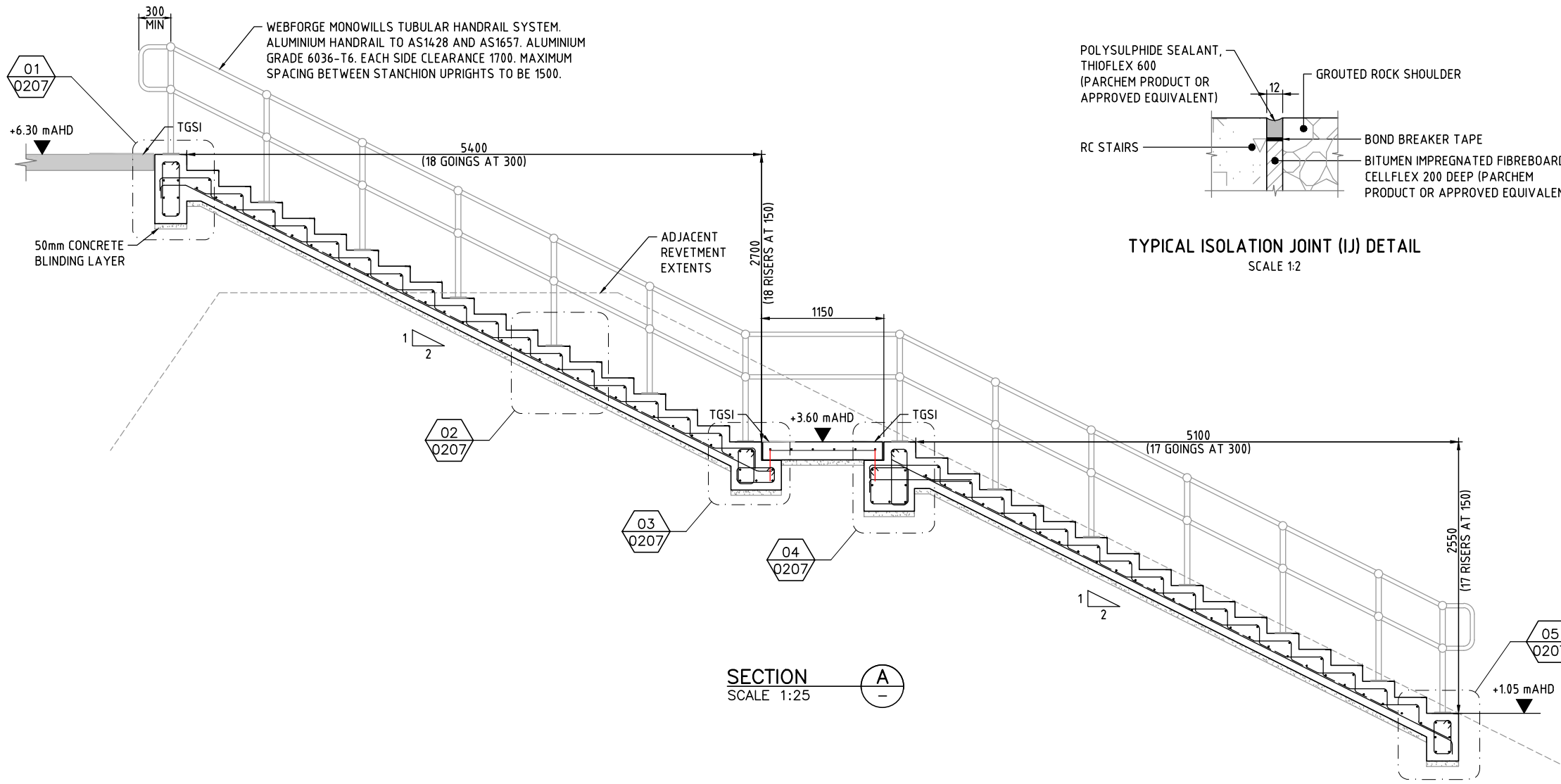
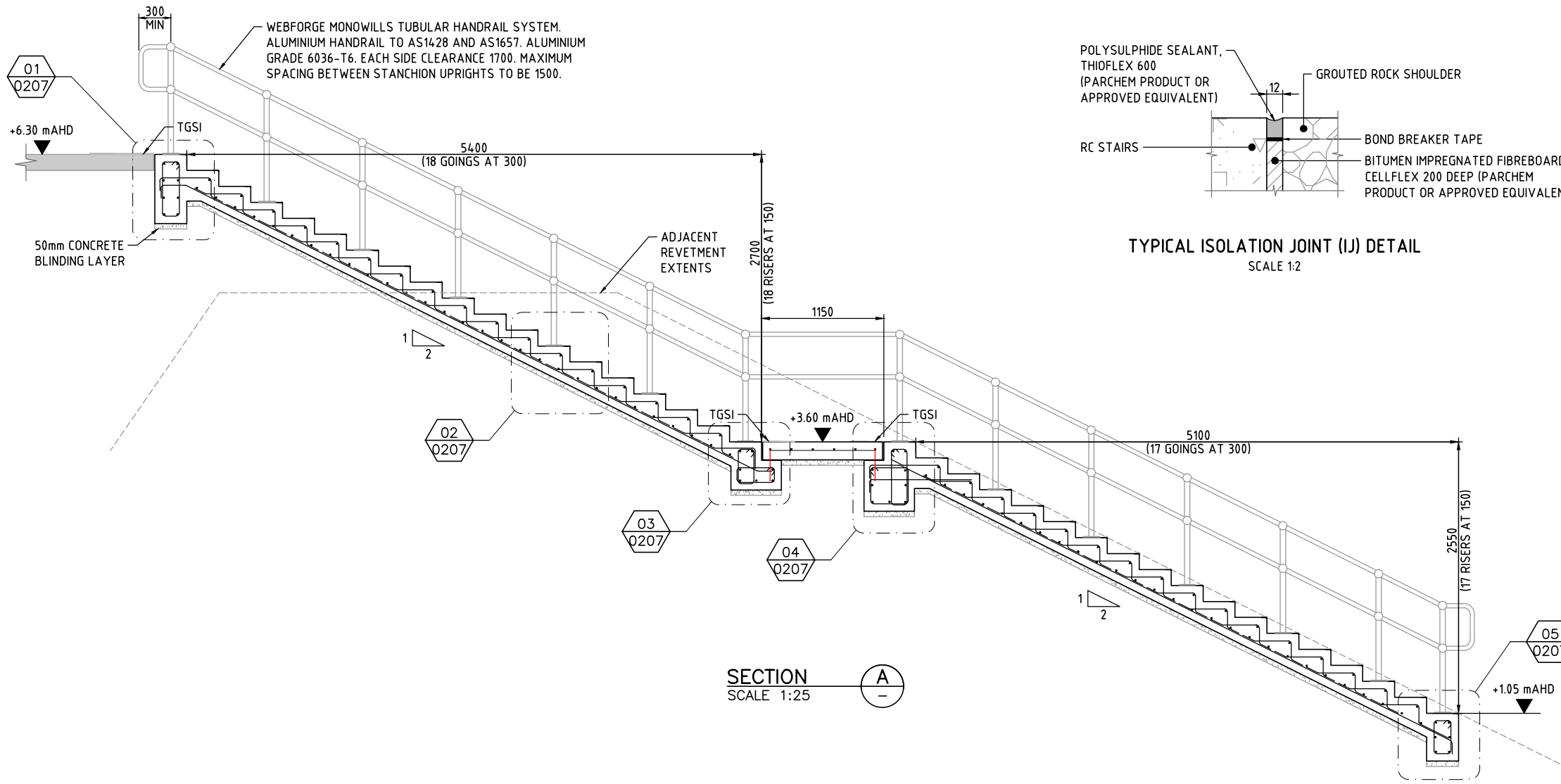
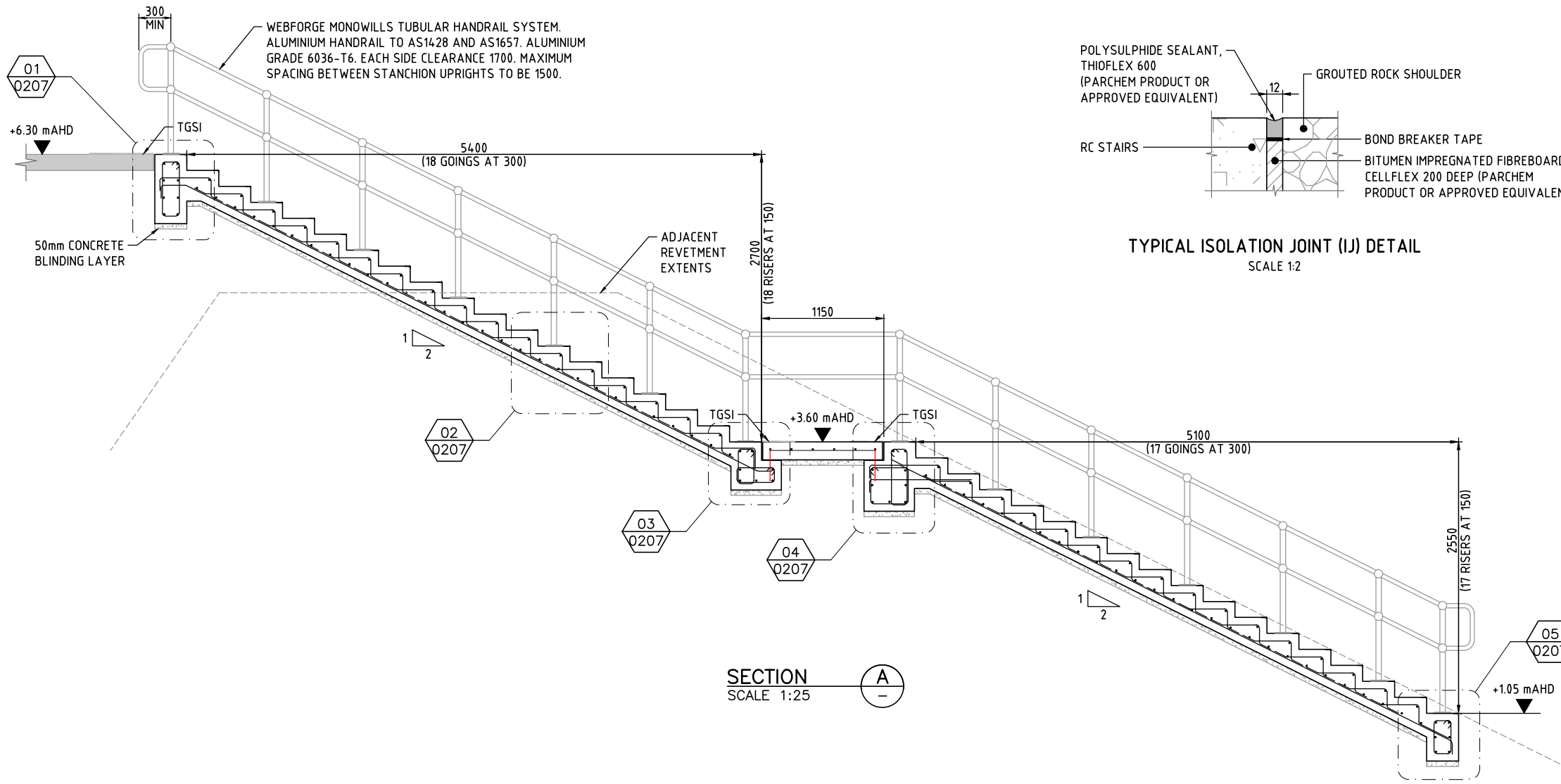
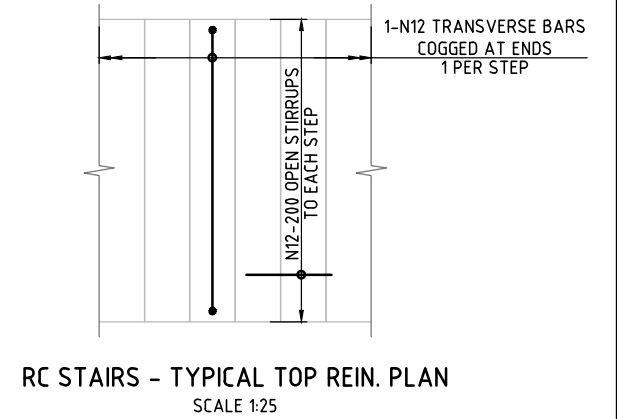
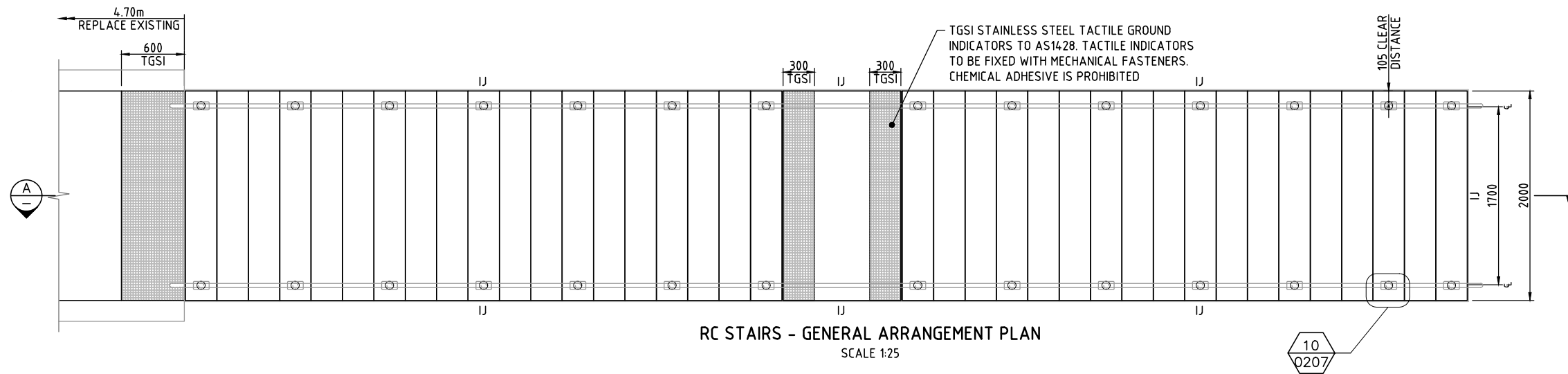
SECTION 07  
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204

- NOTES:
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
  - FOR GENERAL NOTES REFER DRAWINGS 002 & 003.
  - THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE SET OF DRAWINGS AND TECHNICAL SPECIFICATIONS.

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						DESIGNER	A FOLAN
						DESIGN CHECK	S KNIGHT
						PROJECT MANAGER	A FOLAN
						PROJECT DIRECTOR	G BENDELL
SCALES AT A1 SIZE DRAWING 1:50 (AT A1) 1:100 (AT A3)				DESIGNER SMEC Member of the Surbana Jurong Group © ABN 47 065 475 149 LEVEL 2, 6-8 REGEND STREET WOLLONGONG, NSW, 2500 PH 02 4243 4400 SMEC PROJECT No 30032016			
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PROJECT TITLE WARILLA BEACH - ROCK REVETMENT WARILLA, NSW, 2528 STAIRCASE CIVIL CROSS SECTIONS				SCALE AS SHOWN			
				PHASE REVIEW			
PROJECT / DRAWING No. 30032016-GE-0205				REVISION 02			



RC STAIRS - TYPICAL TOP REIN. PLAN  
SCALE 1:25

RC STAIRS - TYPICAL BOTTOM REIN. PLAN  
SCALE 1:25

TYPICAL ISOLATION JOINT (IJ) DETAIL  
SCALE 1:2

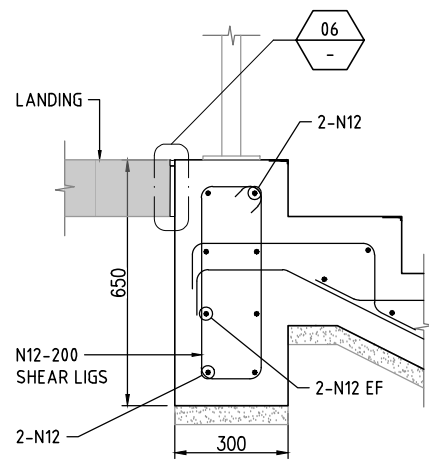
SECTION  
SCALE 1:25

- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
  2. FOR GENERAL NOTES REFER DRAWINGS 002 & 003.
  3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE SET OF DRAWINGS AND TECHNICAL SPECIFICATIONS.

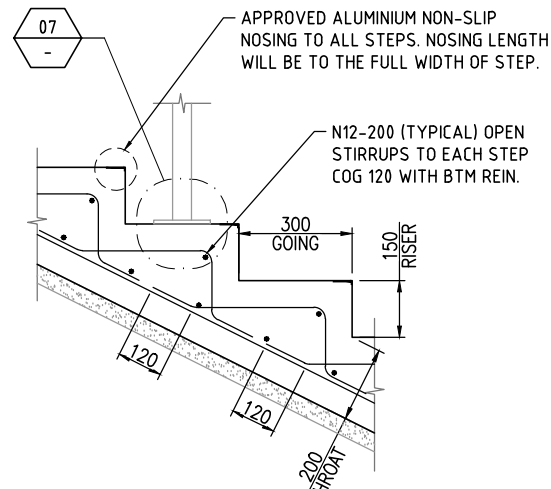
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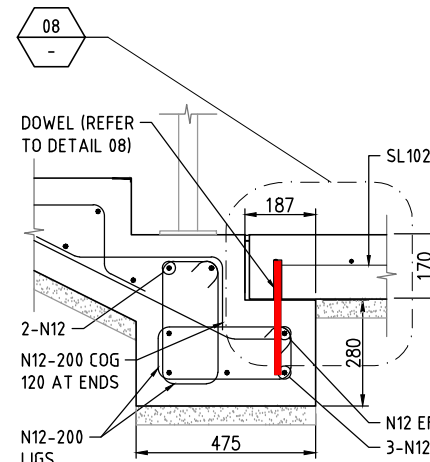
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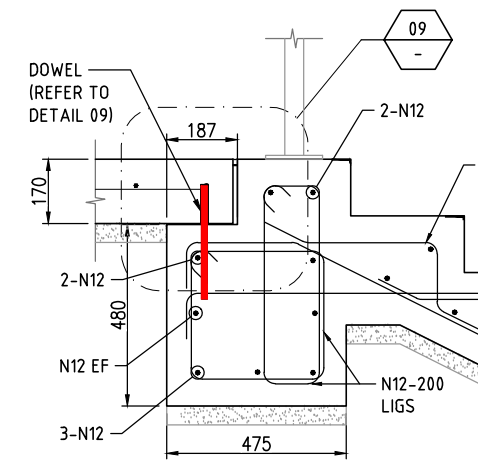
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0206



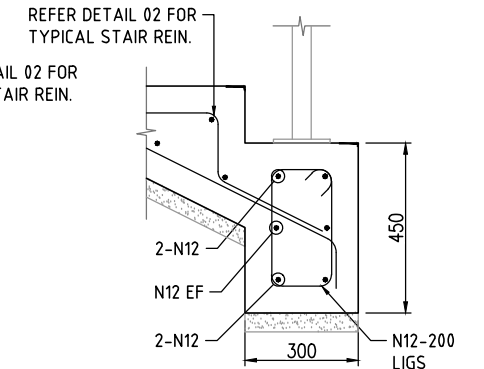
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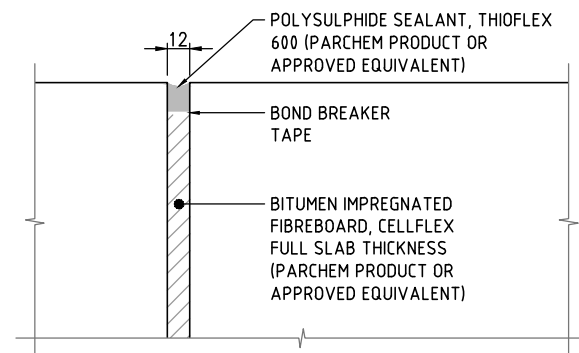
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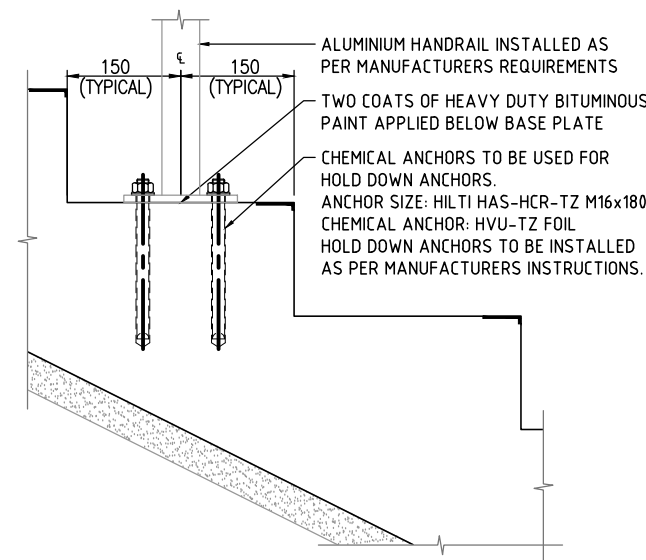
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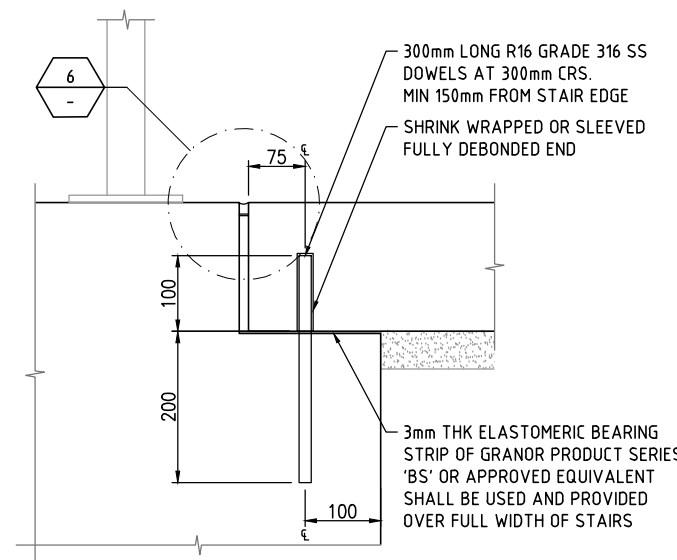
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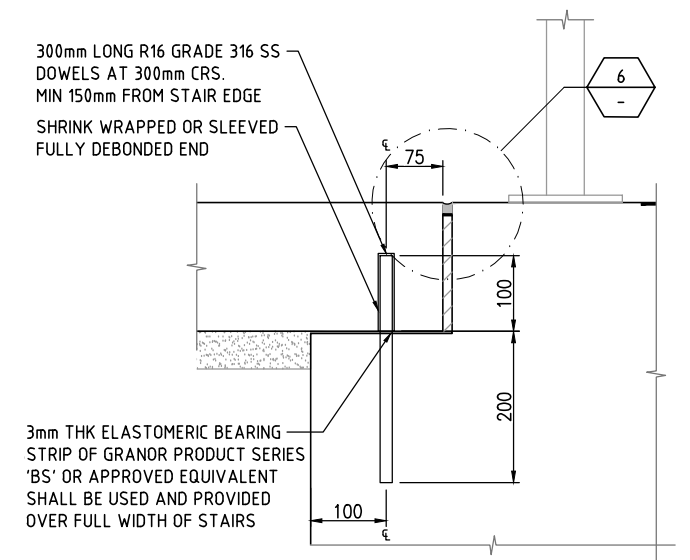
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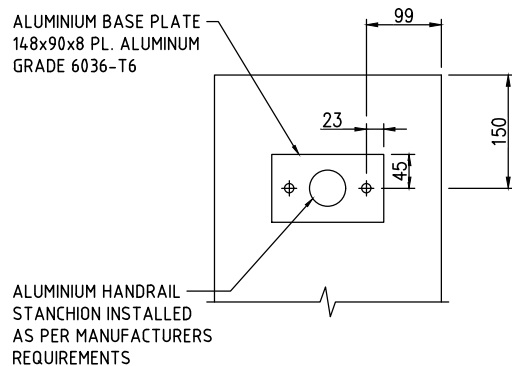
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SCALE 1:5  
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DETAIL 08  
SCALE 1:5  
-



DETAIL 09  
SCALE 1:5  
-



DETAIL 10  
SCALE 1:5  
0206

- NOTES:**
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
  - FOR GENERAL NOTES REFER DRAWINGS 002 & 003.
  - THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE SET OF DRAWINGS AND TECHNICAL SPECIFICATIONS.

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	02	13.12.2021	ISSUED FOR TENDER	03	AF	DRAFTING CHECK	N PHILLIPS
						DESIGNER	R HEGARTY
						DESIGN CHECK	S HASHEMI
						PROJECT MANAGER	A FOLAN
						PROJECT DIRECTOR	G BENDELL

**REVISION IN PROGRESS**

SCALES AT A1 SIZE DRAWING	0.1	0.2	0.3	0.4	0.5
1:10 (AT A1)	0.1	0.2	0.3	0.4	0.5
1:20 (AT A3)	0.2	0.4	0.6	0.8	1.0
1:5 (AT A1)	0.05	0.10	0.20		
1:10 (AT A3)	0.1	0.20	0.40		
1:1 (AT A1)	0.01	0.01	0.02	0.03	0.04
1:2 (AT A3)	0.02	0.04	0.06	0.08	0.1

DESIGNER **SMEC**  
Member of the Surbana Jurong Group  
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LEVEL 2, 6-8 REGEND STREET  
WOLLONGONG, NSW, 2500  
PH 02 4243 4400  
SMEC PROJECT No 30032016

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DISCIPLINE			
DISCIPLINE			
DISCIPLINE			
BACKDRAFTED/CORRECTED			
CONFIRMED			

PROJECT TITLE WARILLA BEACH - ROCK REVETMENT WARILLA, NSW, 2528 STAIRCASE SECTIONS & DETAILS			
SCALE AS SHOWN	PHASE REVIEW	PROJECT / DRAWING No. 30032016-GE-0207	REVISION 02



TOP OF WALL SETOUT  
X = 304490.575  
Y = 6173720.102  
Z = 5.000  
DATUM RL -2.000

REVTMENT	6.477	4.191	5.000	5.000	5.000	-1.000	0.150
NATURAL SURFACE	6.477	4.625	4.200	3.279	1.132	0.336	0.150
OFFSET	-8.794	-5.365	-4.151	-3.250	0.000	9.000	11.299

CHAINAGE 27.819

TOP OF WALL SETOUT  
X = 304504.162  
Y = 6173701.617  
Z = 5.000  
DATUM RL -2.000

REVTMENT	4.600	4.191	5.000	5.000	5.000	-1.000	0.115
NATURAL SURFACE	4.600	4.400	4.024	3.600	1.862	0.242	0.115
OFFSET	-5.978	-5.365	-4.151	-3.250	0.000	9.000	11.230

CHAINAGE 4.627

TOP OF WALL SETOUT  
X = 304507.754  
Y = 6173698.699  
Z = 5.000  
DATUM RL -2.000

REVTMENT	4.154	4.191	5.000	5.000	5.000	-1.000	0.055
NATURAL SURFACE	4.154	4.162	4.113	3.600	2.050	0.178	0.055
OFFSET	-5.421	-5.365	-4.151	-3.250	0.000	9.000	11.110

CHAINAGE 0

TOP OF WALL SETOUT  
X = 304465.329  
Y = 6173784.448  
Z = 5.000  
DATUM RL -2.000

REVTMENT	6.068	4.191	5.000	5.000	5.000	-1.000	0.318
NATURAL SURFACE	6.068	5.190	4.264	3.458	1.526	0.577	0.318
OFFSET	-8.180	-5.365	-4.151	-3.250	0.000	9.000	11.636

CHAINAGE 96.954

TOP OF WALL SETOUT  
X = 304467.128  
Y = 6173778.937  
Z = 5.000  
DATUM RL -2.000

REVTMENT	6.209	4.191	5.000	5.000	5.000	-1.000	0.306
NATURAL SURFACE	6.209	4.730	4.000	3.422	1.400	0.542	0.306
OFFSET	-8.392	-5.365	-4.151	-3.250	0.000	9.000	11.612

CHAINAGE 91.154

TOP OF WALL SETOUT  
X = 304482.363  
Y = 6173740.707  
Z = 5.000  
DATUM RL -2.000

REVTMENT	6.600	4.191	5.000	5.000	5.000	-1.000	-0.061
NATURAL SURFACE	6.600	5.084	4.421	3.702	1.784	0.100	-0.061
OFFSET	-8.978	-5.365	-4.151	-3.250	0.000	9.000	10.877

CHAINAGE 50

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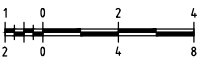
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01	05.11.2021	ISSUED FOR REVIEW
02	13.12.2021	ISSUED FOR TENDER

REVISION  
IN PROGRESS

WVR No.	APPROVAL	TITLE	NAME
02	AF	DRAFTER	J FARGHER
03	AF	DRAFTING CHECK	N PHILLIPS
		DESIGNER	A FOLAN
		DESIGN CHECK	S KNIGHT
		PROJECT MANAGER	A FOLAN
		PROJECT DIRECTOR	G BENDELL

SCALES AT A1 SIZE DRAWING  
1:100 (AT A1)  
1:200 (AT A3)



DESIGNER  
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SMEC PROJECT No 30032016

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DISCIPLINE		
DISCIPLINE		
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CONFIRMED		

PROJECT TITLE  
WARILLA BEACH - ROCK REVETMENT  
WARILLA, NSW, 2528  
SOUTHERN ROCK REVETMENT  
CROSS SECTIONS  
SHEET 1 OF 4

SCALE	PHASE	PROJECT / DRAWING No.	REVISION
AS SHOWN	REVIEW	30032016-GE-0300	02

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TOP OF WALL SETOUT  
X = 304458.355  
Y = 6173802.144  
Z = 5.000  
DATUM RL -2.000

REVTMENT	6.068	4.191	5.000	5.000	5.000	-1.000	0.406
NATURAL SURFACE	6.068	5.324	4.333	3.702	1.848	0.675	0.406
OFFSET	-8.180	-5.365	-4.151	-3.250	0.000	9.000	11.811

CHAINAGE 116.01

TOP OF WALL SETOUT  
X = 304450.184  
Y = 6173827.845  
Z = 5.000  
DATUM RL -2.000

REVTMENT	6.217	4.191	5.000	5.000	5.000	-1.000	0.500
NATURAL SURFACE	6.217	4.943	4.099	3.569	1.650	0.788	0.500
OFFSET	-8.405	-5.365	-4.151	-3.250	0.000	9.000	12.000

CHAINAGE 142.98

TOP OF WALL SETOUT  
X = 304461.049  
Y = 6173795.725  
Z = 5.000  
DATUM RL -2.000

REVTMENT	5.693	4.191	5.000	5.000	5.000	-1.000	0.369
NATURAL SURFACE	5.693	4.690	4.160	3.986	1.600	0.667	0.369
OFFSET	-7.618	-5.365	-4.151	-3.250	0.000	9.000	11.737

CHAINAGE 109.042

TOP OF WALL SETOUT  
X = 304451.838  
Y = 6173822.363  
Z = 5.000  
DATUM RL -2.000

REVTMENT	6.220	4.191	5.000	5.000	5.000	-1.000	0.542
NATURAL SURFACE	6.220	5.110	4.242	3.692	1.586	0.825	0.542
OFFSET	-8.409	-5.365	-4.151	-3.250	0.000	9.000	12.084

CHAINAGE 137.254

TOP OF WALL SETOUT  
X = 304464.489  
Y = 6173787.375  
Z = 5.000  
DATUM RL -2.000

REVTMENT	5.988	4.191	5.000	5.000	5.000	-1.000	0.316
NATURAL SURFACE	5.988	4.947	4.074	3.382	1.476	0.571	0.316
OFFSET	-8.061	-5.365	-4.151	-3.250	0.000	9.000	11.632

CHAINAGE 100

TOP OF WALL SETOUT  
X = 304455.982  
Y = 6173809.290  
Z = 5.000  
DATUM RL -2.000

REVTMENT	5.967	4.191	5.000	5.000	5.000	-1.000	0.480
NATURAL SURFACE	5.967	5.121	4.356	3.742	1.622	0.774	0.480
OFFSET	-8.029	-5.365	-4.151	-3.250	0.000	9.000	11.961

CHAINAGE 123.539

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PLOT DATE  
15 Dec 2021

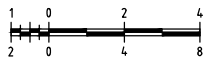
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	02	13.12.2021	ISSUED FOR TENDER	03	AF	DRAFTING CHECK	N PHILLIPS
						DESIGNER	A FOLAN
						DESIGN CHECK	S KNIGHT
						PROJECT MANAGER	A FOLAN
						PROJECT DIRECTOR	G BENDELL

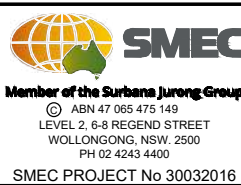
REVISION  
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SCALES AT A1 SIZE DRAWING

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	INITIAL	DATE
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PROJECT TITLE	WARILLA BEACH - ROCK REVTMENT WARILLA, NSW, 2528 SOUTHERN ROCK REVTMENT CROSS SECTIONS SHEET 2 OF 4
SCALE	AS SHOWN
PHASE	REVIEW
PROJECT / DRAWING No.	30032016-GE-0301
REVISION	02

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150 mm ON ORIGINAL  
A1  
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

TOP OF WALL SETOUT  
X = 304443.504  
Y = 6173846.736  
Z = 5.000  
DATUM RL -2.000

REVTMENT		5.800	4.191	5.000	5.000		5.000		-1.000	0.674	
NATURAL SURFACE		5.800	4.730	4.038	3.427		1.684		0.956	0.674	
OFFSET		-7.779	-5.365	-4.151	-3.250		0.000		9.000	12.348	

CHAINAGE 163.025

TOP OF WALL SETOUT  
X = 304435.069  
Y = 6173873.360  
Z = 5.000  
DATUM RL -2.000

REVTMENT		5.681	4.191	5.000	5.000		5.000		-1.000	0.830	
NATURAL SURFACE		5.681	5.022	4.380	4.200		1.751		1.180	0.830	
OFFSET		-7.600	-5.365	-4.151	-3.250		0.000		9.000	12.660	

CHAINAGE 190.995

TOP OF WALL SETOUT  
X = 304446.790  
Y = 6173837.392  
Z = 5.000  
DATUM RL -2.000

REVTMENT		6.009	4.191	5.000	5.000		5.000		-1.000	0.566	
NATURAL SURFACE		6.009	4.981	4.192	3.800		1.729		0.854	0.566	
OFFSET		-8.093	-5.365	-4.151	-3.250		0.000		9.000	12.132	

CHAINAGE 153.116

TOP OF WALL SETOUT  
X = 304438.275  
Y = 6173862.849  
Z = 5.000  
DATUM RL -2.000

REVTMENT		5.028	4.191	5.000	5.000		5.000		-1.000	0.750	
NATURAL SURFACE		5.028	4.750	4.222	3.800		1.846		0.961	0.750	
OFFSET		-6.620	-5.365	-4.151	-3.250		0.000		9.000	12.500	

CHAINAGE 179.98

TOP OF WALL SETOUT  
X = 304447.932  
Y = 6173834.493  
Z = 5.000  
DATUM RL -2.000

REVTMENT		6.101	4.191	5.000	5.000		5.000		-1.000	0.525	
NATURAL SURFACE		6.101	4.878	4.184	3.705		1.721		0.837	0.525	
OFFSET		-8.229	-5.365	-4.151	-3.250		0.000		9.000	12.050	

CHAINAGE 150

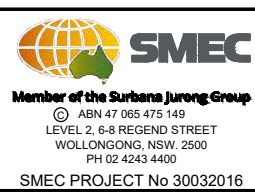
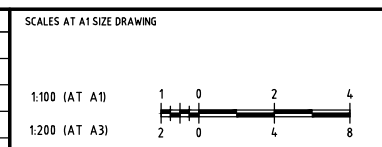
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X = 304440.724  
Y = 6173856.174  
Z = 5.000  
DATUM RL -2.000

REVTMENT		5.721	4.191	5.000	5.000		5.000		-1.000	0.698	
NATURAL SURFACE		5.721	4.749	3.867	3.480		1.707		0.921	0.698	
OFFSET		-7.661	-5.365	-4.151	-3.250		0.000		9.000	12.395	

CHAINAGE 172.864

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				02	13.12.2021	ISSUED FOR TENDER	03
				REVISION IN PROGRESS			
				APPROVAL	TITLE	NAME	
				AF	DRAFTER	J FARGHER	
				AF	DRAFTING CHECK	N PHILLIPS	
					DESIGNER	A FOLAN	
					DESIGN CHECK	S KNIGHT	
					PROJECT MANAGER	A FOLAN	
					PROJECT DIRECTOR	G BENDELL	



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		INITIAL	DATE
DISCIPLINE			
DISCIPLINE			
DISCIPLINE			
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CONFIRMED			

PROJECT TITLE WARILLA BEACH - ROCK REVETMENT WARILLA, NSW, 2528 SOUTHERN ROCK REVETMENT CROSS SECTIONS SHEET 3 OF 4			
SCALE AS SHOWN	PHASE REVIEW	PROJECT / DRAWING No. 30032016-GE-0302	REVISION 02

150 mm ON ORIGINAL

A1

TOP OF WALL SETOUT  
X = 304422.980  
Y = 6173920.846  
Z = 5.000  
DATUM RL -2.000

REVETMENT	5.827	4.191	5.000	5.000	5.000	-1.000	0.721
NATURAL SURFACE	5.827	4.676	3.558	3.118	1.762	1.005	0.721
OFFSET	-7.819	-5.365	-4.151	-3.250	0.000	9.000	12.443

CHAINAGE 240

TOP OF WALL SETOUT  
X = 304432.978  
Y = 6173882.115  
Z = 5.000  
DATUM RL -2.000

REVETMENT	5.539	4.191	5.000	5.000	5.000	-1.000	0.789
NATURAL SURFACE	5.539	4.800	4.600	4.049	1.786	0.994	0.789
OFFSET	-7.386	-5.365	-4.151	-3.250	0.000	9.000	12.579

CHAINAGE 200

TOP OF WALL SETOUT  
X = 304434.173  
Y = 6173877.483  
Z = 5.000  
DATUM RL -2.000

REVETMENT	5.600	4.191	5.000	5.000	5.000	-1.000	0.838
NATURAL SURFACE	5.600	4.800	4.259	3.800	1.800	1.137	0.838
OFFSET	-7.478	-5.365	-4.151	-3.250	0.000	9.000	12.676

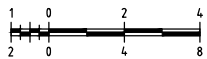
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	02	13.12.2021	ISSUED FOR TENDER	03	AF	DRAFTING CHECK	N PHILLIPS
						DESIGNER	A FOLAN
						DESIGN CHECK	S KNIGHT
						PROJECT MANAGER	A FOLAN
						PROJECT DIRECTOR	G BENDELL

REVISION  
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SCALES AT A1 SIZE DRAWING
1:100 (AT A1)
1:200 (AT A3)



DESIGNER

 **SMEC**

Member of the Surlana Jurong Group

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WOLLONGONG, NSW, 2500  
PH 02 4243 4400

SMEC PROJECT No 30032016

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DISCIPLINE		
DISCIPLINE		
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PROJECT TITLE		WARILLA BEACH - ROCK REVETMENT WARILLA, NSW, 2528	
		SOUTHERN ROCK REVETMENT CROSS SECTIONS SHEET 4 OF 4	
SCALE	PHASE	PROJECT / DRAWING No.	REVISION
AS SHOWN	REVIEW	30032016-GE-0303	02

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150 mm ON ORIGINAL

A1

TOP OF WALL SETOUT  
X = 304407.535  
Y = 6174010.863  
Z = 5.000  
DATUM RL -2.000

REVTMENT	7.002	3.879	5.000	5.000	5.000	-1.000	0.646
NATURAL SURFACE	7.002	6.646	6.590	6.554	5.267	0.949	0.646
OFFSET	-10.518	-5.833	-4.151	-3.250	0.000	12.000	15.293

CHAINAGE 50

TOP OF WALL SETOUT  
X = 304412.451  
Y = 6173966.241  
Z = 5.000  
DATUM RL -2.000

REVTMENT	6.400	3.879	5.000	5.000	5.000	-1.000	0.679
NATURAL SURFACE	6.400	6.343	6.338	6.338	5.376	0.963	0.679
OFFSET	-9.615	-5.833	-4.151	-3.250	0.000	12.000	15.357

CHAINAGE 5

TOP OF WALL SETOUT  
X = 304397.879  
Y = 6174110.208  
Z = 5.000  
DATUM RL -2.000

REVTMENT	6.550	3.879	5.000	5.000	5.000	-1.000	0.920
NATURAL SURFACE	6.550	6.428	6.400	6.400	5.373	1.319	0.920
OFFSET	-9.839	-5.833	-4.151	-3.250	0.000	12.000	15.841

CHAINAGE 150

TOP OF WALL SETOUT  
X = 304400.484  
Y = 6174060.345  
Z = 5.000  
DATUM RL -2.000

REVTMENT	6.880	3.879	5.000	5.000	5.000	-1.000	0.990
NATURAL SURFACE	6.880	6.770	6.652	6.389	4.258	1.362	0.990
OFFSET	-10.335	-5.833	-4.151	-3.250	0.000	12.000	15.981

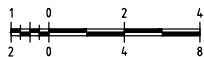
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						DESIGNER	
						DESIGN CHECK	
						PROJECT MANAGER	
						PROJECT DIRECTOR	

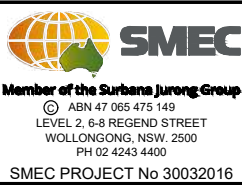
REVISION  
IN PROGRESS

SCALES AT A1 SIZE DRAWING

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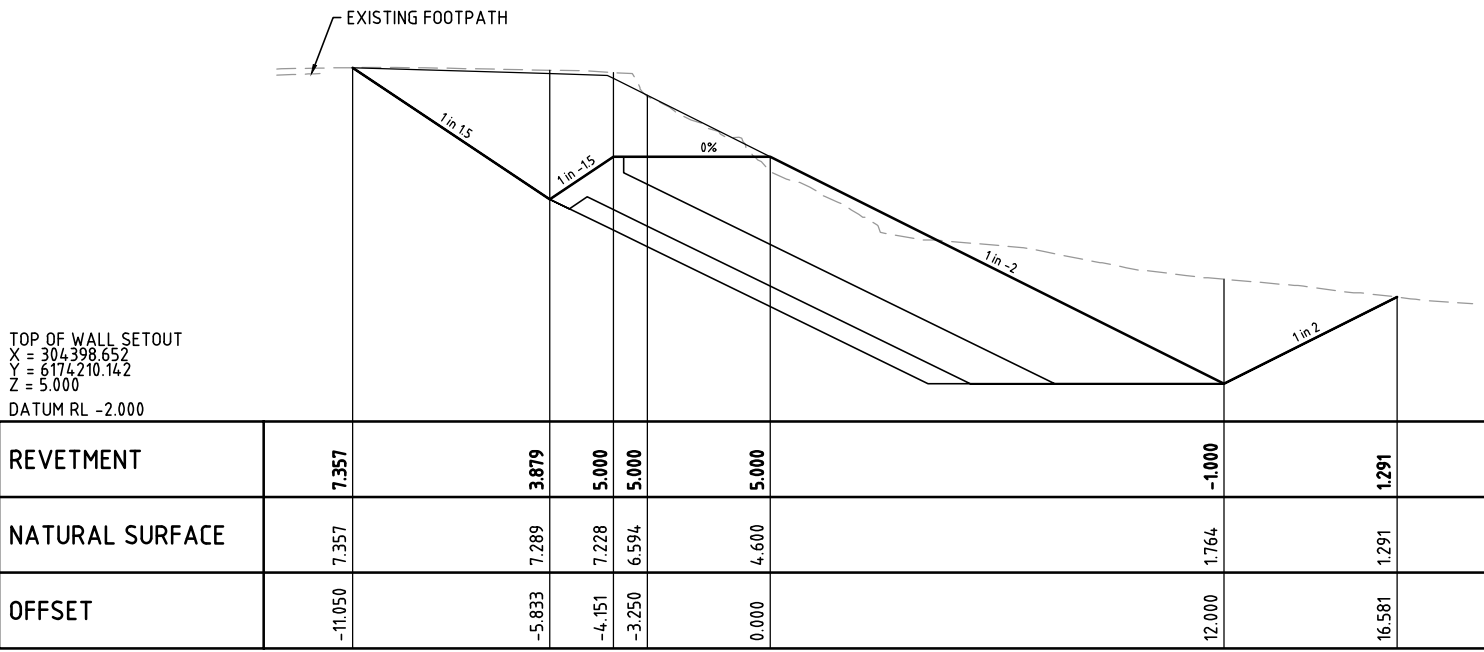
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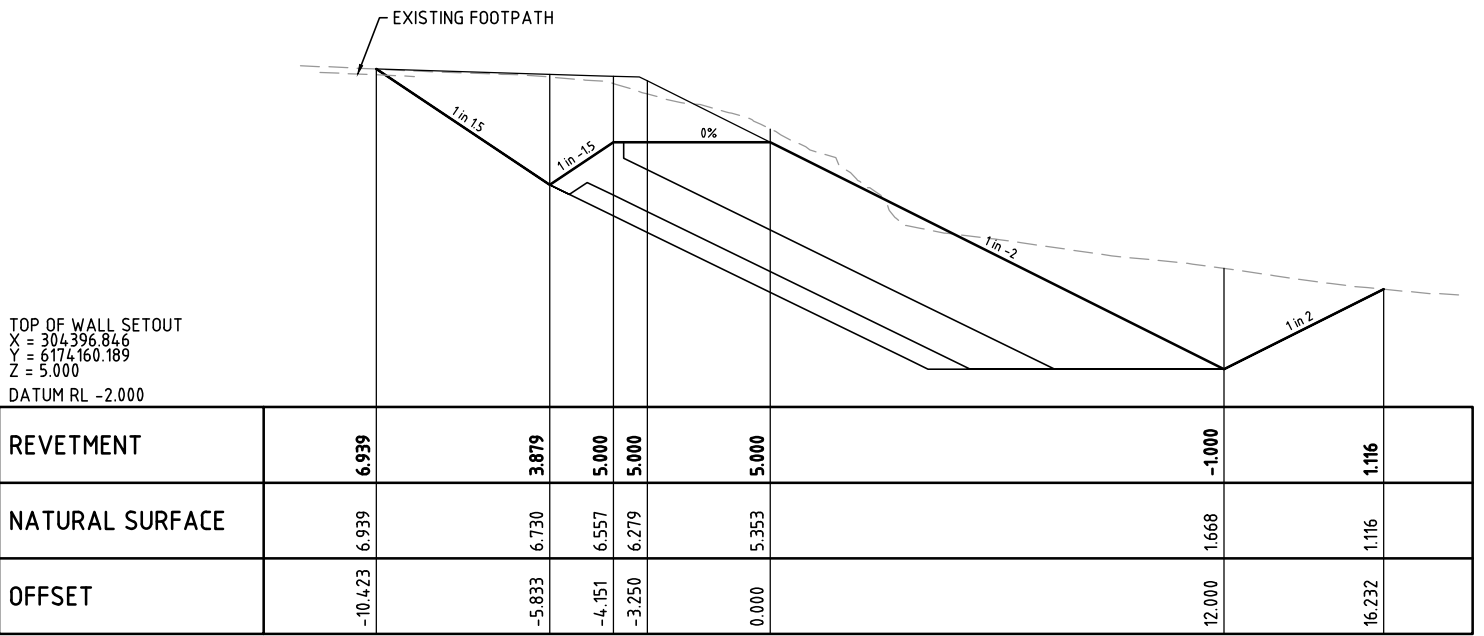


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A1

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CHAINAGE 250



CHAINAGE 200

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				02	13.12.2021	ISSUED FOR TENDER	03	AF	DRAFTING CHECK	N PHILLIPS			DISCIPLINE		AS SHOWN	REVIEW	30032016-GE-0305	02
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									DESIGN CHECK	S KNIGHT			DISCIPLINE					
									PROJECT MANAGER	A FOLAN			DISCIPLINE					
									PROJECT DIRECTOR	G BENDELL	DISCIPLINE							
											BACKDRAFTED/CORRECTED							
											CONFIRMED							

150 mm ON ORIGINAL

A1

TOP OF WALL SETOUT  
X = 3044.07623  
Y = 6174.309393  
Z = 5.000  
DATUM RL -2.000

REVTMENT	9.200	3.879	5.000	5.000	5.000	-1.000	0.920
NATURAL SURFACE	9.200	8.558	7.690	7.391	5.089	1.325	0.920
OFFSET	-13.814	-5.833	-4.151	-3.250	0.000	12.000	15.840

CHAINAGE 350

TOP OF WALL SETOUT  
X = 3044.00596  
Y = 6174.260103  
Z = 5.000  
DATUM RL -2.000

REVTMENT	8.253	3.879	5.000	5.000	5.000	-1.000	1.345
NATURAL SURFACE	8.253	7.000	6.991	6.330	4.597	1.868	1.345
OFFSET	-12.394	-5.833	-4.151	-3.250	0.000	12.000	16.689

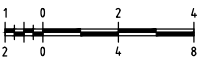
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						DESIGNER	A FOLAN
						DESIGN CHECK	S KNIGHT
						PROJECT MANAGER	A FOLAN
						PROJECT DIRECTOR	G BENDELL

REVISION  
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SCALES AT A1 SIZE DRAWING
1:100 (AT A1)
1:200 (AT A3)



DESIGNER

**SMEC**

Member of the Surbana Jurong Group

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LEVEL 2, 6-8 REGEND STREET  
WOLLONGONG, NSW, 2500  
PH 02 4243 4400

SMEC PROJECT No 30032016

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PROJECT TITLE		WARILLA BEACH - ROCK REVETMENT WARILLA, NSW, 2528	
		NORTHERN ROCK REVETMENT CROSS SECTIONS SHEET 3 OF 6	
SCALE	PHASE	PROJECT / DRAWING No.	REVISION
AS SHOWN	REVIEW	30032016-GE-0306	02

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150 mm ON ORIGINAL

A1

TOP OF WALL SETOUT  
X = 304428.499  
Y = 6174407.177  
Z = 5.000  
DATUM RL -2.000

REVTMENT	8.432	3.879	5.000	5.000	5.000	-1.000	0.972
NATURAL SURFACE	8.432	7.770	6.843	6.537	4.529	1.286	0.972
OFFSET	-12.663	-5.833	-4.151	-3.250	0.000	12.000	15.944

CHAINAGE 450

TOP OF WALL SETOUT  
X = 304418.642  
Y = 6174358.159  
Z = 5.000  
DATUM RL -2.000

REVTMENT	8.976	3.879	5.000	5.000	5.000	-1.000	0.665
NATURAL SURFACE	8.976	8.627	8.365	7.740	4.906	0.885	0.665
OFFSET	-13.478	-5.833	-4.151	-3.250	0.000	12.000	15.331

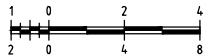
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						DESIGNER	A FOLAN
						DESIGN CHECK	S KNIGHT
						PROJECT MANAGER	A FOLAN
						PROJECT DIRECTOR	G BENDELL

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SCALES AT A1 SIZE DRAWING

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BACKDRAFTED/CORRECTED		
CONFIRMED		

PROJECT TITLE  
WARILLA BEACH - ROCK REVETMENT  
WARILLA, NSW, 2528  
NORTHERN ROCK REVETMENT  
CROSS SECTIONS  
SHEET 4 OF 6

SCALE	PHASE	PROJECT / DRAWING No.	REVISION
AS SHOWN	REVIEW	30032016-GE-0307	02

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150

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X = 304449.983  
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REVETMENT		7.519		3.879	5.000	5.000		5.000		-1.000		1.436
NATURAL SURFACE		7.519		7.564	7.181	6.558		4.946		1.593		1.436
OFFSET		-11.292		-5.833	-4.151	-3.250		0.000		12.000		16.872

CHAINAGE 550

TOP OF WALL SETOUT  
X = 304438.766  
Y = 6174456.111  
Z = 5.000  
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REVETMENT		8.119		3.879	5.000	5.000		5.000		-1.000		1.303
NATURAL SURFACE		8.119		5.600	4.756	4.551		2.715		1.622		1.303
OFFSET		-12.194		-5.833	-4.151	-3.250		0.000		12.000		16.606

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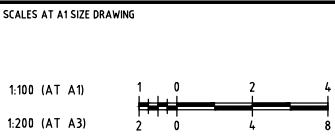
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PLOT DATE  
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						DESIGNER	A FOLAN
						DESIGN CHECK	S KNIGHT
						PROJECT MANAGER	A FOLAN
						PROJECT DIRECTOR	G BENDELL

REVISION  
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DESIGNER

**SMEC**  
Member of the Surlana Jurong Group  
© ABN 47 065 475 149  
LEVEL 2, 6-8 REGEND STREET  
WOLLONGONG, NSW, 2500  
PH 02 4243 4400  
SMEC PROJECT No 30032016

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DISCIPLINE		
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BACKDRAFTED/CORRECTED		
CONFIRMED		

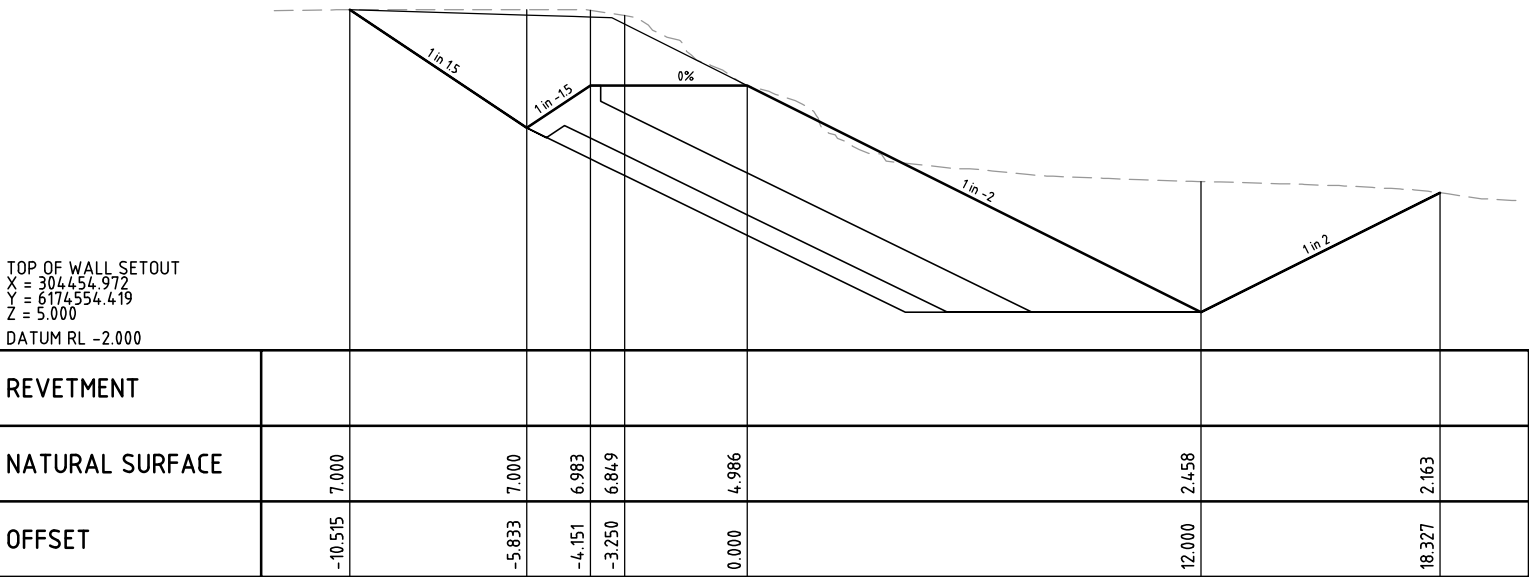
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AS SHOWN	REVIEW	30032016-GE-0308	02



150 mm ON ORIGINAL



TOP OF WALL SETOUT  
X = 304454.972  
Y = 6174554.419  
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CHAINAGE 600

UNCONTROLLED COPY  
Check Print  
NOT FOR CONSTRUCTION

ISSUED FOR TENDER

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									DESIGN CHECK	S KNIGHT							CROSS SECTIONS	
									PROJECT MANAGER	A FOLAN							SHEET 6 OF 6	
					PROJECT DIRECTOR	G BENDELL							SCALE		PHASE	PROJECT / DRAWING No.	REVISION	
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## Appendix B - Consultation

Our Ref: FE21/1149; PN21/533

Date: 30 November 2021

General Manager  
Shellharbour City Council  
76 Cygnet Avenue  
SHELLHARBOUR CITY CENTRE NSW 2529

Attn: Ms Caitlyn Thomas

Dear Sir/Madam,

**RE: Permit: Dredging and reclamation associated with construction of a seawall along Warilla Beach (lot 45 DP 23239, Lot 67 DP 21893, Lot 76 DP238866)**

I refer to your application received 25 November 2021 for a permit under Part 7 of the *Fisheries Management Act 1994* (FM Act). DPI Fisheries, a division of NSW Department of Primary Industries, assesses applications for dredging and reclamation in accordance with Part 7 of the FM Act, Part 14 of the *Fisheries Management (General) Regulation 2010* and the *Policy and Guidelines for Fish Habitat Conservation and Management (2013)*.

This application attracts a minimum fee of \$358.00. The fee comprises \$179.00 application fee plus \$179.00 for the first three hours of assessment. An invoice for \$358.00 has been raised and will be posted separately.

The environmental assessment has been completed and it has been determined that a permit can be issued. The permit is attached.

Please carefully read and note the conditions included in the permit. **If you agree that all the conditions are reasonable, appropriate and achievable, you must sign and date the attached form (Acceptance of Conditions) and return it to the Departmental Contact Officer as soon as possible. If you believe that you cannot comply with all the Conditions then you must not commence work.** Instead, you should contact the Contact Officer listed on the first page of the permit so that your concerns can be considered.

If you intend to have the work undertaken by a contractor, please ensure that the contractor receives a full copy of the permit and understands the importance of abiding by the conditions. As the permit holder, you are responsible for ensuring compliance with all conditions therein and with any other relevant legislative obligations. **Breaching a condition of a permit can incur an on-the-spot penalty notice of \$500 or up to \$11,000 through the courts in accordance with clause 225 of the *Fisheries Management (General) Regulation 2010*.**

The extent of work is to be restricted to that outlined in the application and plans submitted to the Department. **If for any reason, other works are required, or the works need to be extended to other areas, you must seek specific approval beforehand.** DPI Fisheries will require a justification for these variations and may charge additional assessment fees as outlined in the permit application. Similarly **please note the expiry date** on the permit. If the works are not completed by the expiry date you will need to obtain an extension. **Requests for an extension after the expiry date will incur the \$170.00 permit application fee. Requests for an extension before the expiry date will not incur an application fee.**

DPI Fisheries, places particular importance upon the need to minimise the harm to the natural environment both at the work site and in downstream/adjacent waters. The Department expects implementation of Best Management Practice with respect to erosion and sediment control as outlined in the publication "Managing Urban Stormwater: Soils and Construction" (4<sup>th</sup> Edition Landcom, 2004), commonly referred to as "The Blue Book"

(see <http://www.environment.nsw.gov.au/resources/water/BlueBookVol1.pdf>).

The extent and magnitude of works is such that I have included a condition requiring the preparation of a Construction Environmental Management Plan (CEMP) to be submitted to and approved by DPI Fisheries prior to the commencement of works. The CEMP is to incorporate erosion and sediment control measures to be used at the site, dewatering procedures and site rehabilitation / revegetation provisions.

Note: The attached permit providing authorisation under the *Fisheries Management Act 1994*, to undertake dredging and/or reclamation (s.200 or s.201), and/or harm marine vegetation (s.205) does not provide authorisation under any other Act or planning instrument. It is the applicant's responsibility to ensure they have all appropriate approvals and land owner consents before works occur. This may include, but is not restricted to, development consent under the *Environmental Planning & Assessment Act*, land owners consent and/or a licence under the *Crown Lands Management Act 2016*, and a controlled activity approval under the *Water Management Act 2000*.

If you have any queries please call Carla Ganassin on (02) 4222 8342.

Yours sincerely,



**Carla Ganassin**  
**Senior Fisheries Manager – Coastal Systems, South**  
Authorised delegate of the Minister for Primary Industries

cc: Daniel Minter District Fisheries Officer, Illawarra Fisheries Office  
cc: Mick Bettanin, A/Fisheries Conservation Officer - South



Permit under Part 7 of the  
**FISHERIES MANAGEMENT ACT 1994**

<b>Permit Number:</b>	PN21/533
<b>Permit Holder:</b>	76 Cygnet Ave (Locked Bag 155), Shellharbour City Centre NSW 2529 CONTACT PERSON NAME: Caitlyn Thomas Ph: 0457 196 482 Email: Caitlyn.thomas@shellharbour.nsw.gov.au
<b>Permit Area:</b>	Warilla Beach (Lot 45 DP 23239, Lot 67 DP 21893, Lot 76 DP 238866)
<b>Permit Activity:</b>	Dredging and reclamation in association construction of a seawall, as described in the permit application received 25 November 2021
<b>Departmental Contact Officer:</b>	Carla Ganassin Ph: (02) 4222 8342 Email: carla.ganassin@dpi.nsw.gov.au
<b>District Fisheries Officer:</b>	Daniel Minter Ph: (02) 4220 8499 Email: daniel.minter@dpi.nsw.gov.au
<b>Expiry Date:</b>	Unless cancelled or suspended sooner, this permit shall remain in force until 20 December 2024

This permit is subject to the following Conditions:

**ADMINISTRATIVE CONDITIONS**

- 1) The **Acceptance of Conditions** form (attached) must be completed and returned to the Officers listed at the bottom of the form before commencing any works authorised by this permit.  
*Reason – To remove any doubt that the Permit Holder understands and accepts the Conditions before work commences.*
- 2) The **Commence Works Notification** form (attached) must be completed and sent to the Officers listed at the bottom of the form at least three to five (3-5) days BEFORE the commencement of works authorised by this permit.  
*Reason - To ensure that local DPI Fisheries staff are aware that works authorised by this permit are about to commence.*
- 3) The **Active Works Notification** form (attached) must be completed and sent to the Officers listed at the bottom of the form at least three to five (3-5) days BEFORE works are complete or machinery is removed from the site. Several colour photographs showing the work site and works completed to date must be included.  
*Reason - To provide an opportunity for local DPI Fisheries staff to inspect the site whilst machinery is still on site and available to do any remedial work that may be necessary.*
- 4) This permit (or a true copy) and a copy of the finalised Construction Environmental Management Plan (CEMP) must be carried by the permit holder or sub-contractor operating on-site at all times during work activity in the permit area.  
*Reason – DPI Fisheries staff may wish to check compliance of works with imposed conditions.*

**NATURE AND EXTENT OF WORKS**

- 5) The permit holder must ensure that all works authorised by this permit are restricted to the permit area and are undertaken in a manner consistent with those described in the permit application dated 25 November 2021, and associated documents including plans for the

works. Other works, which have not been described, are not to be undertaken.

*Reason – This permit has been granted following an assessment of the potential impacts of the described works upon the aquatic and neighbouring environments. Other works, which were not described in the application have not been assessed and may have significant adverse impacts.*

## CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

- 6) A Construction Environmental Management Plan (CEMP) detailing provisions relating to the items listed in this section below, is to be prepared **and submitted to the Contact Officer listed above for approval two weeks prior to any works taking place.** The CEMP should consist of simple statements and diagrams of how each of the factors will be managed on site to achieve the stated aim.
- a) Site delineation and marking of “no go” areas (with the aim of keeping the impacted area to a minimum),
  - b) Sediment and erosion control plan (with the aim of achieving an outcome of “no visible turbid plumes reaching the waterway”, for any rainfall event up to a 1 in 2 year Annual Recurrence Interval (ARI) event) (This is to include detail of any bund to be constructed in front of seawall during construction, if relevant),
  - c) Material storage and stockpiling (with the aim of keeping the impacted area to a minimum),
  - d) Site restoration and clean up (with the aim of ensuring that the impacted area recovers as soon as possible),
  - e) Site rehabilitation and revegetation (with the aim of ensuring that there are no long term impacts after works are completed).

All works undertaken are to be consistent with this statement.

*Reason – To ensure that appropriate strategies for preventing sediment input to downstream waterways and rehabilitation of aquatic habitats and the riparian zone are proposed and carried out.*

## DEWATERING

- 7) The site shall not be dewatered, unless a Dewatering Management Plan is prepared and approved by the contact officer. Any Dewatering Management Plan shall specifically consider any potential off-site impacts as a result of the dewatering operations and contain mitigation controls to effectively treat any discharge waters to prevent offsite pollution of any receiving waters.
- Reason – Dewatering poses a significant risk to aquatic animals and needs to be carefully managed.*

## WORK IN WATERS

- 8) Machinery is not to enter, or work from the waterway unless in accordance with works proposed in your application for the permit and the requirements of this permit.
- Reason – To ensure minimal risk of water pollution from oil or petroleum products and to minimise disturbance to the streambed substrate.*
- 9) Only clean rock (no fines) is to be used in construction of works authorised by this permit.
- Reason – To avoid fines, clay and other sediment un-necessarily entering the waterway and potentially impacting on aquatic habitats.*
- 10) Prior to use at the site and / or entry into the waterway, machinery is to be appropriately cleaned, degreased and serviced. Spill kits are to be available on site at all times during works.
- Reason – To reduce the threat of an unintended pollution incident impacting upon the aquatic environment.*
- 11) Material storage and stockpiling is not to be undertaken on water land. Stockpiling must be undertaken in a manner to avoid harm to water land. Stockpiles should also be located 20 metres away from adjacent water land. Stockpiles and/or dewatering areas should be appropriately controlled by sediment fencing or other materials prescribed in the “Blue Book” to ensure sediments do not enter the waterway.
- Reason – To ensure that impacts on aquatic habitats, the riparian zone and threatened*

*saltmarsh communities are minimised. "Degradation of native riparian vegetation along NSW water courses" (excluding estuarine and marine waters) is listed as a Key Threatening Process under the provisions of the FM Act.*

#### FISH KILL CONTINGENCY

- 12) A visual inspection of the waterway for dead or distressed fish (indicated by fish gasping at the water surface, fish crowding in pools or at the creek's banks) is to be undertaken daily during the works. **Observations of dead or distressed fish are to be immediately reported to the Contact Officer by the Permit Holder.** In such a case all works are to cease until the issue is rectified and approval is given to proceed. If requested, the Permit Holder is to commit resources to the satisfaction of the Contact Officer for an effective fish rescue, if in the view of that officer, a fish kill event is imminent and likely to occur within or adjacent to the works area due to conditions associated with weather, water quality and other parameters.

*Reason – DPI Fisheries needs to be aware of fish kills so that it can assess the cause and mitigate further incidents in consultation with relevant authorities. They are also potentially contentious incidents from the public perspective. Work practices may need to be modified to reduce the impacts upon the aquatic environment.*

#### IMPORTANT NOTE:


In the event of any inconsistency between the conditions of this approval and:

- the drawings / documents referred to above, the conditions of this approval prevail to the extent of the inconsistency;
- any Government publication referred to in this permit, the most recent document shall prevail to the extent of the inconsistency; and
- the proponent's mitigation measures outlined in the application, the conditions of this approval prevail to the extent of the inconsistency.

#### STOP WORK ORDERS

A Fisheries Officer or other appropriate delegate, who has reasonable cause to suspect that the conditions of this permit have not been complied with, **may order the work to stop immediately.** The order may be given to the permit holder or any person who informs the officer that they are acting in any capacity on behalf of the permit holder. Any damage caused to the habitat outside the specified permit area, or the carrying out of works not in accordance with the conditions specified in this permit and/or the application and that were accepted by the permit holder, could result in a breach of the *Fisheries Management Act 1994* or *Regulations*, and penalties of up to \$220,000 may apply. Orders may also be made requiring work to rectify any damage caused by unauthorised works. **Breaching a condition of a permit can incur an on-the-spot penalty notice of \$500 or up to \$11,000 through the courts pursuant to clause 225 of the *Fisheries Management (General) Regulation 2010*.**

Yours sincerely,



**Carla Ganassin**  
**Senior Fisheries Manager – Coastal Systems, South**  
Authorised delegate of the Minister for Primary Industries

30 November 2021

cc: **Error! Reference source not found.**District Fisheries Officer, Illawarra Fisheries Office

cc: Mick Bettanin A/Fisheries Conservation Officer - South

Figure 1 Location diagram of works authorised under PN21/533





**Permit No. PN21/533 issued under Part 7 of the  
*Fisheries Management Act 1994***

PLEASE COMPLETE THIS PAGE AND RETURN TO DPI Fisheries

**In reference to Permit No. PN21/533 associated with dredging and reclamation Error!**  
Reference source not found.**to construct a seawall at Warilla Beach:**

**Acceptance of Conditions Form**

I the undersigned, acknowledge that I have read and understood and agree to comply with the conditions specified. I understand that penalties can be imposed for non compliance with conditions.

Responsible Officer's name: \_\_\_\_\_

Responsible Officer's signature: \_ \_\_\_\_\_

Date: \_\_\_\_\_

**Please ensure you have SIGNED this page and RETAINED a  
copy for your records before you email it to:**

Daniel Minter District Fisheries Officer, Illawarra Fisheries Office  
Email: daniel.minter@dpi.nsw.gov.au

Departmental Contact Officer: Carla Ganassin  
Email: carla.ganassin@dpi.nsw.gov.au



## Department of Primary Industries

**Permit No. PN21/533 issued under Part 7 of the  
*Fisheries Management Act 1994***

PLEASE COMPLETE THIS PAGE AND RETURN TO DPI Fisheries

**In reference to Permit No. PN21/533 associated with dredging and reclamation Error!  
Reference source not found.to construct a seawall at Warilla Beach:**

### **Commence Works Notification Form**

*(Note: to be completed and returned 3 - 5 working days before commencement of works)*

Responsible Officer's name: \_\_\_\_\_

Expected Commencement date: \_\_\_\_\_

Responsible Officer's signature: \_\_\_\_\_

Date: \_\_\_\_\_

Comments:

**Please ensure you have SIGNED this page and RETAINED a  
copy for your records before you email it to:**

Daniel Minter District Fisheries Officer, Illawarra Fisheries Office  
Email: [daniel.minter@dpi.nsw.gov.au](mailto:daniel.minter@dpi.nsw.gov.au)

Departmental Contact Officer: Carla Ganassin  
Email: [carla.ganassin@dpi.nsw.gov.au](mailto:carla.ganassin@dpi.nsw.gov.au)



## Department of Primary Industries

### Permit No. PN21/533 issued under Part 7 of the *Fisheries Management Act 1994*

PLEASE COMPLETE THIS PAGE AND RETURN TO DPI Fisheries

In reference to Permit No. PN21/533 associated with dredging and reclamation Error!  
Reference source not found.to construct a seawall at Warilla Beach:

### Active Works Notification Form

*(Note: to be completed and returned 3- 5 days before completion of works or before  
machinery is removed from the site)*

Responsible Officer's Name \_\_\_\_\_

Commencement Date: \_\_\_\_\_

Anticipated Completion Date: \_\_\_\_\_

Comments:

Responsible Officer's signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Please provide several photographs showing completed works**

**Please ensure you have SIGNED this page and RETAINED a  
copy for your records before you email it (including  
photographs) to:**

Daniel Minter District Fisheries Officer, Illawarra Fisheries Office  
Email: daniel.minter@dpi.nsw.gov.au

Departmental Contact Officer: Carla Ganassin  
Email: carla.ganassin@dpi.nsw.gov.au

## Andrew Fielding

---

**From:** Nicole Dibben <nicole.dibben@crownland.nsw.gov.au>  
**Sent:** Friday, 3 September 2021 2:28 PM  
**To:** Caitlyn Thomas  
**Subject:** RE: Shellharbour City Council - Warilla Seawall Renewal

Hi Caitlyn,

Thanks for the images, they are helpful and provide better clarity. I can see that the parcels are Council freehold land and our mapping system confirms that position. No approval is required from Crown for works contained within Council Land.

I should have explained better – If the works go below mean high water mark and that land becomes Crown Land then approval is required, which is not the case in this circumstance.

Thanks Caitlyn.

Regards

**Nicole Dibben | A/Group Leader – South East (Goulburn)**

Crown Lands | Department of Planning, Industry and Environment  
**T** 02 4428 9120 | **T** 1300 886 235 | **E** [nicole.dibben@crownland.nsw.gov.au](mailto:nicole.dibben@crownland.nsw.gov.au)  
Ground floor, 5 O’Keefe Ave, Nowra NSW 2541  
[www.dpie.nsw.gov.au](http://www.dpie.nsw.gov.au)



**Our Vision:** Together, we create thriving environments, communities and economies.

*The Department of Planning, Industry and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.*

---

**From:** Caitlyn Thomas <Caitlyn.Thomas@shellharbour.nsw.gov.au>  
**Sent:** Friday, 3 September 2021 9:24 AM  
**To:** Nicole Dibben <nicole.dibben@crownland.nsw.gov.au>  
**Cc:** Daniel Brilsky <Daniel.Brilsky@shellharbour.nsw.gov.au>  
**Subject:** RE: Shellharbour City Council - Warilla Seawall Renewal

Hi Nicole,

Thanks for your time on the phone yesterday.

See below snips from our system of the land which the Warilla Seawall Renewal Project will occupy.

I was of the belief that only development on Crown Lands needed approval from your end. If it is the case that we need approval for work below the mean high water mark, can you let me know what the process is.



OSBORNE POE

LITTLE LAKE CR

Warilla Beach

Leggett Park

BUCKNELL ST

Crown Foreshore Land - OS374354

LAND PARCELS

LAND INFORMATION 1 OF 1

Land No. 9308

Land Title LOT: 76 DP: 238866

Land Area 3.65 Ha

Land Name Strong Reserve

Street View [Click Here](#)

Land Address Osborne Parade  
WARILLA NSW 2528

WARD FROM SEPT 2021

Ward C

REGISTERED DOCUMENTS

Registered Plan [Plan of Subdivision](#)

88B Instrument [88B](#)

LAND NOTES

Land Classification Community

Council/Crown Council Land

Plan of Management Plan of Management exists

CONTRIBUTION PLAN (\$7.11 / \$94)

Precinct Precinct 1 - Warilla

PROPERTY INFORMATION 1 OF 1

Property No. 3074574

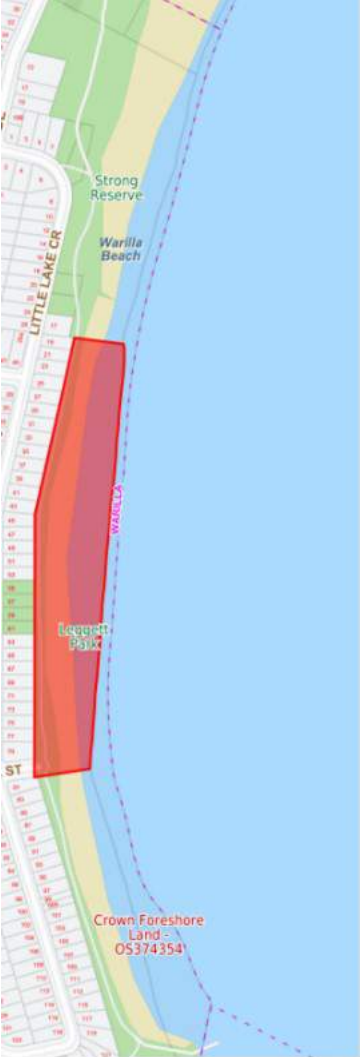
Owners Shellharbour City Council

Primary Address Osborne Parade  
WARILLA NSW 2528

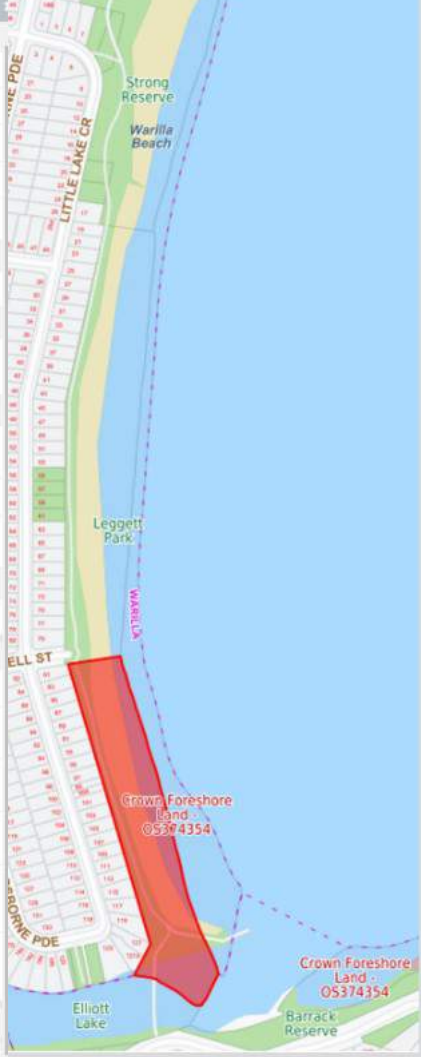
Alternate Address

Service Address Locked Bag 155  
SHELLHARBOUR CITY  
CENTRE NSW 2529

Property Legal Description Lot 5 DP 224845 Lot 77  
DP 553511 Lot 71 DP



LAND INFORMATION	
Land No.	7480
Land Title	LOT: 67 DP: 21893
Land Area	3.08 Ha
Land Name	Leggett Park
Street View	<a href="#">Click Here</a>
WARD FROM SEPT 2021	
Ward	C
REGISTERED DOCUMENTS	
Registered Plan	Plan of Subdivision (Woodford Park Estate)
LAND NOTES	
Land Classification	Community
Council/Crown	Council Land
Plan of Management	Plan of Management exists
CONTRIBUTION PLAN (\$7.11 / \$94)	
Precinct	Precinct 1 - Warilla
PROPERTY INFORMATION	
Property No.	3026111
Owners	Shellharbour City Council
Primary Address	Little Lake Crescent Warilla NSW 2528
Alternate Address	Headland Parade BARRACK POINT
Service Address	Locked Bag 155 SHELLHARBOUR CITY CENTRE NSW 2529
Property Legal Description	Lot 45 DP 23239 Lot 67 DP 21893 Lot 46 DP 23239
PARENT REGISTERED PLANS	NO
ELECTORATE	YES (1)



LAND INFORMATION	
Land No.	7479
Land Title	LOT: 45 DP: 23239
Land Area	2.16 Ha
Land Name	Leggett Park
Street View	<a href="#">Click Here</a>
WARD FROM SEPT 2021	
Ward	C
REGISTERED DOCUMENTS	
Registered Plan	Plan of Subdivision (Woodford Park Estate)
LAND NOTES	
Land Classification	Community
Council/Crown	Council Land
Plan of Management	Plan of Management exists
CONTRIBUTION PLAN (\$7.11 / \$94)	
Precinct	Precinct 1 - Warilla
PROPERTY INFORMATION	
Property No.	3026111
Owners	Shellharbour City Council
Primary Address	Little Lake Crescent Warilla NSW 2528
Alternate Address	Headland Parade BARRACK POINT
Service Address	Locked Bag 155 SHELLHARBOUR CITY CENTRE NSW 2529
Property Legal Description	Lot 45 DP 23239 Lot 67 DP 21893 Lot 46 DP 23239
PARENT REGISTERED PLANS	NO
ELECTORATE	YES (1)

Regards,  
Caitlyn

**From:** Nicole Dibben <[nicole.dibben@crownland.nsw.gov.au](mailto:nicole.dibben@crownland.nsw.gov.au)>  
**Sent:** Thursday, 2 September 2021 7:03 AM  
**To:** Caitlyn Thomas <[Caitlyn.Thomas@shellharbour.nsw.gov.au](mailto:Caitlyn.Thomas@shellharbour.nsw.gov.au)>  
**Subject:** RE: Shellharbour City Council - Warilla Seawall Renewal

Hi Caitlyn,

Apology for my delay in response. If the works are entirely within Council owned land, on balance no approval is required by Crown Land. If you are Crown Land Manager then landowners consent is required.

Any works below mean high watermark will require Crown approval.

Regards

**Nicole Dibben | A/Group Leader – South East (Goulburn)**

Crown Lands | Department of Planning, Industry and Environment  
**T** 02 4428 9120 | **T** 1300 886 235 | [E nicole.dibben@crownland.nsw.gov.au](mailto:nicole.dibben@crownland.nsw.gov.au)  
 Ground floor, 5 O'Keefe Ave, Nowra NSW 2541  
[www.dpie.nsw.gov.au](http://www.dpie.nsw.gov.au)



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*The Department of Planning, Industry and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.*

---

**From:** Caitlyn Thomas <[Caitlyn.Thomas@shellharbour.nsw.gov.au](mailto:Caitlyn.Thomas@shellharbour.nsw.gov.au)>

**Sent:** Tuesday, 17 August 2021 12:30 PM

**To:** Nicole Dibben <[nicole.dibben@crownland.nsw.gov.au](mailto:nicole.dibben@crownland.nsw.gov.au)>

**Subject:** Shellharbour City Council - Warilla Seawall Renewal

Hi Nicole,

I have recently commented as Project Delivery Officer for SCC's Warilla Seawall Renewal Project.

I am looking to get some advice on approvals, if any, that we would need to get from Crown Lands for the works.

The project footprint is within SCC land, as shown in the below 2 images.

Let me know your thoughts.

Feel free to call if you would like more info

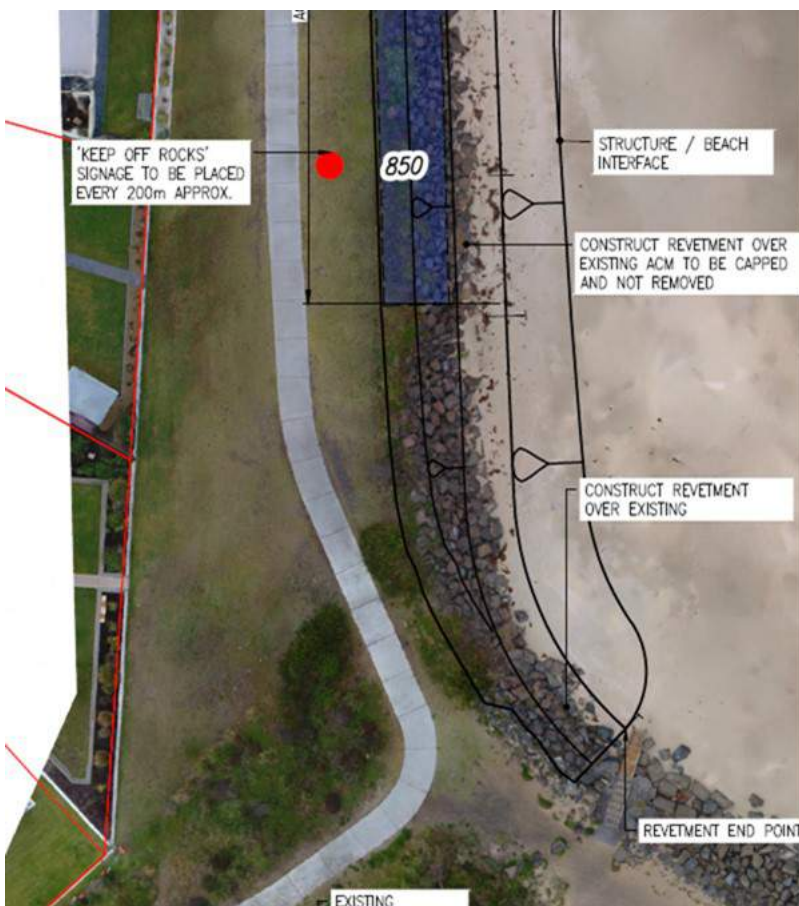




Image 1: Design Southern Extent

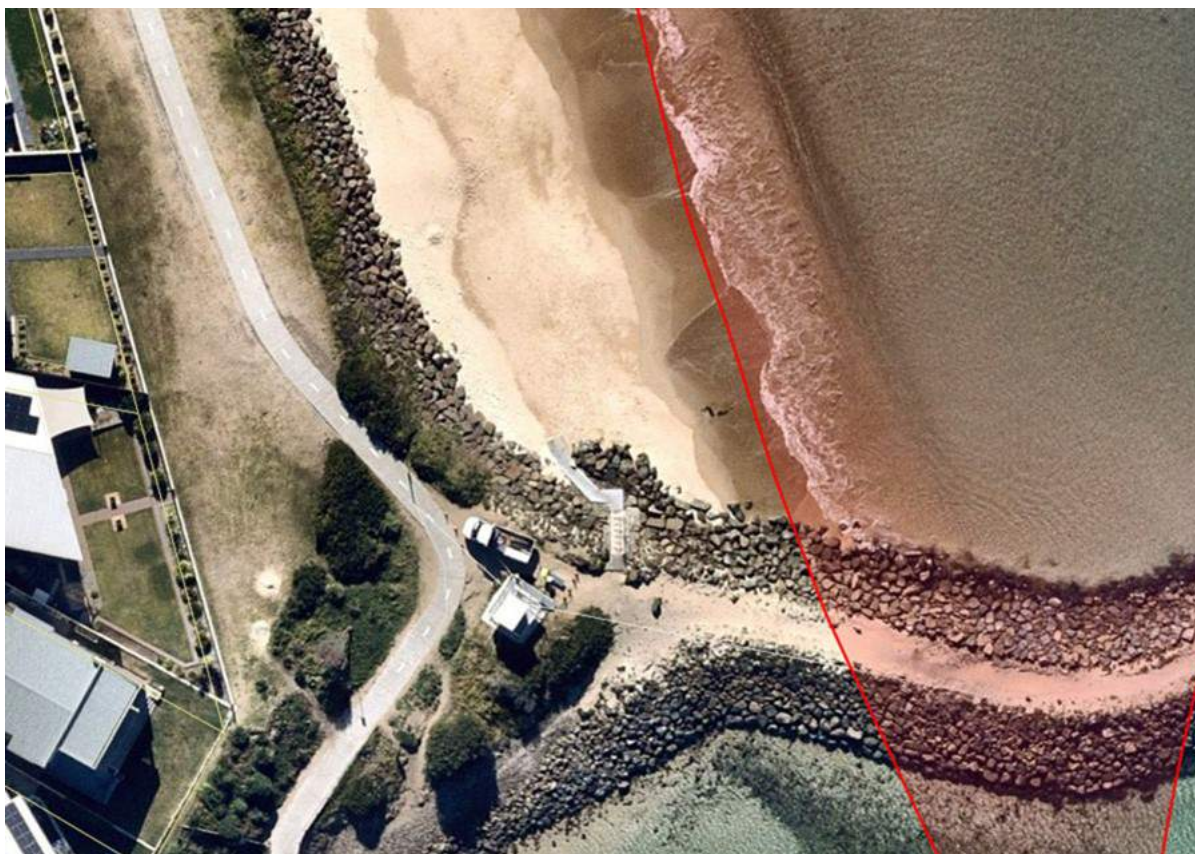


Image 2: Aerial Imagery (RED denotes Crown Land)

Regards,



**Caitlyn Thomas** | Project Delivery Officer

76 Cygnet Avenue, Shellharbour City Centre  
Locked Bag 155, Shellharbour City Centre, NSW 2529

p. (02) 4221 6217 m. 0457 196 482

[www.shellharbour.nsw.gov.au](http://www.shellharbour.nsw.gov.au)



COLLABORATION

ACCOUNTABILITY

INTEGRITY

RESPECT

SUSTAINABILITY



## Appendix C – Database Searches



# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 19-Nov-2021

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

# Summary

## Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance (Ramsar</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	1
<a href="#">Listed Threatened Ecological Communities:</a>	6
<a href="#">Listed Threatened Species:</a>	94
<a href="#">Listed Migratory Species:</a>	77

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

<a href="#">Commonwealth Lands:</a>	23
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	107
<a href="#">Whales and Other Cetaceans:</a>	14
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None
<a href="#">Habitat Critical to the Survival of Marine Turtles:</a>	None

## Extra Information

This part of the report provides information that may also be relevant to the area you have

<a href="#">State and Territory Reserves:</a>	3
<a href="#">Regional Forest Agreements:</a>	1
<a href="#">Nationally Important Wetlands:</a>	5
<a href="#">EPBC Act Referrals:</a>	23
<a href="#">Key Ecological Features (Marine):</a>	None
<a href="#">Biologically Important Areas:</a>	9
<a href="#">Bioregional Assessments:</a>	1
<a href="#">Geological and Bioregional Assessments:</a>	None

# Details

## Matters of National Environmental Significance

Commonwealth Marine Area

[ Resource Information ]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name	Buffer Status
EEZ and Territorial Sea	In buffer area only

Listed Threatened Ecological Communities

[ Resource Information ]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.  
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community</a>	Endangered	Community likely to occur within area	In feature area
<a href="#">Illawarra and south coast lowland forest and woodland ecological community</a>	Critically Endangered	Community likely to occur within area	In feature area
<a href="#">Illawarra-Shoalhaven Subtropical Rainforest of the Sydney Basin Bioregion</a>	Critically Endangered	Community likely to occur within area	In feature area
<a href="#">Littoral Rainforest and Coastal Vine Thickets of Eastern Australia</a>	Critically Endangered	Community likely to occur within area	In buffer area only
<a href="#">River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria</a>	Critically Endangered	Community likely to occur within area	In feature area
<a href="#">Subtropical and Temperate Coastal Saltmarsh</a>	Vulnerable	Community likely to occur within area	In feature area

Listed Threatened Species

[ Resource Information ]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.  
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			



Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Anthochaera phrygia</a> Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Botaurus poiciloptilus</a> Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Calidris tenuirostris</a> Great Knot [862]	Critically Endangered	Roosting known to occur within area	In feature area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Charadrius mongolus</a> Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area	In feature area
<a href="#">Dasyornis brachypterus</a> Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Diomedea antipodensis</a> Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea antipodensis gibsoni</a> Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea epomophora</a> Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Diomedea exulans</a> Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea sanfordi</a> Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Falco hypoleucos</a> Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Fregetta grallaria grallaria</a> White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Grantiella picta</a> Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
<a href="#">Limosa lapponica baueri</a> Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Neophema chrysogaster</a> Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Pachyptila turtur subantarctica</a> Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Phoebetria fusca</a> Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Pterodroma leucoptera leucoptera</a> Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#">Pterodroma neglecta neglecta</a> Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area	In feature area
<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Sternula nereis nereis</a> Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Thalassarche bulleri</a> Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche bulleri platei</a> Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Thalassarche cauta</a> Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Thalassarche eremita</a> Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche salvini</a> Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Thinornis cucullatus cucullatus</a> Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area	In feature area
FISH			
<a href="#">Epinephelus daemeli</a> Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Hippocampus whitei</a> White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Prototroctes maraena</a> Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Seriolella brama</a> Blue Warehou [69374]	Conservation Dependent	Species or species habitat known to occur within area	In feature area



Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Thunnus maccoyii</a> Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area
FROG			
<a href="#">Heleioporus australiacus</a> Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Litoria aurea</a> Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Mixophyes balbus</a> Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat may occur within area	In feature area
MAMMAL			
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
<a href="#">Chalinolobus dwyeri</a> Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Dasyurus maculatus maculatus (SE mainland population)</a> Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Isoodon obesulus obesulus</a> Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Petauroides volans</a> Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Petrogale penicillata</a> Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<a href="#">Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)</a> Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Potorous tridactylus tridactylus</a> Long-nosed Potoroo (SE Mainland) [66645]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Pseudomys novaehollandiae</a> New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
<a href="#">Pteropus poliocephalus</a> Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area	In feature area
PLANT			
<a href="#">Acacia bynoeana</a> Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Caladenia tessellata</a> Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Cryptostylis hunteriana</a> Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Cynanchum elegans</a> White-flowered Wax Plant [12533]	Endangered	Species or species habitat known to occur within area	In buffer area only
<a href="#">Daphnandra johnsonii</a> Illawarra Socketwood [67186]	Endangered	Species or species habitat likely to occur within area	In buffer area only
<a href="#">Genoplesium baueri</a> Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid [7528]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Haloragis exalata subsp. exalata</a> Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Irenepharsus trypherus</a> Delicate Cress, Illawarra Irene [14664]	Endangered	Species or species habitat may occur within area	In buffer area only
<a href="#">Melaleuca biconvexa</a> Biconvex Paperbark [5583]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Persicaria elatior</a> Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Persoonia hirsuta</a> Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#">Pimelea spicata</a> Spiked Rice-flower [20834]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Pomaderris brunnea</a> Rufous Pomaderris, Brown Pomaderris [16845]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Prasophyllum affine</a> Jervis Bay Leek Orchid, Culburra Leek-orchid, Kinghorn Point Leek-orchid [2210]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Pterostylis gibbosa</a> Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Pultenaea aristata</a> [18062]	Vulnerable	Species or species habitat may occur within area	In buffer area only
<a href="#">Rhizanthella slateri</a> Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area	In buffer area only
<a href="#">Rhodamnia rubescens</a> Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Rhodomyrtus psidioides</a> Native Guava [19162]	Critically Endangered	Species or species habitat may occur within area	In feature area
<a href="#">Syzygium paniculatum</a> Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Thesium australe</a> Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Zieria granulata</a> Hill Zieria, Hilly Zieria, Illawarra Zieria [17147]	Endangered	Species or species habitat likely to occur within area	In buffer area only
REPTILE			
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In feature area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In feature area



Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Hoplocephalus bungaroides</a> Broad-headed Snake [1182]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
SHARK			
<a href="#">Carcharias taurus (east coast population)</a> Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Galeorhinus galeus</a> School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area	In feature area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Sphyrna lewini</a> Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat may occur within area	In feature area
Listed Migratory Species			
[ Resource Information ]			
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat likely to occur within area	In feature area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Ardenna carneipes</a> Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Ardenna grisea</a> Sooty Shearwater [82651]		Species or species habitat likely to occur within area	In feature area
<a href="#">Ardenna pacifica</a> Wedge-tailed Shearwater [84292]		Breeding known to occur within area	In buffer area only
<a href="#">Ardenna tenuirostris</a> Short-tailed Shearwater [82652]		Breeding known to occur within area	In buffer area only
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Diomedea antipodensis</a> Antipodean Albatross [64458]		Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea epomophora</a> Southern Royal Albatross [89221]		Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea exulans</a> Wandering Albatross [89223]		Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea sanfordi</a> Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area	In feature area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Phoebetria fusca</a> Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Sternula albifrons</a> Little Tern [82849]		Breeding known to occur within area	In feature area
<a href="#">Thalassarche bulleri</a> Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Thalassarche cauta</a> Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Thalassarche eremita</a> Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche salvini</a> Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Migratory Marine Species			
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
<a href="#">Caperea marginata</a> Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In feature area
<a href="#">Carcharhinus longimanus</a> Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area	In feature area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In feature area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area



Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Eubalaena australis as Balaena glacialis australis</a> Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Lagenorhynchus obscurus</a> Dusky Dolphin [43]		Species or species habitat may occur within area	In feature area
<a href="#">Lamna nasus</a> Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area	In feature area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Mobula birostris as Manta birostris</a> Giant Manta Ray [90034]		Species or species habitat may occur within area	In feature area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat likely to occur within area	In feature area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area
Migratory Terrestrial Species			
<a href="#">Cuculus optatus</a> Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area	In feature area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area	In buffer area only
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area	In feature area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat known to occur within area	In feature area
<a href="#">Symposiachrus trivirgatus as Monarcha trivirgatus</a> Spectacled Monarch [83946]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
<a href="#">Arenaria interpres</a> Ruddy Turnstone [872]		Roosting known to occur within area	In feature area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Roosting known to occur within area	In feature area
<a href="#">Calidris alba</a> Sanderling [875]		Roosting known to occur within area	In feature area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Calidris ruficollis</a> Red-necked Stint [860]		Roosting known to occur within area	In feature area
<a href="#">Calidris tenuirostris</a> Great Knot [862]		Roosting known to occur within area	In feature area
<a href="#">Charadrius bicinctus</a> Double-banded Plover [895]	Vulnerable	Roosting known to occur within area	In feature area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]		Species or species habitat known to occur within area	In feature area
<a href="#">Charadrius mongolus</a> Lesser Sand Plover, Mongolian Plover [879]		Roosting known to occur within area	In feature area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Gallinago megala</a> Swinhoe's Snipe [864]		Roosting likely to occur within area	In feature area
<a href="#">Gallinago stenura</a> Pin-tailed Snipe [841]		Roosting likely to occur within area	In feature area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Limosa limosa</a> Black-tailed Godwit [845]		Roosting known to occur within area	In feature area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]		Species or species habitat known to occur within area	In feature area
<a href="#">Numenius minutus</a> Little Curlew, Little Whimbrel [848]	Critically Endangered	Roosting likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Numenius phaeopus</a> Whimbrel [849]		Roosting known to occur within area	In feature area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat known to occur within area	In feature area
<a href="#">Pluvialis fulva</a> Pacific Golden Plover [25545]		Roosting known to occur within area	In feature area
<a href="#">Thalasseus bergii</a> Greater Crested Tern [83000]		Breeding known to occur within area	In buffer area only
<a href="#">Tringa brevipes</a> Grey-tailed Tattler [851]		Roosting known to occur within area	In feature area
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area	In feature area
<a href="#">Tringa stagnatilis</a> Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area	In feature area

### Other Matters Protected by the EPBC Act

Commonwealth Lands <a href="#">[ Resource Information ]</a>		
The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.		
Commonwealth Land Name	State	Buffer Status
<b>Australian Academy of Science</b>		
Commonwealth Land - Australian Academy of Science [12031]	NSW	In buffer area only
<b>Communications, Information Technology and the Arts - Telstra Corporation Limited</b>		
Commonwealth Land - Australian Telecommunications Commission [12215]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [12221]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [12228]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [11892]	NSW	In buffer area only



Commonwealth Land Name		State	Buffer Status
Commonwealth Land - Australian Telecommunications Commission [12026]		NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [12036]		NSW	In feature area
Commonwealth Land - Telstra Corporation Limited [12039]		NSW	In feature area
Defence			
Commonwealth Land - Defence Service Homes Corporation [12029]		NSW	In buffer area only
Commonwealth Land - Defence Service Homes Corporation [12217]		NSW	In buffer area only
Defence - LAKE ILLAWARRA CADET FACILITY [10241]		NSW	In buffer area only
Defence - THROSBY TRG DEPOT-PORT KEMBLA [10056]		NSW	In buffer area only
Defence - Defence Housing Authority			
Commonwealth Land - Director of War Service Homes [12032]		NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [12030]		NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [12028]		NSW	In buffer area only
Commonwealth Land - Director of War Service Homes [12027]		NSW	In buffer area only
Unknown			
Commonwealth Land - [12218]		NSW	In buffer area only
Commonwealth Land - [12219]		NSW	In buffer area only
Commonwealth Land - [12230]		NSW	In buffer area only
Commonwealth Land - [12232]		NSW	In buffer area only
Commonwealth Land - [12229]		NSW	In buffer area only
Commonwealth Land - [12231]		NSW	In buffer area only
Commonwealth Land - [12220]		NSW	In buffer area only
Listed Marine Species [ Resource Information ]			
Scientific Name		Threatened Category	Presence Text
Bird			
<a href="#">Actitis hypoleucos</a>			
Common Sandpiper [59309]			
		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat likely to occur within area	In feature area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
<a href="#">Ardenna carneipes as Puffinus carneipes</a> Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Ardenna grisea as Puffinus griseus</a> Sooty Shearwater [82651]		Species or species habitat likely to occur within area	In feature area
<a href="#">Ardenna pacifica as Puffinus pacificus</a> Wedge-tailed Shearwater [84292]		Breeding known to occur within area	In buffer area only
<a href="#">Ardenna tenuirostris as Puffinus tenuirostris</a> Short-tailed Shearwater [82652]		Breeding known to occur within area	In buffer area only
<a href="#">Arenaria interpres</a> Ruddy Turnstone [872]		Roosting known to occur within area	In feature area
<a href="#">Bubulcus ibis as Ardea ibis</a> Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Roosting known to occur within area	In feature area
<a href="#">Calidris alba</a> Sanderling [875]		Roosting known to occur within area	In feature area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area	In feature area
<a href="#">Calidris ruficollis</a> Red-necked Stint [860]		Roosting known to occur within area overfly marine area	In feature area
<a href="#">Calidris tenuirostris</a> Great Knot [862]	Critically Endangered	Roosting known to occur within area overfly marine area	In feature area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat known to occur within area	In feature area
<a href="#">Charadrius bicinctus</a> Double-banded Plover [895]		Roosting known to occur within area overfly marine area	In feature area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Charadrius mongolus</a> Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area	In feature area
<a href="#">Charadrius ruficapillus</a> Red-capped Plover [881]		Roosting known to occur within area overfly marine area	In feature area
<a href="#">Chroicocephalus novaehollandiae as Larus novaehollandiae</a> Silver Gull [82326]		Breeding known to occur within area	In buffer area only
<a href="#">Diomedea antipodensis</a> Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Diomedea antipodensis gibsoni</a> as <a href="#">Diomedea gibsoni</a> Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea epomophora</a> Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea exulans</a> Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Diomedea sanfordi</a> Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Eudyptula minor</a> Little Penguin [1085]		Breeding known to occur within area	In buffer area only
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area	In feature area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area	In buffer area only
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area overfly marine area	In feature area
<a href="#">Gallinago megala</a> Swinhoe's Snipe [864]		Roosting likely to occur within area overfly marine area	In feature area
<a href="#">Gallinago stenura</a> Pin-tailed Snipe [841]		Roosting likely to occur within area overfly marine area	In feature area



Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
<a href="#">Himantopus himantopus</a> Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area overfly marine area	In feature area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
<a href="#">Larus dominicanus</a> Kelp Gull [809]		Breeding known to occur within area	In buffer area only
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In buffer area only
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
<a href="#">Limosa limosa</a> Black-tailed Godwit [845]		Roosting known to occur within area overfly marine area	In feature area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Motacilla flava</a> Yellow Wagtail [644]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In buffer area only
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area	In feature area
<a href="#">Neophema chrysogaster</a> Orange-bellied Parrot [747]		Species or species habitat may occur within area overfly marine area	In feature area
<a href="#">Neophema chrysostoma</a> Blue-winged Parrot [726]		Species or species habitat likely to occur within area overfly marine area	In feature area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Numenius minutus</a> Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area overfly marine area	In feature area
<a href="#">Numenius phaeopus</a> Whimbrel [849]		Roosting known to occur within area	In feature area
<a href="#">Pachyptila turtur</a> Fairy Prion [1066]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat known to occur within area	In feature area
<a href="#">Pelagodroma marina</a> White-faced Storm-Petrel [1016]		Breeding known to occur within area	In buffer area only
<a href="#">Phoebetria fusca</a> Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Pluvialis fulva</a> Pacific Golden Plover [25545]		Roosting known to occur within area	In feature area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area	In feature area
<a href="#">Rostratula australis as Rostratula benghalensis (sensu lato)</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
<a href="#">Stercorarius skua as Catharacta skua</a> Great Skua [823]		Species or species habitat may occur within area	In buffer area only
<a href="#">Sternula albifrons as Sterna albifrons</a> Little Tern [82849]		Breeding known to occur within area	In feature area
<a href="#">Symposiachrus trivirgatus as Monarcha trivirgatus</a> Spectacled Monarch [83946]		Species or species habitat may occur within area overfly marine area	In feature area
<a href="#">Thalassarche bulleri</a> Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche bulleri platei as Thalassarche sp. nov.</a> Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<a href="#">Thalassarche cauta</a> Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Thalassarche eremita</a> Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In feature area
<a href="#">Thalassarche salvini</a> Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
<a href="#">Thalasseus bergii as Sterna bergii</a> Greater Crested Tern [83000]		Breeding known to occur within area	In buffer area only
<a href="#">Thinornis cucullatus cucullatus as Thinornis rubricollis rubricollis</a> Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
<a href="#">Tringa brevipes as Heteroscelus brevipes</a> Grey-tailed Tattler [851]		Roosting known to occur within area	In feature area
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area overfly marine area	In feature area
<a href="#">Tringa stagnatilis</a> Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area overfly marine area	In feature area
Fish			
<a href="#">Acentronura tentaculata</a> Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area	In feature area
<a href="#">Cosmocampus howensis</a> Lord Howe Pipefish [66208]		Species or species habitat may occur within area	In feature area



Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Festucalex cinctus</a> Girdled Pipefish [66214]		Species or species habitat may occur within area	In feature area
<a href="#">Filicampus tigris</a> Tiger Pipefish [66217]		Species or species habitat may occur within area	In feature area
<a href="#">Heraldia nocturna</a> Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In feature area
<a href="#">Hippichthys penicillus</a> Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area	In feature area
<a href="#">Hippocampus abdominalis</a> Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area	In feature area
<a href="#">Hippocampus breviceps</a> Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area	In feature area
<a href="#">Hippocampus whitei</a> White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat likely to occur within area	In feature area
<a href="#">Histiogamphelus briggsii</a> Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area	In feature area
<a href="#">Kimblaeus bassensis</a> Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area	In feature area
<a href="#">Lissocampus runa</a> Javelin Pipefish [66251]		Species or species habitat may occur within area	In feature area
<a href="#">Maroubra perserrata</a> Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Notiocampus ruber</a> Red Pipefish [66265]		Species or species habitat may occur within area	In feature area
<a href="#">Phyllopteryx taeniolatus</a> Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In feature area
<a href="#">Solegnathus spinosissimus</a> Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area	In feature area
<a href="#">Solenostomus cyanopterus</a> Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area	In feature area
<a href="#">Solenostomus paradoxus</a> Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area	In feature area
<a href="#">Stigmatopora argus</a> Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In feature area
<a href="#">Stigmatopora nigra</a> Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In feature area
<a href="#">Syngnathoides biaculeatus</a> Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area	In feature area
<a href="#">Trachyrhamphus bicoarctatus</a> Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area	In feature area
<a href="#">Urocampus carinirostris</a> Hairy Pipefish [66282]		Species or species habitat may occur within area	In feature area
<a href="#">Vanacampus margaritifer</a> Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
<a href="#">Vanacampus phillipi</a> Port Phillip Pipefish [66284]		Species or species habitat may occur within area	In feature area
Mammal			
<a href="#">Arctocephalus forsteri</a> Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area	In feature area
<a href="#">Arctocephalus pusillus</a> Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area	In feature area
Reptile			
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In feature area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Whales and Other Cetaceans			
[ Resource Information ]			
Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
<a href="#">Balaenoptera acutorostrata</a> Minke Whale [33]		Species or species habitat may occur within area	In feature area

Current Scientific Name	Status	Type of Presence	Buffer Status
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
<a href="#">Caperea marginata</a> Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In feature area
<a href="#">Delphinus delphis</a> Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In feature area
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In feature area
<a href="#">Grampus griseus</a> Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In feature area
<a href="#">Lagenorhynchus obscurus</a> Dusky Dolphin [43]		Species or species habitat may occur within area	In feature area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area	In feature area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat likely to occur within area	In feature area



Current Scientific Name	Status	Type of Presence	Buffer Status
<a href="#">Tursiops aduncus</a>			
Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In feature area
<a href="#">Tursiops truncatus s. str.</a>			
Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In feature area

### Extra Information

State and Territory Reserves			<a href="#">[ Resource Information ]</a>
Protected Area Name	Reserve Type	State	Buffer Status
Berkeley	Nature Reserve	NSW	In buffer area only
Bushrangers Bay	Aquatic Reserve	NSW	In buffer area only
Five Islands	Nature Reserve	NSW	In buffer area only

Regional Forest Agreements			<a href="#">[ Resource Information ]</a>
Note that all areas with completed RFAs have been included.			
RFA Name		State	Buffer Status
<a href="#">Southern RFA</a>		New South Wales	In buffer area only

Nationally Important Wetlands			<a href="#">[ Resource Information ]</a>
Wetland Name		State	Buffer Status
<a href="#">Coomaditchy Lagoon</a>		NSW	In buffer area only
<a href="#">Five Islands Nature Reserve</a>		NSW	In buffer area only
<a href="#">Killalea Lagoon</a>		NSW	In buffer area only
<a href="#">Lake Illawarra</a>		NSW	In feature area
<a href="#">Minnamurra River Estuary</a>		NSW	In buffer area only

EPBC Act Referrals					<a href="#">[ Resource Information ]</a>
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status	
Controlled action					
<a href="#">Albion Park Quarry Extraction Area Stage 7 Extension</a>	2020/8871	Controlled Action	Assessment Approach	In buffer area only	
<a href="#">Albion Park Rail Bypass, NSW</a>	2017/7909	Controlled Action	Post-Approval	In buffer area only	
<a href="#">Pilot Offshore Artificial Reefs</a>	2008/4176	Controlled Action	Post-Approval	In buffer area only	

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
<a href="#">Residential subdivision, Lot 101 DP 785139 Crest Road, Albion Park, NSW</a>	2017/8048	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
<a href="#">Calderwood Urban Development</a>	2010/5381	Not Controlled Action	Completed	In buffer area only
<a href="#">Duke Cogeneration Plant Port Kembla</a>	2001/179	Not Controlled Action	Completed	In buffer area only
<a href="#">Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia</a>	2015/7522	Not Controlled Action	Completed	In feature area
<a href="#">Increase of Road Access to 24 Hours a Day 7 Days a Week</a>	2008/4206	Not Controlled Action	Completed	In buffer area only
<a href="#">INDIGO Central Submarine Telecommunications Cable</a>	2017/8127	Not Controlled Action	Completed	In feature area
<a href="#">Lake Illawarra entrance works, Stage 2</a>	2004/1696	Not Controlled Action	Completed	In feature area
<a href="#">Lot 2 Foreshore Drive, in-filling pit, Port Kembla, NSW</a>	2018/8374	Not Controlled Action	Completed	In buffer area only
<a href="#">Optus mobiles telecommunications base station facility, BlueScope Steel, Lot 1 Five Islands Rd, Port Kembla</a>	2013/7014	Not Controlled Action	Completed	In buffer area only
<a href="#">Shellcove Boatharbour Marine, Commercial &amp; Residential Development</a>	2007/3935	Not Controlled Action	Completed	In buffer area only
<a href="#">Tallawarra Lands: Urban Development</a>	2011/6002	Not Controlled Action	Completed	In buffer area only
<a href="#">Whytes Gully New Landfill Cell Project, Kembla Grange, NSW</a>	2013/6712	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
<a href="#">INDIGO Marine Cable Route Survey (INDIGO)</a>	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
<a href="#">Lake Illawarra Entrance Works (stage 2)</a>	2005/1997	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
<a href="#">NBN Transit Fibre Minnamurra Wetlands Section</a>	2011/5900	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action (particular manner)				
<a href="#">Transport of intermediate level radioactive waste to Lucas Heights, NSW</a>	2015/7437	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
<a href="#">Transport of OPAL Spent Fuel to France in 2018 and 2025</a>	2016/7841	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Referral decision				
<a href="#">Breeding program for Grey Nurse Sharks</a>	2007/3245	Referral Decision	Completed	In feature area
<a href="#">Calderwood Mod 4</a>	2021/8981	Referral Decision	Referral Publication	In buffer area only
<a href="#">Stage 2 Masonry Plant, Port Kembla, NSW</a>	2014/7247	Referral Decision	Completed	In buffer area only
Biologically Important Areas				
Scientific Name		Behaviour	Presence	Buffer Status
Dolphins				
<a href="#">Tursiops aduncus</a>				
Indo-Pacific/Spotted Bottlenose Dolphin [68418]		Breeding	Likely to occur	In feature area
Seabirds				
<a href="#">Ardenna carneipes</a>				
Flesh-footed Shearwater [82404]		Foraging	Known to occur	In buffer area only
<a href="#">Diomedea exulans antipodensis</a>				
Antipodean Albatross [82269]		Foraging	Known to occur	In buffer area only
<a href="#">Eudyptula minor</a>				
Little Penguin [1085]		Breeding	Known to occur	In buffer area only
<a href="#">Eudyptula minor</a>				
Little Penguin [1085]		Breeding	Likely to occur	In feature area
<a href="#">Procellaria parkinsoni</a>				
Black Petrel [1048]		Foraging	Likely to occur	In buffer area only
Sharks				
<a href="#">Carcharias taurus</a>				
Grey Nurse Shark [64469]		Foraging	Known to occur	In feature area
<a href="#">Carcharodon carcharias</a>				
White Shark [64470]		Distribution	Known to occur	In buffer area only

Scientific Name	Behaviour	Presence	Buffer Status
Whales			
<a href="#">Megaptera novaeangliae</a>			
Humpback Whale [38]	Foraging	Known to occur	In feature area

Bioregional Assessments			
SubRegion	BioRegion	Website	Buffer Status
Sydney	Sydney Basin	<a href="#">BA website</a>	In feature area



# Caveat

## 1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

## 2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

## 3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

## 4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

# Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria : Public Report of all Valid Records of Threatened (listed on BC Act 2016) ,Protected or Native listed Animals in SHELLHARBOUR LGA returned a total of 7,998 records of 457 species.


Report generated on 19/11/2021 10:56 AM



Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records	Info
Animalia	Chondrichthyes	Centrophoridae	T321	<i>Centrophorus harrissoni</i>		Harrisson's Dogfish			P	
Animalia	Chondrichthyes	Centrophoridae	T322	<i>Centrophorus zeehaani</i>		Southern Dogfish			P	
Animalia	Amphibia	Myobatrachidae	3134	<i>Crinia signifera</i>		Common Eastern Froglet	P		73	
Animalia	Amphibia	Myobatrachidae	3137	<i>Crinia tinnula</i>		Wallum Froglet	V,P		K	
Animalia	Amphibia	Myobatrachidae	3073	<i>^Mixophyes balbus</i>		Stuttering Frog	E1,P,2	V	10	
Animalia	Amphibia	Myobatrachidae	3116	<i>Pseudophryne australis</i>		Red-crowned Toadlet	V,P		K	
Animalia	Amphibia	Myobatrachidae	3158	<i>Uperoleia laevigata</i>		Smooth Toadlet	P		1	
Animalia	Amphibia	Hylidae	3166	<i>Litoria aurea</i>		Green and Golden Bell Frog	E1,P	V	19	
Animalia	Amphibia	Hylidae	3171	<i>Litoria caerulea</i>		Green Tree Frog	P		2	
Animalia	Amphibia	Hylidae	3180	<i>Litoria dentata</i>		Bleating Tree Frog	P		15	
Animalia	Amphibia	Hylidae	3183	<i>Litoria fallax</i>		Eastern Dwarf Tree Frog	P		60	













Animalia	Amphibia	Hylidae	3190	<i>Litoria jervisiensis</i>	Jervis Bay Tree Frog	P		3	
Animalia	Amphibia	Hylidae	3316	<i>Litoria lesueuri</i>	Lesueur's Frog	P		19	
Animalia	Amphibia	Hylidae	3039	<i>Litoria littlejohni</i>	Littlejohn's Tree Frog	V,P	V	K	
Animalia	Amphibia	Hylidae	3309	<i>Litoria nudidigita</i>	Leaf Green River Tree Frog	P		40	
Animalia	Amphibia	Hylidae	3204	<i>Litoria peronii</i>	Peron's Tree Frog	P		143	
Animalia	Amphibia	Hylidae	3206	<i>Litoria phyllochroa</i>	Leaf-green Tree Frog	P		2	
Animalia	Amphibia	Hylidae	3215	<i>Litoria verreauxii</i>	Verreaux's Frog	P		14	
Animalia	Amphibia	Limnodynastidae	3042	<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V,P	V	K	
Animalia	Amphibia	Limnodynastidae	3061	<i>Limnodynastes peronii</i>	Brown-striped Frog	P		135	
Animalia	Reptilia	Cheloniidae	2004	<i>Caretta caretta</i>	Loggerhead Turtle	E1,P	E	K	
Animalia	Reptilia	Cheloniidae	2007	<i>Chelonia mydas</i>	Green Turtle	V,P	V	K	
Animalia	Reptilia	Cheloniidae	2008	<i>Eretmochelys imbricata</i>	Hawksbill Turtle	P	V	K	
Animalia	Reptilia	Dermochelyidae	2013	<i>Dermochelys coriacea</i>	Leatherback Turtle	E1,P	E	K	
Animalia	Reptilia	Chelidae	2017	<i>Chelodina longicollis</i>	Eastern Snake-necked Turtle	P		39	
Animalia	Reptilia	Scincidae	2444	<i>Anepischetosia maccoyi</i>	Highlands Forest-skink	P		2	
Animalia	Reptilia	Scincidae	2559	<i>Concinnia tenuis</i>	Barred-sided Skink	P		5	
Animalia	Reptilia	Scincidae	2866	<i>Cyclodomorphus michaeli</i>	Mainland She-oak Skink	P		1	


Animalia	Reptilia	Scincidae	2214	<i>Eulamprus heatwolei</i>	Yellow-bellied Water-skink	P	4	
Animalia	Reptilia	Scincidae	2557	<i>Eulamprus quoyii</i>	Eastern Water-skink	P	42	
Animalia	Reptilia	Scincidae	2450	<i>Lampropholis delicata</i>	Dark-flecked Garden Sunskink	P	25	
Animalia	Reptilia	Scincidae	2451	<i>Lampropholis guichenoti</i>	Pale-flecked Garden Sunskink	P	20	
Animalia	Reptilia	Scincidae	T117	<i>Lampropholis sp.</i>	unidentified grass skink	P	2	
Animalia	Reptilia	Scincidae	2430	<i>Liopholis whitii</i>	White's Skink	P	K	
Animalia	Reptilia	Scincidae	2542	<i>Saiphos equalis</i>	Three-toed Skink	P	9	
Animalia	Reptilia	Scincidae	2452	<i>Saproscincus mustelinus</i>	Weasel Skink	P	7	
Animalia	Reptilia	Scincidae	2580	<i>Tiliqua scincoides</i>	Eastern Blue-tongue	P	144	
Animalia	Reptilia	Agamidae	2194	<i>Amphibolurus muricatus</i>	Jacky Lizard	P	15	
Animalia	Reptilia	Agamidae	2252	<i>Intellagama lesueurii</i>	Eastern Water Dragon	P	23	
Animalia	Reptilia	Agamidae	2177	<i>Pogona barbata</i>	Bearded Dragon	P	6	
Animalia	Reptilia	Varanidae	2287	<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V,P	K	
Animalia	Reptilia	Varanidae	2283	<i>Varanus varius</i>	Lace Monitor	P	3	
Animalia	Reptilia	Pythonidae	5096	<i>Morelia spilota spilota</i>	Diamond Python	P	1	
Animalia	Reptilia	Elapidae	2640	<i>Acanthophis antarcticus</i>	Common Death Adder	P	4	
Animalia	Reptilia	Elapidae	2647	<i>Cacophis squamulosus</i>	Golden-crowned Snake	P	15	

Animalia	Reptilia	Elapidae	5136	<i>Cryptophis nigrescens</i>	Eastern Small-eyed Snake	P		18	
Animalia	Reptilia	Elapidae	2655	<i>Demansia psammophis</i>	Yellow-faced Whip Snake	P		1	
Animalia	Reptilia	Elapidae	2805	<i>Drysdalia rhodogaster</i>	Mustard-bellied Snake	P		3	
Animalia	Reptilia	Elapidae	2676	<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	E1,P,2	V	K	
Animalia	Reptilia	Elapidae	2770	<i>Hydrophis platurus</i>	Yellow-bellied Seasnake	P		2	
Animalia	Reptilia	Elapidae	2681	<i>Notechis scutatus</i>	Tiger Snake	P		3	
Animalia	Reptilia	Elapidae	2693	<i>Pseudechis porphyriacus</i>	Red-bellied Black Snake	P		154	
Animalia	Reptilia	Elapidae	2699	<i>Pseudonaja textilis</i>	Eastern Brown Snake	P		12	
Animalia	Aves	Megapodiidae	0008	<i>Alectura lathamii</i>	Australian Brush-turkey	P		1	
Animalia	Aves	Phasianidae	0009	<i>Coturnix pectoralis</i>	Stubble Quail	P		5	
Animalia	Aves	Phasianidae	9046	<i>Coturnix sp.</i>	Unidentified Quail	P		1	
Animalia	Aves	Phasianidae	0012	<i>Synoicus chinensis</i>	King Quail	P		1	
Animalia	Aves	Phasianidae	0011	<i>Synoicus ypsilophora</i>	Brown Quail	P		5	
Animalia	Aves	Anseranatidae	0199	<i>Anseranas semipalmata</i>	Magpie Goose	V,P		K	
Animalia	Aves	Anatidae	0210	<i>Anas castanea</i>	Chestnut Teal	P		18	
Animalia	Aves	Anatidae	0211	<i>Anas gracilis</i>	Grey Teal	P		24	
Animalia	Aves	Anatidae	0212	<i>Anas rhynchotis</i>	Australasian Shoveler	P		6	

Animalia	Aves	Anatidae	0208	<i>Anas superciliosa</i>	Pacific Black Duck	P		54	
Animalia	Aves	Anatidae	0215	<i>Aythya australis</i>	Hardhead	P		12	
Animalia	Aves	Anatidae	0217	<i>Biziura lobata</i>	Musk Duck	P		10	
Animalia	Aves	Anatidae	0202	<i>Chenonetta jubata</i>	Australian Wood Duck	P		36	
Animalia	Aves	Anatidae	0203	<i>Cygnus atratus</i>	Black Swan	P		105	
Animalia	Aves	Anatidae	0213	<i>Malacorhynchus membranaceus</i>	Pink-eared Duck	P		5	
Animalia	Aves	Anatidae	0216	<i>Oxyura australis</i>	Blue-billed Duck	V,P		3	
Animalia	Aves	Anatidae	0214	<i>Stictonetta naevosa</i>	Freckled Duck	V,P		5	
Animalia	Aves	Anatidae	0207	<i>Tadorna tadornoides</i>	Australian Shelduck	P		3	
Animalia	Aves	Phaethontidae	0107	<i>Phaethon rubricauda</i>	Red-tailed Tropicbird	V,P	C,J	K	
Animalia	Aves	Podicipedidae	0062	<i>Poliocephalus poliocephalus</i>	Hoary-headed Grebe	P		15	
Animalia	Aves	Podicipedidae	T180	<i>small grebe sp.</i>	Small grebe	P		1	
Animalia	Aves	Podicipedidae	0061	<i>Tachybaptus novaehollandiae</i>	Australasian Grebe	P		13	
Animalia	Aves	Columbidae	0033	<i>Chalcophaps indica</i>	Emerald Dove	P		2	
Animalia	Aves	Columbidae	0028	<i>Columba leucomela</i>	White-headed Pigeon	P		15	
Animalia	Aves	Columbidae	0032	<i>Geopelia humeralis</i>	Bar-shouldered Dove	P		22	
Animalia	Aves	Columbidae	0044	<i>Leucosarcia melanoleuca</i>	Wonga Pigeon	P		8	

Animalia	Aves	Columbidae	0027	<i>Lopholaimus antarcticus</i>	Topknot Pigeon	P		8	
Animalia	Aves	Columbidae	0029	<i>Macropygia phasianella</i>	Brown Cuckoo-Dove	P		19	
Animalia	Aves	Columbidae	0043	<i>Ocyphaps lophotes</i>	Crested Pigeon	P		37	
Animalia	Aves	Columbidae	0035	<i>Phaps elegans</i>	Brush Bronzewing	P		1	
Animalia	Aves	Columbidae	0025	<i>Ptilinopus magnificus</i>	Wompoo Fruit-Dove	V,P		K	
Animalia	Aves	Columbidae	0021	<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove	V,P		5	
Animalia	Aves	Columbidae	0023	<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V,P		K	
Animalia	Aves	Podargidae	0313	<i>Podargus strigoides</i>	Tawny Frogmouth	P		31	
Animalia	Aves	Caprimulgidae	0330	<i>Eurostopodus mystacalis</i>	White-throated Nightjar	P		1	
Animalia	Aves	Apodidae	0335	<i>Apus pacificus</i>	Fork-tailed Swift	P	C,J,K	3	
Animalia	Aves	Apodidae	0334	<i>Hirundapus caudacutus</i>	White-throated Needletail	P	V,C,J,K	4	
Animalia	Aves	Oceanitidae	0944	<i>Fregetta grallaria</i>	White-bellied Storm-Petrel	V,P	V	P	
Animalia	Aves	Diomedeidae	0846	<i>Diomedea antipodensis</i>	Antipodean Albatross	V,P	V	K	
Animalia	Aves	Diomedeidae	0086	<i>Diomedea exulans</i>	Wandering Albatross	E1,P	E	2	
Animalia	Aves	Diomedeidae	0847	<i>Diomedea gibsoni</i>	Gibson's Albatross	V,P	V	K	
Animalia	Aves	Diomedeidae	0092	<i>Phoebetria fusca</i>	Sooty Albatross	V,P	V	K	
Animalia	Aves	Diomedeidae	0931	<i>Thalassarche bulleri</i>	Buller's Albatross	P	V	K	



Animalia	Aves	Diomedidae	0091	<i>Thalassarche cauta</i>	Shy Albatross	V,P	V	2	
Animalia	Aves	Diomedidae	0089	<i>Thalassarche chlororhynchos</i>	Yellow-nosed Albatross	P		1	
Animalia	Aves	Diomedidae	0090	<i>Thalassarche chrysostoma</i>	Grey-headed Albatross	P	E	K	
Animalia	Aves	Diomedidae	0859	<i>Thalassarche impavida</i>	Campbell Albatross	P	V	K	
Animalia	Aves	Diomedidae	0088	<i>Thalassarche melanophris</i>	Black-browed Albatross	V,P	V	1	
Animalia	Aves	Diomedidae	0862	<i>Thalassarche salvini</i>	Salvin's Albatross	P	V	K	
Animalia	Aves	Procellariidae	0072	<i>Ardenna carneipes</i>	Flesh-footed Shearwater	V,P	J,K	1	
Animalia	Aves	Procellariidae	0070	<i>Ardenna grisea</i>	Sooty Shearwater	P	J	1	
Animalia	Aves	Procellariidae	0069	<i>Ardenna pacifica</i>	Wedge-tailed Shearwater	P	J	35	
Animalia	Aves	Procellariidae	0071	<i>Ardenna tenuirostris</i>	Short-tailed Shearwater	P	C,J,K	20	
Animalia	Aves	Procellariidae	0853	<i>Calonectris leucomelas</i>	Streaked Shearwater	P	C,J,K	1	
Animalia	Aves	Procellariidae	0081	<i>Halobaena caerulea</i>	Blue Petrel	P	V	K	
Animalia	Aves	Procellariidae	0929	<i>Macronectes giganteus</i>	Southern Giant Petrel	E1,P	E	1	
Animalia	Aves	Procellariidae	0937	<i>Macronectes halli</i>	Northern Giant-Petrel	V,P	V	1	
Animalia	Aves	Procellariidae	0083	<i>Pachyptila turtur</i>	Fairy Prion	P		3	
Animalia	Aves	Procellariidae	8684	<i>Pterodroma leucoptera leucoptera</i>	Gould's Petrel	V,P	E	K	






Animalia	Aves	Procellariidae	0075	<i>Pterodroma macroptera</i>	Great-winged Petrel	P		1	
Animalia	Aves	Procellariidae	8993	<i>Pterodroma neglecta neglecta</i>	Kermadec Petrel (west Pacific subspecies)	V,P	V	K	
Animalia	Aves	Procellariidae	0955	<i>Pterodroma nigripennis</i>	Black-winged Petrel	V,P		K	
Animalia	Aves	Procellariidae	0971	<i>Pterodroma solandri</i>	Providence Petrel	V,P		K	
Animalia	Aves	Procellariidae	0067	<i>Puffinus assimilis</i>	Little Shearwater	V,P		K	
Animalia	Aves	Procellariidae	0068	<i>Puffinus gavia</i>	Fluttering Shearwater	P		5	
Animalia	Aves	Procellariidae	0913	<i>Puffinus huttoni</i>	Hutton's Shearwater	P		2	
Animalia	Aves	Spheniscidae	0005	<i>Eudyptula minor</i>	Little Penguin	P		15	
Animalia	Aves	Sulidae	0104	<i>Morus serrator</i>	Australasian Gannet	P		8	
Animalia	Aves	Sulidae	0105	<i>Sula dactylatra</i>	Masked Booby	V,P	J,K	K	
Animalia	Aves	Anhingidae	8731	<i>Anhinga novaehollandiae</i>	Australasian Darter	P		12	
Animalia	Aves	Phalacrocoracidae	0100	<i>Microcarbo melanoleucos</i>	Little Pied Cormorant	P		32	
Animalia	Aves	Phalacrocoracidae	0096	<i>Phalacrocorax carbo</i>	Great Cormorant	P		44	
Animalia	Aves	Phalacrocoracidae	T021	<i>Phalacrocorax sp.</i>	Unidentified Cormorant	P		10	
Animalia	Aves	Phalacrocoracidae	0097	<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant	P		34	
Animalia	Aves	Phalacrocoracidae	0099	<i>Phalacrocorax varius</i>	Pied Cormorant	P		15	

Animalia	Aves	Pelecanidae	0106	<i>Pelecanus conspicillatus</i>	Australian Pelican	P		121	
Animalia	Aves	Ciconiidae	0183	<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E1,P		1	
Animalia	Aves	Ardeidae	0186	<i>Ardea intermedia</i>	Intermediate Egret	P		1	
Animalia	Aves	Ardeidae	0189	<i>Ardea pacifica</i>	White-necked Heron	P		9	
Animalia	Aves	Ardeidae	T179	<i>Ardea/Egretta sp.</i>	Unidentified Egret	P		11	
Animalia	Aves	Ardeidae	0197	<i>Botaurus poiciloptilus</i>	Australasian Bittern	E1,P	E	5	
Animalia	Aves	Ardeidae	0977	<i>Bubulcus ibis</i>	Cattle Egret	P		10	
Animalia	Aves	Ardeidae	0193	<i>Butorides striata</i>	Striated Heron	P		7	
Animalia	Aves	Ardeidae	8712	<i>Casmerodius modesta</i>	Eastern Great Egret	P		23	
Animalia	Aves	Ardeidae	0185	<i>Egretta garzetta</i>	Little Egret	P		10	
Animalia	Aves	Ardeidae	0188	<i>Egretta novaehollandiae</i>	White-faced Heron	P		66	
Animalia	Aves	Ardeidae	0191	<i>Egretta sacra</i>	Eastern Reef Egret	P		8	
Animalia	Aves	Ardeidae	0196	<i>Ixobrychus flavicollis</i>	Black Bittern	V,P		K	
Animalia	Aves	Ardeidae	0192	<i>Nycticorax caledonicus</i>	Nankeen Night Heron	P		1	
Animalia	Aves	Threskiornithidae	0182	<i>Platalea flavipes</i>	Yellow-billed Spoonbill	P		8	
Animalia	Aves	Threskiornithidae	0181	<i>Platalea regia</i>	Royal Spoonbill	P		14	
Animalia	Aves	Threskiornithidae	0178	<i>Plegadis falcinellus</i>	Glossy Ibis	P		6	

Animalia	Aves	Threskiornithidae	0179	<i>Threskiornis moluccus</i>	Australian White Ibis	P	43	
Animalia	Aves	Threskiornithidae	0180	<i>Threskiornis spinicollis</i>	Straw-necked Ibis	P	11	
Animalia	Aves	Accipitridae	0222	<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk	P	3	
Animalia	Aves	Accipitridae	0221	<i>Accipiter fasciatus</i>	Brown Goshawk	P	20	
Animalia	Aves	Accipitridae	0220	<i>Accipiter novaehollandiae</i>	Grey Goshawk	P	8	
Animalia	Aves	Accipitridae	0224	<i>Aquila audax</i>	Wedge-tailed Eagle	P	18	
Animalia	Aves	Accipitridae	0234	<i>Aviceda subcristata</i>	Pacific Baza	P	1	
Animalia	Aves	Accipitridae	0219	<i>Circus approximans</i>	Swamp Harrier	P	8	
Animalia	Aves	Accipitridae	0218	<i>Circus assimilis</i>	Spotted Harrier	V,P	11	
Animalia	Aves	Accipitridae	0232	<i>Elanus axillaris</i>	Black-shouldered Kite	P	18	
Animalia	Aves	Accipitridae	0226	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V,P	18	
Animalia	Aves	Accipitridae	0228	<i>Haliastur sphenurus</i>	Whistling Kite	P	13	
Animalia	Aves	Accipitridae	0225	<i>Hieraaetus morphnoides</i>	Little Eagle	V,P	8	
Animalia	Aves	Accipitridae	0230	<i>^^Lophoictinia isura</i>	Square-tailed Kite	V,P,3	2	
Animalia	Aves	Accipitridae	0229	<i>Milvus migrans</i>	Black Kite	P	2	
Animalia	Aves	Accipitridae	8739	<i>^^Pandion cristatus</i>	Eastern Osprey	V,P,3	5	
Animalia	Aves	Falconidae	0239	<i>Falco berigora</i>	Brown Falcon	P	3	

Animalia	Aves	Falconidae	0240	<i>Falco cenchroides cenchroides</i>	Nankeen Kestrel	P	44	
Animalia	Aves	Falconidae	0235	<i>Falco longipennis</i>	Australian Hobby	P	7	
Animalia	Aves	Falconidae	0237	<i>Falco peregrinus</i>	Peregrine Falcon	P	14	
Animalia	Aves	Falconidae	0238	<i>Falco subniger</i>	Black Falcon	V,P	K	
Animalia	Aves	Rallidae	0059	<i>Fulica atra</i>	Eurasian Coot	P	34	
Animalia	Aves	Rallidae	0056	<i>Gallinula tenebrosa</i>	Dusky Moorhen	P	11	
Animalia	Aves	Rallidae	0046	<i>Hypotaenidia philippensis</i>	Buff-banded Rail	P	5	
Animalia	Aves	Rallidae	0045	<i>Lewinia pectoralis</i>	Lewin's Rail	P	1	
Animalia	Aves	Rallidae	0058	<i>Porphyrio porphyrio</i>	Purple Swamphen	P	38	
Animalia	Aves	Rallidae	0049	<i>Porzana fluminea</i>	Australian Spotted Crake	P	6	
Animalia	Aves	Rallidae	0050	<i>Porzana pusilla</i>	Baillon's Crake	P	5	
Animalia	Aves	Rallidae	0051	<i>Porzana tabuensis</i>	Spotless Crake	P	1	
Animalia	Aves	Burhinidae	0174	<i>Burhinus grallarius</i>	Bush Stone-curlew	E1,P	K	
Animalia	Aves	Burhinidae	0175	<i>Esacus magnirostris</i>	Beach Stone-curlew	E4A,P	K	
Animalia	Aves	Haematopodidae	0131	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V,P	13	
Animalia	Aves	Haematopodidae	0130	<i>Haematopus longirostris</i>	Pied Oystercatcher	E1,P	9	



Animalia	Aves	Recurvirostridae	0146	<i>Himantopus himantopus</i>	Black-winged Stilt	P		20	
Animalia	Aves	Recurvirostridae	0148	<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet	P		1	
Animalia	Aves	Charadriidae	0140	<i>Charadrius bicinctus</i>	Double-banded Plover	P		16	
Animalia	Aves	Charadriidae	0141	<i>Charadrius leschenaultii</i>	Greater Sand-plover	V,P	V,C,J,K	6	
Animalia	Aves	Charadriidae	0139	<i>Charadrius mongolus</i>	Lesser Sand-plover	V,P	E,C,J,K	2	
Animalia	Aves	Charadriidae	0143	<i>Charadrius ruficapillus</i>	Red-capped Plover	P		6	
Animalia	Aves	Charadriidae	0144	<i>Elseyaornis melanops</i>	Black-fronted Dotterel	P		6	
Animalia	Aves	Charadriidae	0132	<i>Erythrogonyx cinctus</i>	Red-kneed Dotterel	P		7	
Animalia	Aves	Charadriidae	8006	<i>Pluvialis fulva</i>	Pacific Golden Plover	P	C,J,K	3	
Animalia	Aves	Charadriidae	0136	<i>Pluvialis squatarola</i>	Grey Plover	P	C,J,K	14	
Animalia	Aves	Charadriidae	T453	<i>Thinornis cucullatus cucullatus</i>	Eastern Hooded Dotterel	E4A	V	1	
Animalia	Aves	Charadriidae	0133	<i>Vanellus miles</i>	Masked Lapwing	P		67	
Animalia	Aves	Jacaniidae	0171	<i>Irediparra gallinacea</i>	Comb-crested Jacana	V,P		2	
Animalia	Aves	Rostratulidae	0170	<i>Rostratula australis</i>	Australian Painted Snipe	E1,P	E	1	
Animalia	Aves	Scolopacidae	0157	<i>Actitis hypoleucos</i>	Common Sandpiper	P	C,J,K	3	
Animalia	Aves	Scolopacidae	0129	<i>Arenaria interpres</i>	Ruddy Turnstone	P	C,J,K	3	

Animalia	Aves	Scolopacidae	0163	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	P	C,J,K	4	
Animalia	Aves	Scolopacidae	0166	<i>Calidris alba</i>	Sanderling	V,P	C,J,K	15	
Animalia	Aves	Scolopacidae	0164	<i>Calidris canutus</i>	Red Knot	P	E,C,J,K	4	
Animalia	Aves	Scolopacidae	0161	<i>Calidris ferruginea</i>	Curlew Sandpiper	E1,P	CE,C,J,K	1	
Animalia	Aves	Scolopacidae	0849	<i>Calidris fuscicollis</i>	White-rumped Sandpiper	P		2	
Animalia	Aves	Scolopacidae	0978	<i>Calidris melanotos</i>	Pectoral Sandpiper	P	J,K	3	
Animalia	Aves	Scolopacidae	0162	<i>Calidris ruficollis</i>	Red-necked Stint	P	C,J,K	1	
Animalia	Aves	Scolopacidae	0165	<i>Calidris tenuirostris</i>	Great Knot	V,P	CE,C,J,K	10	
Animalia	Aves	Scolopacidae	0168	<i>Gallinago hardwickii</i>	Latham's Snipe	P	J,K	8	
Animalia	Aves	Scolopacidae	0167	<i>Limicola falcinellus</i>	Broad-billed Sandpiper	V,P	C,J,K	1	
Animalia	Aves	Scolopacidae	0153	<i>Limosa lapponica</i>	Bar-tailed Godwit	P	C,J,K	12	
Animalia	Aves	Scolopacidae	8781	<i>Limosa lapponica baueri</i>	Bar-tailed Godwit (baueri)	P	V	P	
Animalia	Aves	Scolopacidae	0152	<i>Limosa limosa</i>	Black-tailed Godwit	V,P	C,J,K	1	
Animalia	Aves	Scolopacidae	0149	<i>Numenius madagascariensis</i>	Eastern Curlew	P	CE,C,J,K	7	
Animalia	Aves	Scolopacidae	0150	<i>Numenius phaeopus</i>	Whimbrel	P	C,J,K	3	
Animalia	Aves	Scolopacidae	0155	<i>Tringa brevipes</i>	Grey-tailed Tattler	P	C,J,K	1	

Animalia	Aves	Scolopacidae	0154	<i>Tringa glareola</i>	Wood Sandpiper	P	C,J,K	1	
Animalia	Aves	Scolopacidae	0156	<i>Tringa incana</i>	Wandering Tattler	P	J	7	
Animalia	Aves	Scolopacidae	0158	<i>Tringa nebularia</i>	Common Greenshank	P	C,J,K	14	
Animalia	Aves	Scolopacidae	0159	<i>Tringa stagnatilis</i>	Marsh Sandpiper	P	C,J,K	4	
Animalia	Aves	Scolopacidae	0160	<i>Xenus cinereus</i>	Terek Sandpiper	V,P	C,J,K	6	
Animalia	Aves	Turnicidae	0014	<i>Turnix varius</i>	Painted Button-quail	P		5	
Animalia	Aves	Stercorariidae	0980	<i>Catharacta skua</i>	Great Skua	P		2	
Animalia	Aves	Stercorariidae	0128	<i>Stercorarius parasiticus</i>	Arctic Jaeger	P	C,J,K	2	
Animalia	Aves	Stercorariidae	0945	<i>Stercorarius pomarinus</i>	Pomarine Jaeger	P	C,J,K	3	
Animalia	Aves	Laridae	0110	<i>Chlidonias hybrida</i>	Whiskered Tern	P		7	
Animalia	Aves	Laridae	0109	<i>Chlidonias leucopterus</i>	White-winged Black Tern	P	C,J,K	16	
Animalia	Aves	Laridae	0125	<i>Chroicocephalus novaehollandiae</i>	Silver Gull	P		231	
Animalia	Aves	Laridae	0972	<i>Gygis alba</i>	White Tern	V,P		K	
Animalia	Aves	Laridae	0112	<i>Hydroprogne caspia</i>	Caspian Tern	P	J	13	
Animalia	Aves	Laridae	0981	<i>Larus dominicanus</i>	Kelp Gull	P		18	
Animalia	Aves	Laridae	0126	<i>Larus pacificus</i>	Pacific Gull	P		17	
Animalia	Aves	Laridae	0120	<i>Onychoprion fuscata</i>	Sooty Tern	V,P		2	

Animalia	Aves	Laridae	9926	<i>Procelsterna cerulea</i>	Grey Ternlet	V,P		K	
Animalia	Aves	Laridae	0953	<i>Sterna hirundo</i>	Common Tern	P	C,J,K	9	
Animalia	Aves	Laridae	0952	<i>Sterna paradisaea</i>	Arctic Tern	P		1	
Animalia	Aves	Laridae	0114	<i>Sterna striata</i>	White-fronted Tern	P		6	
Animalia	Aves	Laridae	0117	<i>Sternula albifrons</i>	Little Tern	E1,P	C,J,K	74	
Animalia	Aves	Laridae	0115	<i>Thalasseus bergii</i>	Crested Tern	P	J	17	
Animalia	Aves	Cacatuidae	0269	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	P		154	
Animalia	Aves	Cacatuidae	0271	<i>Cacatua sanguinea</i>	Little Corella	P		29	
Animalia	Aves	Cacatuidae	0272	<i>Cacatua tenuirostris</i>	Long-billed Corella	P		24	
Animalia	Aves	Cacatuidae	0268	^^ <i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V,P,3		8	
Animalia	Aves	Cacatuidae	0265	^ <i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V,P,2		1	
Animalia	Aves	Cacatuidae	0273	<i>Eolophus roseicapilla</i>	Galah	P		125	
Animalia	Aves	Cacatuidae	0274	<i>Nymphicus hollandicus</i>	Cockatiel	P		4	
Animalia	Aves	Cacatuidae	0267	<i>Zanda funereus</i>	Yellow-tailed Black-Cockatoo	P		21	
Animalia	Aves	Psittacidae	0281	<i>Alisterus scapularis</i>	Australian King-Parrot	P		25	
Animalia	Aves	Psittacidae	0258	<i>Glossopsitta concinna</i>	Musk Lorikeet	P		8	
Animalia	Aves	Psittacidae	0260	<i>Glossopsitta pusilla</i>	Little Lorikeet	V,P		K	

Animalia	Aves	Psittacidae	0309	<i>^^Lathamus discolor</i>	Swift Parrot	E1,P,3	CE	7	
Animalia	Aves	Psittacidae	0305	<i>^^Neophema chrysogaster</i>	Orange-bellied Parrot	E4A,P,3	CE	1	
Animalia	Aves	Psittacidae	0302	<i>^^Neophema pulchella</i>	Turquoise Parrot	V,P,3		K	
Animalia	Aves	Psittacidae	8913	<i>^^Pezoporus wallicus wallicus</i>	Eastern Ground Parrot	V,P,3		K	
Animalia	Aves	Psittacidae	0282	<i>Platycercus elegans</i>	Crimson Rosella	P		77	
Animalia	Aves	Psittacidae	0288	<i>Platycercus eximius</i>	Eastern Rosella	P		52	
Animalia	Aves	Psittacidae	T039	<i>Platycercus sp.</i>	Unidentified Rosella	P		20	
Animalia	Aves	Psittacidae	0295	<i>Psephotus haematonotus</i>	Red-rumped Parrot	P		2	
Animalia	Aves	Psittacidae	0256	<i>Trichoglossus chlorolepidotus</i>	Scaly-breasted Lorikeet	P		1	
Animalia	Aves	Psittacidae	9947	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	P		387	
Animalia	Aves	Psittacidae	8882	<i>Trichoglossus haematodus moluccanus</i>		P		2	
Animalia	Aves	Cuculidae	0338	<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo	P		33	
Animalia	Aves	Cuculidae	0339	<i>Cacomantis variolosus</i>	Brush Cuckoo	P		8	
Animalia	Aves	Cuculidae	0349	<i>Centropus phasianinus</i>	Pheasant Coucal	P		1	
Animalia	Aves	Cuculidae	0342	<i>Chalcites basalis</i>	Horsfield's Bronze- Cuckoo	P		15	
Animalia	Aves	Cuculidae	0343	<i>Chalcites lucidus</i>	Shining Bronze- Cuckoo	P		20	



Animalia	Aves	Cuculidae	0347	<i>Eudynamys orientalis</i>	Eastern Koel	P	31	
Animalia	Aves	Cuculidae	0337	<i>Heteroscenes pallidus</i>	Pallid Cuckoo	P	2	
Animalia	Aves	Cuculidae	0348	<i>Scythrops novaehollandiae</i>	Channel-billed Cuckoo	P	14	
Animalia	Aves	Strigidae	0246	<i>^^Ninox connivens</i>	Barking Owl	V,P,3	1	
Animalia	Aves	Strigidae	9922	<i>Ninox novaeseelandiae</i>	Southern Boobook	P	34	
Animalia	Aves	Strigidae	0248	<i>^^Ninox strenua</i>	Powerful Owl	V,P,3	10	
Animalia	Aves	Tytonidae	9923	<i>Tyto javanica</i>	Eastern Barn Owl	P	16	
Animalia	Aves	Tytonidae	0252	<i>^^Tyto longimembris</i>	Eastern Grass Owl	V,P,3	K	
Animalia	Aves	Tytonidae	0250	<i>^^Tyto novaehollandiae</i>	Masked Owl	V,P,3	1	
Animalia	Aves	Tytonidae	9924	<i>^^Tyto tenebricosa</i>	Sooty Owl	V,P,3	7	
Animalia	Aves	Alcedinidae	0319	<i>Ceyx azureus</i>	Azure Kingfisher	P	6	
Animalia	Aves	Alcedinidae	0322	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	P	106	
Animalia	Aves	Alcedinidae	0324	<i>Todiramphus macleayii</i>	Forest Kingfisher	P	1	
Animalia	Aves	Alcedinidae	0326	<i>Todiramphus sanctus</i>	Sacred Kingfisher	P	21	
Animalia	Aves	Coraciidae	0318	<i>Eurystomus orientalis</i>	Dollarbird	P	15	
Animalia	Aves	Pittidae	0352	<i>Pitta versicolor</i>	Noisy Pitta	P	5	
Animalia	Aves	Menuridae	0350	<i>Menura novaehollandiae</i>	Superb Lyrebird	P	22	

Animalia	Aves	Climacteridae	0560	<i>Climacteris erythrops</i>	Red-browed Treecreeper	P		1	
Animalia	Aves	Climacteridae	8127	<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V,P		K	
Animalia	Aves	Climacteridae	0558	<i>Cormobates leucophaea</i>	White-throated Treecreeper	P		16	
Animalia	Aves	Ptilonorhynchidae	0676	<i>Ailuroedus crassirostris</i>	Green Catbird	P		5	
Animalia	Aves	Ptilonorhynchidae	0679	<i>Ptilonorhynchus violaceus</i>	Satin Bowerbird	P		71	
Animalia	Aves	Maluridae	0529	<i>Malurus cyaneus</i>	Superb Fairy-wren	P		72	
Animalia	Aves	Maluridae	0536	<i>Malurus lamberti</i>	Variegated Fairy-wren	P		30	
Animalia	Aves	Maluridae	0526	<i>Stipiturus malachurus</i>	Southern Emu-wren	P		4	
Animalia	Aves	Dasyornithidae	0519	<i>Dasyornis brachypterus</i>	Eastern Bristlebird	E1,P,2	E	K	
Animalia	Aves	Dasyornithidae	0506	<i>Pycnoptilus floccosus</i>	Pilotbird	P		2	
Animalia	Aves	Acanthizidae	0486	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	P		9	
Animalia	Aves	Acanthizidae	0470	<i>Acanthiza lineata</i>	Striated Thornbill	P		16	
Animalia	Aves	Acanthizidae	0471	<i>Acanthiza nana</i>	Yellow Thornbill	P		35	
Animalia	Aves	Acanthizidae	0475	<i>Acanthiza pusilla</i>	Brown Thornbill	P		51	
Animalia	Aves	Acanthizidae	0500	<i>Calamanthus fuliginosus</i>	Striated Fieldwren	E1,P		K	
Animalia	Aves	Acanthizidae	0454	<i>Gerygone mouki</i>	Brown Gerygone	P		40	

Animalia	Aves	Acanthizidae	0453	<i>Gerygone olivacea</i>	White-throated Gerygone	P		2	
Animalia	Aves	Acanthizidae	0493	<i>Neosericornis citreogularis</i>	Yellow-throated Scrubwren	P		5	
Animalia	Aves	Acanthizidae	0505	<i>Origma solitaria</i>	Rockwarbler	P		1	
Animalia	Aves	Acanthizidae	0488	<i>Sericornis frontalis</i>	White-browed Scrubwren	P		48	
Animalia	Aves	Acanthizidae	0494	<i>Sericornis magnirostra</i>	Large-billed Scrubwren	P		7	
Animalia	Aves	Pardalotidae	0565	<i>Pardalotus punctatus</i>	Spotted Pardalote	P		58	
Animalia	Aves	Pardalotidae	0976	<i>Pardalotus striatus</i>	Striated Pardalote	P		7	
Animalia	Aves	Meliphagidae	0591	<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill	P		57	
Animalia	Aves	Meliphagidae	0638	<i>Anthochaera carunculata</i>	Red Wattlebird	P		81	
Animalia	Aves	Meliphagidae	0710	<i>Anthochaera chrysoptera</i>	Little Wattlebird	P		41	
Animalia	Aves	Meliphagidae	0603	<i>Anthochaera phrygia</i>	Regent Honeyeater	E4A,P	CE	1	
Animalia	Aves	Meliphagidae	T210	<i>Anthochaera sp.</i>	Unidentified Wattlebird	P		10	
Animalia	Aves	Meliphagidae	0614	<i>Caligavis chrysops</i>	Yellow-faced Honeyeater	P		26	
Animalia	Aves	Meliphagidae	0448	<i>Epthianura albifrons</i>	White-fronted Chat	V,P		8	
Animalia	Aves	Meliphagidae	0634	<i>Manorina melanocephala</i>	Noisy Miner	P		39	
Animalia	Aves	Meliphagidae	0633	<i>Manorina melanophrys</i>	Bell Miner	P		3	
Animalia	Aves	Meliphagidae	0605	<i>Meliphaga lewinii</i>	Lewin's Honeyeater	P		88	

Animalia	Aves	Meliphagidae	0583	<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater	P	1	
Animalia	Aves	Meliphagidae	8303	<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	V,P	K	
Animalia	Aves	Meliphagidae	0578	<i>Melithreptus lunatus</i>	White-naped Honeyeater	P	7	
Animalia	Aves	Meliphagidae	0586	<i>Myzomela sanguinolenta</i>	Scarlet Honeyeater	P	12	
Animalia	Aves	Meliphagidae	0617	<i>Nesoptilotis leucotis</i>	White-eared Honeyeater	P	1	
Animalia	Aves	Meliphagidae	0646	<i>Philemon citreogularis</i>	Little Friarbird	P	1	
Animalia	Aves	Meliphagidae	0645	<i>Philemon corniculatus</i>	Noisy Friarbird	P	15	
Animalia	Aves	Meliphagidae	0632	<i>Phylidonyris niger</i>	White-cheeked Honeyeater	P	1	
Animalia	Aves	Meliphagidae	0631	<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	P	50	
Animalia	Aves	Meliphagidae	0613	<i>Ptilotula fusca</i>	Fuscous Honeyeater	P	1	
Animalia	Aves	Orthonychidae	0434	<i>Orthonyx temminckii</i>	Logrunner	P	3	
Animalia	Aves	Falcunculidae	0416	<i>Falcunculus frontatus frontatus</i>	Eastern Shrike-tit	P	4	
Animalia	Aves	Psophodidae	0421	<i>Psophodes olivaceus</i>	Eastern Whipbird	P	71	
Animalia	Aves	Neosittidae	0549	<i>Daphoenositta chrysoptera</i>	Varied Sittella	V,P	2	
Animalia	Aves	Campephagidae	0424	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	P	54	

Animalia	Aves	Campephagidae	0429	<i>Edolisoma tenuirostris</i>	Cicadabird	P	2	
Animalia	Aves	Campephagidae	0430	<i>Lalage sueurii</i>	White-winged Triller	P	3	
Animalia	Aves	Pachycephalidae	0408	<i>Colluricincla harmonica</i>	Grey Shrike-thrush	P	32	
Animalia	Aves	Pachycephalidae	0405	<i>Pachycephala olivacea</i>	Olive Whistler	V,P	2	
Animalia	Aves	Pachycephalidae	0398	<i>Pachycephala pectoralis</i>	Golden Whistler	P	51	
Animalia	Aves	Pachycephalidae	0401	<i>Pachycephala rufiventris</i>	Rufous Whistler	P	16	
Animalia	Aves	Oriolidae	0671	<i>Oriolus sagittatus</i>	Olive-backed Oriole	P	16	
Animalia	Aves	Oriolidae	0432	<i>Sphecotheres vieilloti</i>	Australasian Figbird	P	27	
Animalia	Aves	Artamidae	8519	<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V,P	4	
Animalia	Aves	Artamidae	0544	<i>Artamus personatus</i>	Masked Woodswallow	P	2	
Animalia	Aves	Artamidae	0545	<i>Artamus superciliosus</i>	White-browed Woodswallow	P	3	
Animalia	Aves	Artamidae	0700	<i>Cracticus nigrogularis</i>	Pied Butcherbird	P	5	
Animalia	Aves	Artamidae	T022	<i>Cracticus sp.</i>	Unidentified Butcherbird	P	7	
Animalia	Aves	Artamidae	0702	<i>Cracticus torquatus</i>	Grey Butcherbird	P	64	
Animalia	Aves	Artamidae	0705	<i>Gymnorhina tibicen</i>	Australian Magpie	P	352	
Animalia	Aves	Artamidae	0694	<i>Strepera graculina</i>	Pied Currawong	P	60	









Animalia	Aves	Artamidae	T906	<i>Strepera sp.</i>		P	1
Animalia	Aves	Artamidae	0697	<i>Strepera versicolor</i>	Grey Currawong	P	4
Animalia	Aves	Dicruridae	0673	<i>Dicrurus bracteatus</i>	Spangled Drongo	P	9
Animalia	Aves	Rhipiduridae	0361	<i>Rhipidura albiscapa</i>	Grey Fantail	P	78
Animalia	Aves	Rhipiduridae	0364	<i>Rhipidura leucophrys</i>	Willie Wagtail	P	65
Animalia	Aves	Rhipiduridae	0362	<i>Rhipidura rufifrons</i>	Rufous Fantail	P	12
Animalia	Aves	Corvidae	0930	<i>Corvus coronoides</i>	Australian Raven	P	105
Animalia	Aves	Corvidae	0954	<i>Corvus mellori</i>	Little Raven	P	2
Animalia	Aves	Corvidae	9067	<i>Corvus sp.</i>	Unidentified Corvid	P	3
Animalia	Aves	Monarchidae	0415	<i>Grallina cyanoleuca</i>	Magpie-lark	P	113
Animalia	Aves	Monarchidae	0373	<i>Monarcha melanopsis</i>	Black-faced Monarch	P	19
Animalia	Aves	Monarchidae	0366	<i>Myiagra cyanoleuca</i>	Satin Flycatcher	P	2
Animalia	Aves	Monarchidae	9955	<i>Myiagra inquieta</i>	Restless Flycatcher	P	4
Animalia	Aves	Monarchidae	0365	<i>Myiagra rubecula</i>	Leaden Flycatcher	P	6
Animalia	Aves	Monarchidae	0375	<i>Symposiachrus trivirgatus</i>	Spectacled Monarch	P	3
Animalia	Aves	Corcoracidae	0693	<i>Corcorax melanorhamphos</i>	White-winged Chough	P	1








Animalia	Aves	Petroicidae	0392	<i>Eopsaltria australis</i>	Eastern Yellow Robin	P	57	
Animalia	Aves	Petroicidae	0380	<i>Petroica boodang</i>	Scarlet Robin	V,P	2	
Animalia	Aves	Petroicidae	0382	<i>Petroica phoenicea</i>	Flame Robin	V,P	2	
Animalia	Aves	Petroicidae	0383	<i>Petroica rodinogaster</i>	Pink Robin	V,P	K	
Animalia	Aves	Petroicidae	0384	<i>Petroica rosea</i>	Rose Robin	P	10	
Animalia	Aves	Cisticolidae	0525	<i>Cisticola exilis</i>	Golden-headed Cisticola	P	14	
Animalia	Aves	Acrocephalidae	0524	<i>Acrocephalus australis</i>	Australian Reed-Warbler	P	13	
Animalia	Aves	Locustellidae	0509	<i>Cincloramphus mathewsi</i>	Rufous Songlark	P	1	
Animalia	Aves	Locustellidae	0523	<i>Cincloramphus timoriensis</i>	Tawny Grassbird	P	4	
Animalia	Aves	Locustellidae	0522	<i>Poodytes gramineus</i>	Little Grassbird	P	8	
Animalia	Aves	Hirundinidae	0357	<i>Hirundo neoxena</i>	Welcome Swallow	P	58	
Animalia	Aves	Hirundinidae	0360	<i>Petrochelidon ariel</i>	Fairy Martin	P	3	
Animalia	Aves	Hirundinidae	0359	<i>Petrochelidon nigricans</i>	Tree Martin	P	6	
Animalia	Aves	Turdidae	0779	<i>Zoothera lunulata</i>	Bassian Thrush	P	12	
Animalia	Aves	Turdidae	7000	<i>Zoothera sp.</i>	unidentified ground thrush	P	1	
Animalia	Aves	Zosteropidae	0574	<i>Zosterops lateralis</i>	Silvereye	P	79	
Animalia	Aves	Dicaeidae	0564	<i>Dicaeum hirundinaceum</i>	Mistletoebird	P	16	









Animalia	Aves	Estrildidae	0657	<i>Lonchura castaneothorax</i>	Chestnut-breasted Mannikin	P		9	
Animalia	Aves	Estrildidae	0662	<i>Neochmia temporalis</i>	Red-browed Finch	P		41	
Animalia	Aves	Estrildidae	0652	<i>Stagonopleura guttata</i>	Diamond Firetail	V,P		K	
Animalia	Aves	Estrildidae	0655	<i>Stizoptera bichenovii</i>	Double-barred Finch	P		1	
Animalia	Aves	Estrildidae	0653	<i>Taeniopygia guttata</i>	Zebra Finch	P		5	
Animalia	Aves	Motacillidae	0647	<i>Anthus novaeseelandiae</i>	Australian Pipit	P		16	
Animalia	Mammalia	Ornithorhynchidae	1001	<i>Ornithorhynchus anatinus</i>	Platypus	P		5	
Animalia	Mammalia	Tachyglossidae	1003	<i>Tachyglossus aculeatus</i>	Short-beaked Echidna	P		98	
Animalia	Mammalia	Dasyuridae	T093	<i>Antechinus sp.</i>	Unidentified Antechinus	P		2	
Animalia	Mammalia	Dasyuridae	1674	<i>Antechinus stuartii</i>	Brown Antechinus	P		14	
Animalia	Mammalia	Dasyuridae	1008	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V,P	E	1	
Animalia	Mammalia	Dasyuridae	1017	<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V,P		K	
Animalia	Mammalia	Dasyuridae	1069	<i>Sminthopsis leucopus</i>	White-footed Dunnart	V,P		K	
Animalia	Mammalia	Peramelidae	1710	<i>Isoodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	E1,P	E	K	
Animalia	Mammalia	Peramelidae	T081	<i>Isoodon/Peramel es sp.</i>	unidentified Bandicoot	P		1	
Animalia	Mammalia	Peramelidae	1097	<i>Perameles nasuta</i>	Long-nosed Bandicoot	P		6	

Animalia	Mammalia	Phascolarctidae	1162	<i>Phascolarctos cinereus</i>	Koala	V,P	V	7	
Animalia	Mammalia	Vombatidae	1165	<i>Vombatus ursinus</i>	Bare-nosed Wombat	P		32	
Animalia	Mammalia	Burramyidae	1150	<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V,P		K	
Animalia	Mammalia	Petauridae	1136	<i>Petaurus australis</i>	Yellow-bellied Glider	V,P		K	
Animalia	Mammalia	Petauridae	1138	<i>Petaurus breviceps</i>	Sugar Glider	P		20	
Animalia	Mammalia	Petauridae	1137	<i>Petaurus norfolcensis</i>	Squirrel Glider	V,P		1	
Animalia	Mammalia	Pseudocheiridae	1133	<i>Petauroides volans</i>	Greater Glider	P	V	6	
Animalia	Mammalia	Pseudocheiridae	1129	<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum	P		30	
Animalia	Mammalia	Acrobatidae	1147	<i>Acrobates pygmaeus</i>	Feathertail Glider	P		2	
Animalia	Mammalia	Phalangeridae	1736	<i>Trichosurus cunninghami</i>	Mountain Brushtail Possum	P		14	
Animalia	Mammalia	Phalangeridae	T082	<i>Trichosurus sp.</i>	brushtail possum	P		9	
Animalia	Mammalia	Phalangeridae	1113	<i>Trichosurus vulpecula</i>	Common Brushtail Possum	P		29	
Animalia	Mammalia	Potoroidae	1175	<i>Potorous tridactylus</i>	Long-nosed Potoroo	V,P	V	K	
Animalia	Mammalia	Macropodidae	1265	<i>Macropus giganteus</i>	Eastern Grey Kangaroo	P		24	
Animalia	Mammalia	Macropodidae	1245	<i>Macropus parma</i>	Parma Wallaby	V,P		K	
Animalia	Mammalia	Macropodidae	T085	<i>Macropus sp.</i>	kangaroo / wallaby	P		32	
Animalia	Mammalia	Macropodidae	1261	<i>Notamacropus rufogriseus</i>	Red-necked Wallaby	P		4	

Animalia	Mammalia	Macropodidae	1266	<i>Osphranter robustus</i>	Common Wallaroo	P		5	
Animalia	Mammalia	Macropodidae	1215	<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E1,P	V	K	
Animalia	Mammalia	Macropodidae	1242	<i>Wallabia bicolor</i>	Swamp Wallaby	P		36	
Animalia	Mammalia	Pteropodidae	1282	<i>Pteropus alecto</i>	Black Flying-fox	P		3	
Animalia	Mammalia	Pteropodidae	1280	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V,P	V	203	
Animalia	Mammalia	Pteropodidae	T087	<i>Pteropus sp.</i>	Flying-fox	P		16	
Animalia	Mammalia	Rhinolophidae	1303	<i>Rhinolophus megaphyllus</i>	Eastern Horseshoe-bat	P		6	
Animalia	Mammalia	Rhinolophidae	1816	<i>Rhinolophus megaphyllus megaphyllus</i>		P		1	
Animalia	Mammalia	Emballonuridae	1321	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V,P		3	
Animalia	Mammalia	Molossidae	1324	<i>Austronomus australis</i>	White-striped Freetail-bat	P		22	
Animalia	Mammalia	Molossidae	1329	<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V,P		5	
Animalia	Mammalia	Molossidae	T454	<i>Molossidae sp.</i>	unidentified mastiff bat	P		1	
Animalia	Mammalia	Molossidae	1938	<i>Ozimops ridei</i>	Eastern Free-tailed Bat	P		7	
Animalia	Mammalia	Vespertilionidae	1353	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V,P	V	4	
Animalia	Mammalia	Vespertilionidae	1349	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	P		32	
Animalia	Mammalia	Vespertilionidae	1351	<i>Chalinolobus morio</i>	Chocolate Wattled Bat	P		24	



Animalia	Mammalia	Vespertilionidae	1372	<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V,P	3	
Animalia	Mammalia	Vespertilionidae	1357	<i>Myotis macropus</i>	Southern Myotis	V,P	13	
Animalia	Mammalia	Vespertilionidae	1335	<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	P	21	
Animalia	Mammalia	Vespertilionidae	1334	<i>Nyctophilus gouldi</i>	Gould's Long-eared Bat	P	9	
Animalia	Mammalia	Vespertilionidae	T092	<i>Nyctophilus sp.</i>	long-eared bat	P	6	
Animalia	Mammalia	Vespertilionidae	1369	<i>Phoniscus papuensis</i>	Golden-tipped Bat	V,P	K	
Animalia	Mammalia	Vespertilionidae	1361	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V,P	4	
Animalia	Mammalia	Vespertilionidae	1365	<i>Scotorepens orion</i>	Eastern Broad-nosed Bat	P	3	
Animalia	Mammalia	Vespertilionidae	1022	<i>Vespadelus darlingtoni</i>	Large Forest Bat	P	15	
Animalia	Mammalia	Vespertilionidae	1377	<i>Vespadelus pumilus</i>	Eastern Forest Bat	P	2	
Animalia	Mammalia	Vespertilionidae	1378	<i>Vespadelus regulus</i>	Southern Forest Bat	P	3	
Animalia	Mammalia	Vespertilionidae	1379	<i>Vespadelus vulturnus</i>	Little Forest Bat	P	49	
Animalia	Mammalia	Miniopteridae	1346	<i>Miniopterus australis</i>	Little Bent-winged Bat	V,P	10	
Animalia	Mammalia	Miniopteridae	3330	<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V,P	16	
Animalia	Mammalia	Muridae	1415	<i>Hydromys chrysogaster</i>	Water-rat	P	1	
Animalia	Mammalia	Muridae	1455	<i>Pseudomys novaehollandiae</i>	New Holland Mouse	P V	K	

Animalia	Mammalia	Muridae	1395	<i>Rattus fuscipes</i>	Bush Rat	P		22	
Animalia	Mammalia	Muridae	T094	<i>Rattus sp.</i>	rat	P		13	
Animalia	Mammalia	Dugongidae	1558	<i>Dugong dugon</i>	Dugong	E1,P		K	
Animalia	Mammalia	Otariidae	1543	<i>Arctocephalus forsteri</i>	New Zealand Fur-seal	V,P		K	
Animalia	Mammalia	Otariidae	1882	<i>Arctocephalus pusillus doriferus</i>	Australian Fur-seal	V,P		4	
Animalia	Mammalia	Otariidae	T099	<i>Arctocephalus sp.</i>	Unidentified Fur-seal	P		8	
Animalia	Mammalia	Otariidae	9040	<i>Seal sp.</i>	Unidentified Seal	P		6	
Animalia	Mammalia	Phocidae	1549	<i>Hydrurga leptonyx</i>	Leopard Seal	P		2	
Animalia	Mammalia	Leporidae	1929	<i>Lepus capensis occidentalis</i>		P		2	
Animalia	Mammalia	Balaenidae	1561	<i>Eubalaena australis</i>	Southern Right Whale	E1,P	E	K	
Animalia	Mammalia	Balaenopteridae	1567	<i>Balaenoptera musculus</i>	Blue Whale	E1,P	E	P	
Animalia	Mammalia	Balaenopteridae	1575	<i>Megaptera novaeangliae</i>	Humpback Whale	V,P	V	K	
Animalia	Mammalia	Physeteridae	1578	<i>Physeter macrocephalus</i>	Sperm Whale	V,P		K	
Animalia	Mammalia	Ziphiidae	1593	<i>Mesoplodon grayi</i>	Gray's Beaked Whale	P		2	
Animalia	Mammalia	Delphinidae	1616	<i>Delphinus delphis</i>	Common Dolphin	P		4	
Animalia	Insecta	Petaluridae	I007	<i>Petalura gigantea</i>	Giant Dragonfly	E1		K	

Animalia	Unknown	Unknown Fauna	T350	<i>Fauna sp.</i>	Unidentified Fauna	80
Animalia	Cubozoa	Tripedaliidae	T384	<i>Capula sivickisi</i>	Box Jellyfish	1