APPLICATION ON NOTIFICATION – CATEGORY 2

Applicant:	Flinders Ports Pty Ltd c/- Arup
Development Number:	010/U060/18
Nature of Development:	Redevelopment of the Port Thevenard Jetty
Development Type:	Merit
Subject Land:	Thevenard Road, Thevenard (A10 D47972; A8 D57833; S166 H660300)
Development Plan:	Ceduna Council Development Plan Consolidated 18 October 2012; and Land not within a council area (Coastal Waters) Development Plan Consolidated 12 December 2017
Zone / Policy Area:	Industry Zone Thevenard Policy Area 10 (Ceduna Council Development Plan); and No Zone (Land not within a council area (Coastal Waters) Development Plan)
Contact Officer:	Laura Kerber
Phone Number:	7109 7073
Consultation Start Date:	Wednesday 21 November 2018
Consultation Close Date:	Tuesday 4 December 2018
During the notification period, hard copies of the application documentation can be viewed at the Department of Planning, Transport and Infrastructure, Level 5, 50 Flinders St, Adelaide, during normal business hours. Application documentation may also be viewed during normal business hours at the local Council office (if identified on the public notice).	

Written representations must be received by the close date (indicated above) and can either be posted, hand-delivered or emailed to the State Commission Assessment Panel.

Any representations received after the close date will not be considered.

Postal Address:
The Secretary
State Commission Assessment Panel
GPO Box 1815
ADELAIDE SA 5001

Street Address:
Development Division
Department of Planning, Transport and Infrastructure
Level 5, 50 Flinders Street
ADELAIDE

Email Address: scapreps@sa.gov.au
Fax Number: (08) 8303 0753

South Australian
DEVELOPMENT ACT, 1993
REPRESENTATION ON APPLICATION – CATEGORY 2

Applicant:	Flinders Ports Pty Ltd c/- Arup
Development Number:	010/U060/18
Nature of Development:	Redevelopment of the Port Thevenard Jetty
Development Type:	Merit
Zone / Policy Area:	Industry Zone Thevenard Policy Area 10 (Ceduna Council Development Plan); No Zone (Land not within a council area (coastal waters) Development Plan)
Subject Land:	Thevenard Road, Thevenard (A10 D47972; A8 D57833; S166 H660300)
Contact Officer:	Laura Kerber
Phone Number:	7109 7073
Close Date:	Tuesday 4th December 2018

My Name: _____ My phone number: _____

Primary method(s) of contact: **Email:** _____

Postal Address: _____ **Postcode:** _____

You may be contacted via your nominated PRIMARY METHOD(s) OF CONTACT if you indicate below that you wish to be heard by the State Commission Assessment Panel in support of your submission.

My interests are: *(please tick one)*

- ☐ owner of local property
- ☐ occupier of local property
- ☐ a representative of a company/other organisation affected by the proposal
- ☐ a private citizen

The address of the property affected is: _____ **Postcode** _____

My interests are: *(please tick one)*

- ☐ I support the development
- ☐ I support the development with some concerns
- ☐ I oppose the development

The specific aspects of the application to which I make comment on are: _____

I: *(please tick one)*

- ☐ wish to be heard in support of my submission
- ☐ do not wish to be heard in support of my submission *(Please tick one)*

By: *(please tick one)*

- ☐ appearing personally
- ☐ being represented by the following person *(Please tick one)*

Signature: _____

Date: _____

Return Address: The Secretary, State Commission Assessment Panel, GPO Box 1815, Adelaide, SA 5001 /or
Email: scapreps@sa.gov.au

DEVELOPMENT APPLICATION FORM

PLEASE USE BLOCK LETTERS

COUNCIL: LAND NOT WITHIN A COUNCIL AREA (COASTAL WATERS)

APPLICANT: FLINDERS PORTS PTY LTD

Postal Address: 295 ST VINCENT STREET, PORT ADELAIDE SA 5015

Owner: AS ABOVE

Postal Address: _____

_____

BUILDER: YET TO BE DETERMINED - CURRENTLY AT TENDER

Postal Address: _____

_____

_____ Licence No: _____

CONTACT PERSON FOR FURTHER INFORMATION

Name: JORDAN GREEN

Telephone: 08 9668 5645 [work] 0430327579 [Ah]

Fax: _____ [work] _____ [Ah]

EXISTING USE: INDUSTRY/PORT

FOR OFFICE USE

Development No: _____

Previous Development No: _____

Assessment No: _____

☐ Complying	Application forwarded to DA
☐ Non Complying	Commission/Council on
☐ Notification Cat 2	/ /
☐ Notification Cat 3	Decision: _____
☐ Referrals/Concurrences	Type: _____
☐ DA Commission	Date: / /

	Decision required	Fees	Receipt No	Date
Planning:				
Building:				
Land Division:				
Additional:				
Development Approval				

DESCRIPTION OF PROPOSED DEVELOPMENT: RESTORATION/WORKS EXISTING JETTY

LOCATION OF PROPOSED DEVELOPMENT: THEVENARD PORT JETTY

House No: - Lot No: 8 Street: WEST TERRACE Town/Suburb: THEVENARD

Section No [~~full~~/part] D47972 A10 Hundred: BONYTHON Volume: 6126 Folio: ~~834~~ 846

Section No [~~full~~/part] D57833 A8 Hundred: BONYTHON Volume: 6126 Folio: 857

LAND DIVISION:

Site Area [m²] N/A Reserve Area [m²] N/A No of existing allotments N/A

Number of additional allotments [excluding road and reserve]: _____ Lease: YES ☐ NO ☐

BUILDING RULES CLASSIFICATION SOUGHT: N/A Present classification: _____

If Class 5,6,78 or 9 classification is sought, state the proposed number of employees: Male: _____ Female: _____

If Class 9a classification is sought, state the number o persons for whom accommodation is provided: _____

If Class 9b classification is sought, state the proposed number of occupants of the various spaces at the premises: _____

DOES EITHER SCHEDULE 21 OR 22 OF THE DEVELOPMENT REGULATIONS 2008 APPLY? YES ☐ NO ☑

HAS THE CONSTRUCTION INDUSTRY TRAINING FUND ACT 2008 LEVY BEEN PAID? YES ☐ NO ☑

DEVELOPMENT COST [do not include any fit-out costs]: $ 15,000,000

I acknowledge that copies of this application and supporting documentation may be provided to interested persons in accordance with the Development Regulations 2008.

SIGNATURE: C.B. Kerina Dated: 10/10/2018

_____

DEVELOPMENT REGULATIONS 1993
Form of Declaration
(Schedule 5 clause 2A)

To:

From:

Date of Application: 10/10/18

Location of Proposed Development: PORT OF THEVENARD

House No: ..... Lot No: 8 Street: WEST TERRACE Town/Suburb THEVENARD

Section No (~~full~~/part): D49972 A18 Hundred: BONYTHON/660300

Volume: 6126 Folio: 846

Nature of Proposed Development:

I JORDAN GREEN ..... **being ~~the applicant~~/ a person acting on behalf of the applicant (delete the inapplicable statement) for the development described above declare that the proposed development will involve the construction of a building which would, if constructed in accordance with the plans submitted, not be contrary to the regulations prescribed for the purposes of section 86 of the *Electricity Act 1996*. I make this declaration under clause 2A(1) of Schedule 5 of the *Development Regulations 1993*.**

Date: 10/10/18

Signed: .....

Note 1
This declaration is only relevant to those development applications seeking authorisation for a form of development that involves the construction of a building (there is a definition of 'building' contained in section 4(1) of the *Development Act 1993*), other than where the development is limited to –

a) an internal alteration of a building; or
b) an alteration to the walls of a building but not so as to alter the shape of the building.

Note 2
The requirements of section 86 of the *Electricity Act 1996* do not apply in relation to:

a) a fence that is less than 2.0 m in height; or
b) a service line installed specifically to supply electricity to the building or structure by the operator of the transmission or distribution network from which the electricity is being supplied.

Note 3
Section 86 of the *Electricity Act 1996* refers to the erection of buildings in proximity to powerlines. The regulations under this Act prescribe minimum safe clearance distances that must be complied with.

Note 4
The majority of applications will not have any powerline issues, as normal residential setbacks often cause the building to comply with the prescribed powerline clearance distances. Buildings/renovations located far away from powerlines, for example towards the back of properties, will usually also comply.

Particular care needs to be taken where high voltage powerlines exist; where the development:

- is on a major road;
- commercial/industrial in nature; or
- built to the property boundary.

Note 5
Information brochures 'Powerline Clearance Declaration Guide' and 'Building Safely Near Powerlines' have been prepared by the Technical Regulator to assist applicants and other interested persons. Copies of these brochures are available from council and the Office of the Technical Regulator. The brochures and other relevant information can also be found at www.technicalregulator.sa.gov.au

Note 6
In cases where applicants have obtained a written approval from the Technical Regulator to build the development specified above in its current form within the prescribed clearance distances, the applicant is able to sign the form.

Flinders Ports Pty Ltd

Port Thevenard Jetty Restoration

Development Application Report

262887

Final | 10 October 2018

Job number 262887

Arup Australia Pty Ltd ABN 76 625 912 665

Arup
Level 7
182 Victoria Square
Adelaide SA 5000
Australia
www.arup.com

Document Verification

ARUP

Job title		Port Thevenard Jetty Restoration			**Job number** 262887
Document title		Development Application Report			**File reference**
Document ref		262887			
Revision	**Date**	**Filename**	Thevenard DA ToC.docx		
Draft 1	9 Aug 2018	**Description**	First draft for discussion		
			Prepared by	Checked by	Approved by
		Name	Jordan Green	David Spink	John Haese
		Signature			
Final Draft	02 Oct 2018	**Filename**	Port Thevenard Jetty Restoration		
		Description	Final Draft for Flinders Ports Review		
			Prepared by	Checked by	Approved by
		Name	Jordan Green	David Spink	John Haese
		Signature			
Final	10 Oct 2018	**Filename**	Port Thevenard Jetty Restoration		
		Description	Final for State Commission Assessment Panel assessment and determination		
			Prepared by	Checked by	Approved by
		Name	Jordan Green	Virginia James	John Haese
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
				Issue Document Verification with Document	✓

Contents

Executive Summary

This Development Application (DA) Report has been prepared by Arup Australia Pty Ltd (Arup) on behalf of Flinders Ports Pty Ltd (ABN 83 097 377 172) (Flinders Ports) to document the proposed Port of Thevenard Jetty Restoration (the proposed Project), and the potential associated environmental, social and economic impacts. The proposed Project includes the 'like for like' restoration of a section of concrete jetty, at Thevenard near Ceduna, in South Australia.

Thevenard is located on the Eyre Peninsula, 793 km west of Adelaide, and 3 km south-west from the centre of Ceduna. Port Thevenard (the Port), is located at the headland of the Thevenard peninsula. The Port is operated by Flinders Ports Pty Ltd (Flinders Ports) under a 99 year lease, from the South Australian Government.

Works to the jetty are required due to the poor state of the jetty, with the concrete section of the jetty being condemned in 2017. The scope of works proposed in this DA Report are considered to be essential maintenance, required to ensure the safe, ongoing operation of the facility and have a time urgency due to the current state. The DA Report however does not consider ongoing operational port based impacts as there is no change to existing operations as a result of this Project.

The preparation of this DA Report has involved the consolidation of desktop information and specialist technical assessments, including Marine and Terrestrial Ecology and Coastal Processes.

Specifically, these technical assessments found that provided particular mitigation measures were in place, specifically the avoidance of the removal of terrestrial vegetation listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (for construction laydown areas), the proposed Project would have a low potential impact on marine and terrestrial ecology.

The coastal processes technical assessment found the extended groyne required for the proposed Project may result in some inshore seagrass loss in addition to any potential direct construction impacts. However, the assessment concluded that the transmission of waves and currents by the remediated jetty structure should be essentially identical to the baseline case and therefore no further impacts to coastal processes would be expected.

Other construction related impacts, such as those due to traffic and transport, noise and vibration, air quality and water quality were found to be short term and capable of being appropriately mitigated through development and implementation of an effective Construction Environment Management Plan (CEMP) process.

1 Project Overview

1.1 Introduction

This Development Application (DA) Report has been prepared by Arup Australia Pty Ltd (Arup) on behalf of Flinders Ports Pty Ltd (ABN 83 097 377 172) (Flinders Ports) to document the proposed Port of Thevenard Jetty Restoration (the proposed Project), and the potential associated environmental, social and economic impacts. The proposed Project includes the 'like for like' restoration of a section of concrete jetty, at Thevenard near Ceduna, in South Australia.

This DA Report has been prepared for the purpose of approval under the *Development Act 1993* and has been structured to ensure consistency with the requirements of the Act. This DA Report presents a clear, detailed understanding of the proposed Project and will enable the responsible authority, the State Commission Assessment Panel (SCAP) to understand the potential risks and proposed mitigation measures associated with the proposed Project.

This DA Report addresses the following matters:

- Details of the proposed Project including project justification and alternatives considered
- Approvals processes and legislative requirements
- Existing environmental, social and economic conditions
- Potential impacts upon the environmental, social and economic conditions
- Construction mitigation measures to be implemented to manage potential impacts in accordance with applicable legislation and policies
- Construction Environmental Management Plan (CEMP) recommendations for construction phase.

This DA Report is supported by several relevant detailed technical assessments and an existing body of technical knowledge, to ensure the SCAP to undertake a suitably robust assessment .

This section provides a detailed introduction and overview of the proposed Project.

1.2 Background

Thevenard is located on the Eyre Peninsula, 793 km west of Adelaide, and 3 km south-west from the centre of Ceduna. Port Thevenard (the Port), is located at the headland of the Thevenard peninsula as shown on Figure 1 and Figure 2. The Port is operated by Flinders Ports under a 99 year lease, from the South Australian government.

The concrete jetty was originally constructed in 1919 and has been periodically added to since, as shown on Figure 3. Overall the jetty is 360 m long. It consists the original 235 m long concrete jetty extending seaward from shore as well as a 125

m long wharf (jetty head). There is also a piled timber jetty, constructed adjacent the original concrete jetty, widening it between the shoreline and wharf.

Vessels access the tidal port from the Yatala Channel which has a depth of 8.2 m. The Port's berths have a prescribed depth of 9.8 m at lowest astronomical tide (LAT). The Port has mean high spring tides of approximately 1.7 m and mean high neap tides of approximately 1.1 m.

Figure 1: Project Location

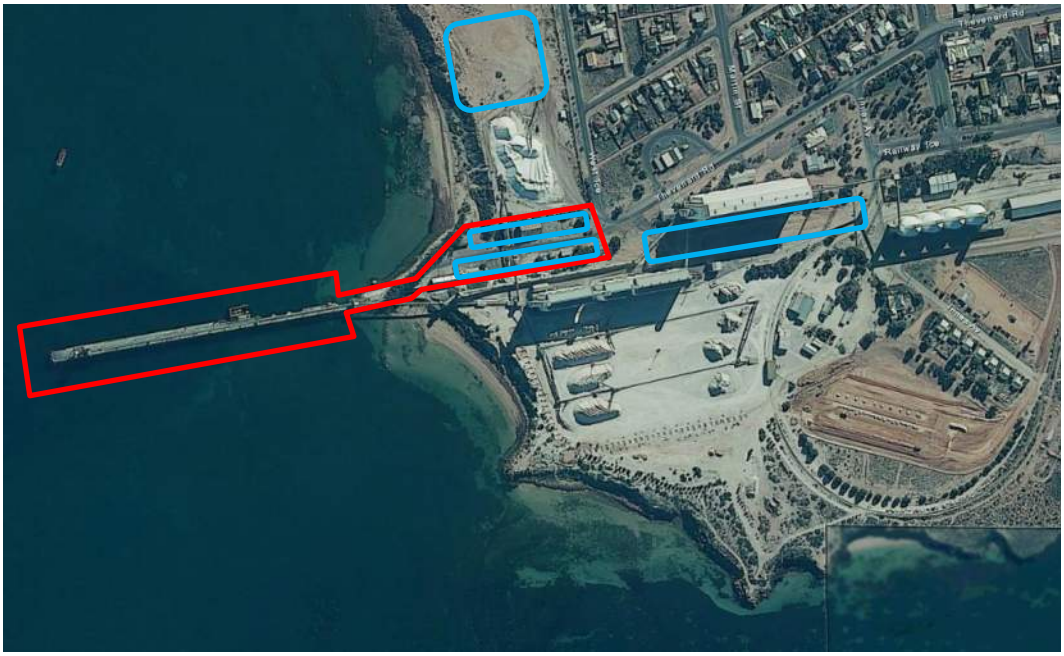

Figure 2: Project Area (red) and potential construction laydown areas (blue)

The Port is the busiest regional port in South Australia with 155 ships berthed in the 12 month period leading up to mid-September 2018. Each ship typically spends one to two days in the Port, resulting in a ship in port approximately 75% of the time.

The Port is a bulk commodities facility, predominantly exporting gypsum, mineral sands, grains and salts with the following typical volumes:

- Gypsum (2M tonnes/year)
- Mineral sands (600k tonnes/year)
- Grain (380k tonnes/year)
- Salt (80k tonnes/year).

The jetty supports a conveyor structure which is shown on Figure 4. The support locations for this structure coincide with the pile locations of the concrete jetty. Concrete caissons support the conveyor gallery legs and conveyer. The concrete and timber jetty structures are largely independent except that the conveyor trestles are supported on the concrete pier as well as at the timber pier locations.

Figure 3: Port Thevenard Jetty structure

Beyond the jetty, on land, the conveyor is supported on A-frame trestles and single columns that are founded on reinforced concrete footings.

The conveyer structure is not owned or operated by Flinders Ports, rather the property of Viterra Inc (Viterra), a bulk commodity handling operator. The common user, north and south berths on the jetty are both fed from the conveyor.

Landside access to the jetty and the adjacent parcels of land is provided from Thevenard Road and West Terrace as shown on Figure 2. Thevenard Road is the main road connecting the Thevenard townsite to Ceduna.

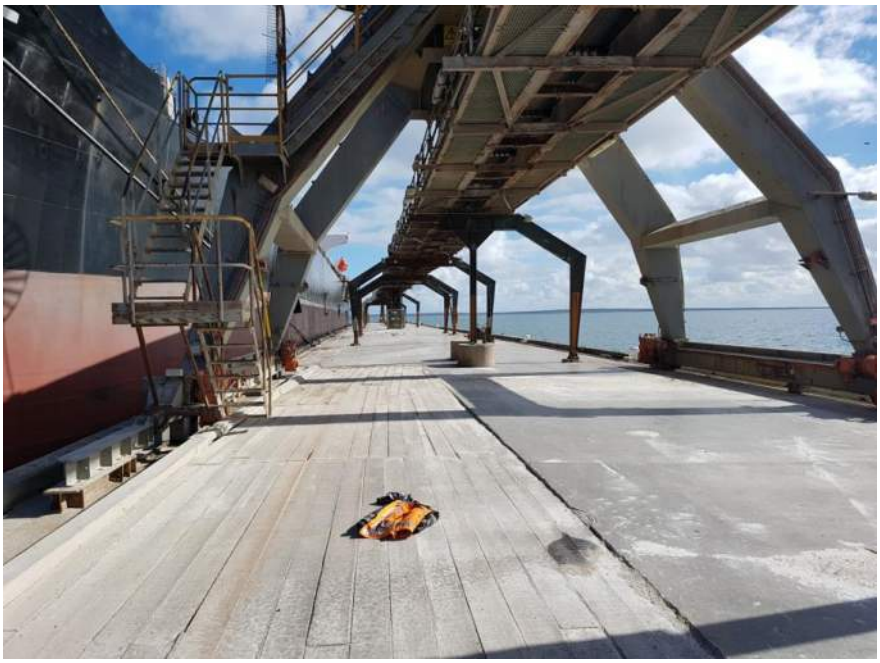

Figure 4: Port Thevenard Jetty Conveyer

1.3 Project Description

The proposed Project is a “like for like” restoration of the original 235 m section of deteriorating concrete jetty, between the shoreline and wharf. Due to the poor state of the jetty, the concrete section has been condemned. As such the scope of works proposed in this DA Report are considered to be essential maintenance, required to ensure the safe, ongoing operation of the facility and have a time urgency due to the current state.

In addition to essential maintenance, improvements have been included in the scope of works to secure the long-term future of this critical asset and enhance port operations. These include:

- Introduction of craneage points for scheduled maintenance (avoiding marine based works in the future)
- Minor widening of the jetty deck structure to improve access along the jetty and hence enhance safety and operational management.

As the jetty is an existing use, the focus of this DA Report is the potential construction impacts. The DA Report does not take into account ongoing impacts associated with operation of the Port Thevenard as there are to be no changes to operations as a result of this proposed Project.

For the purposes of this DA, the proposed Project area is shown on Figure 2. This proposed Project area includes the jetty structure itself as well as potential construction laydown areas to be used during construction, within the bounds of the existing Flinders Ports lease area.

The proposed works will see the existing 235 m section of concrete jetty demolished to avoid further uncontrolled deterioration. As the existing jetty provides support to an additional structure (the conveyer), the existing jetty cannot be demolished until an appropriate supporting structure for the conveyer has been constructed. Design plans showing the proposed works are attached as to this DA Report as Appendix A.

There will be up to a maximum of 16 hollow steel piles driven into the marine floor during construction of the proposed Project. Establishment and preparation for each pile will limit works to one pile a day, with actual pile driving activities assumed to occur for between two to four hours at any one time.

As the proposed Project is currently out for tender, a preferred contractor has not been appointed. While the final details of any construction methodology are yet to be determined (as part of the tender process), the following high-level construction activities will occur in sequence:

- Piling – Marine based piling activities to ensure independence of ongoing operations
- Transverse Beams – Marine based construction of main supporting structures
- Conveyor Support Structures – Jetty based works to construct lighter weight supports and general construction activity
- Demolition – Marine based, upon completion of the piling works
- Seawall construction and civil works – Construct the land-side connection to jetty
- Construct Jetty – Jetty based works placing pre-cast deck & completing construction activity.

As the lessee of the jetty, Flinders Ports has a long-term contractual commitment to providing Viterra with facilities to load their materials onto the ships that dock at the Port. Specifically, Flinders Ports is responsible for maintenance of the jetty, the substructure elements (piles) that support the columns for the conveyor structure and the sheet piled wharf.

Viterra assets do not form part of this proposed Project. There is however a requirement for Flinders Ports to work closely with Viterra to coordinate all construction activities and maintain operations in accordance with existing agreements.

The majority of the jetty subject to this DA Report is located in state waters (ie. defined as land outside a council area) for which no certificate of title exists (Plan Parcel D47972 A10). The landside jetty infrastructure is located on land defined as Lot 8, West Terrace, Thevenard (or Plan Parcel D57833 A8 on Title CT6126/857).

Indicative proposed Project timelines are:

- Engagement of construction contractor: January 2019
- Long lead items procurement: January – March 2019

- Construction works: April – September 2019
- Practical Completion: September 2019.

1.4 Proponent Background

Flinders Ports was formed in 2001 when the Flinders Ports consortium successfully acquired seven ports that were privatised by the South Australian Government. These include:

- Port Adelaide
- Port Giles
- Port Lincoln
- Port of Wallaroo
- Port Pirie
- Klein Point
- Port Thevenard.

In addition to the port infrastructure, Flinders Ports acquired a 99-year land lease and port operating licence for the Port of Adelaide and the six regional ports. Governed by the *Harbors and Navigation Act 1993*, Flinders Ports operates these assets through a Port Operating Agreement, which requires Flinders Ports to meet defined obligations related to the provision of port infrastructure and safely operating the ports in accordance with the agreement and relevant statutory requirements.

Flinders Port Holdings is the overall entity that includes three key businesses; Port Operations (Flinders Ports), Logistics (Flinders Logistics) and the Container Business (Flinders Adelaide Container Terminal) and is owned by five shareholders (including four Superannuation Funds).

Flinders Ports operates a range of businesses and services based out of Port Adelaide with its principle offices located at 296 St Vincent Street, Port Adelaide SA 5015. The organisation has the responsibility to provide the necessary infrastructure to deliver safe and efficient operations at the Port of Adelaide and six regional ports, including Port Thevenard.

Flinders Ports strives for the highest standards in environmental and social governance, holding internationally recognised certifications in the following management systems amongst others:

- ISO 14001: Environmental Management Systems
- OHSAS 18001: Occupational Health & Safety Systems
- ISO 9001: Quality Management Systems.

Flinders Ports have a positive history of compliance with its environmental obligations and any approval conditions for all projects undertaken.

1.5 Project Need

The key driver of the proposed Project is the need to undertake essential maintenance to ensure the continued, safe operation of the Port. Works are required to be undertaken in a time critical manner, due to the concrete jetty being out of operation following due to being condemned.

These circumstances eventuated following a detailed inspection of the jetty in 2017, as part of Flinders Port's asset management plan implementation. This inspection identified a number of structural risks that required further action, including emergency works.

A temporary shutdown of the Port in July 2017 saw emergency works undertaken to the jetty structure to ensure it remained safe and operational whilst a long-term solution was investigated. Emergency works included the partial demolition of the concrete jetty (top slab and precast beams), to avoid uncontrolled failure. Pile strengthening works were also undertaken to the timber jetty, allowing this portion to remain operational.

Flinders Ports assessed multiple long-term options for the Port through a detailed feasibility assessment. This process determined the optimal scope for the proposed Project, taking into consideration the construction methodology, operational and environmental impacts, whole-of-life considerations and economic viability. This proposal, as outlined in this DA Report, is considered the best solution for the long-term sustainability of the Port and further reinforces the strategic need for the proposed Project to proceed.

The jetty needs to be restored and fully operational, in a timely manner so Flinders Ports can return to and continue to operate the Port at full capacity, as soon as possible and into the future. The benefits of the proposed Project, particularly to the community in the form of jobs and economic growth, far outweigh the negatives associated with not undertaking restoration works to the jetty. If works do not proceed, and the jetty is allowed to deteriorate further, Flinders Ports face potential risks from valuable trade bypassing not only the region but South Australia completely as well as the significant economic impacts upon the current users of the Port if they were required to find alternative export options to the current Port.

1.6 Project Environs

Port Thevenard is located within Denial Bay, an open embayment on Thevenard Peninsula. This is shown on Figure 1. An arch of islands, known as the Nuyts Archipelago, stretches south-west of the Peninsula. A sandy beach lies to the direct north of the Port, and low rocky buffs form the northern and southern sides of Cape Thevenard. This is shown on Figure 2. The jetty itself protrudes from a man-made groyne at the end of the headland, as shown on Figure 5. Due to the constant industrial activity in the surrounding environment, the Port is highly disturbed.

The Thevenard Peninsula has been extensively cleared and filled for industrial development. Native vegetation is restricted to narrow roadside copses of eucalypt plantings and natural regeneration and disturbed patches of low open coastal shrubland with minor chenopod shrubland patches on the sand plains.

The landside area of the Port (above the low water mark) is zoned Industry under the District Council of Ceduna Development Plan and heavily utilised for export handling and storage facilities. This is shown on Figure 7. The jetty and berths (beyond the high water mark) are within the Land Not Within a Council Area (Coastal Waters) and are not subject to zoning provisions under the Development Plan.

Figure 5: Port Thevenard Jetty groyne

Figure 6: Thevenard Jetty ecological observations

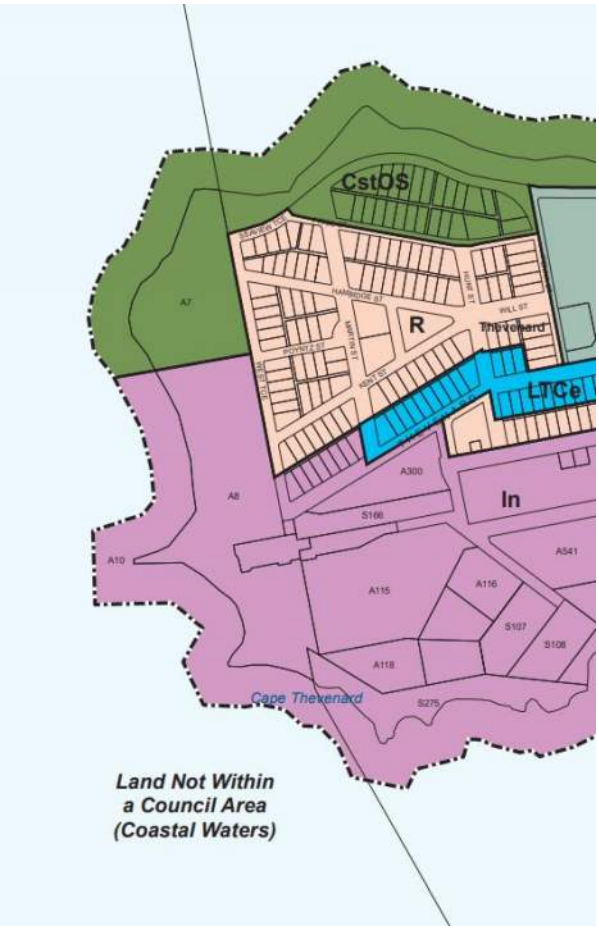

Figure 7: Land Uses surrounding the proposed Project (District Council of Ceduna Development Plan)

1.7 Project Alternatives

1.7.1 Do Nothing

The existing concrete jetty cannot be rehabilitated and therefore requires systematic demolition and reconstruction in order to minimise the risk of future uncontrolled collapse. An uncontrolled collapse scenario has the potential to cause harm to port users, the jetty itself and the environment.

Should further jetty collapse occur and Thevenard jetty not subject to restoration, goods are at risk of needing to be exported via an alternative port facility. This would come at considerable cost and require the timely and costly upgrading of an alternative long-term site. It would have major consequences for the existing users and associated third party infrastructure established at the Port. This would have a negative impact on the local and potentially the broader South Australian economy as a result. The construction of a new ort facility, or the upgrading of a smaller less capable port facility, would also likely come at considerable social and environmental impact.

In consideration of these impacts the Do Nothing option is not viable.

1.7.2 Alternative Options

Flinders Ports considered a range of alternative options through a detailed feasibility assessment. Options considered included a complete re-construction of a new jetty which would have resulted in a closure of the Port for an extended period with associated economic and environmental impacts.

Alternative construction methodologies and approaches were also considered with a total of seven options assessed to determine a preferred solution as presented in this DA Report. All options were assessed against multiple criteria including but not limited to the technical viability, environmental impact, impacts upon operations and economics as well as long term viability and flexibility.

The base case as presented is considered the optimal Project configuration to achieve the objectives of securing the long-term future of the Port with the least impact upon the environment and ongoing operations within the critical timeframes to remediate the existing structure.

1.8 Study Methodology

1.8.1 Study area

The Project Area is shown on Figure 2. This figure also provides the indicative location of potential construction laydown areas. The assessments undertaken as part of the preparation of this DA Report have focused on this Project Area, however where required for a particular assessment, this area has been expanded, to allow for appropriate consideration of environmental constraints and potential for environmental impacts relevant to that discipline.

1.8.2 Study approach

The following steps were undertaken in the preparation of this DA report:

- Definition of the proposed Project, and associated planning and environmental approval requirements
- Desktop assessments of planning and environmental constraints including ecology and cultural heritage
- Where existing data was insufficient to be able to inform an assessment of potential impacts, further detailed technical assessments were undertaken to support this Report, this included:
  - Marine and Terrestrial Ecology
  - Coastal Processes.

Section 8 provides draft Construction Environment Management Plan (CEMP) measures that are proposed to be applied during construction works to minimise potential environmental impacts. These draft CEMP measures will be further updated by Flinders Ports and Flinders Ports appointed contractor prior to commencing any works to comply with all necessary requirements.

1.9 Stakeholder consultation and engagement

Under Section 58 of the Land Outside a Council Area (Coastal Waters) Development Plan, all development (except those designated as non-complying), associated with port activities are assigned Category 2 notification requirements. This requires SCAP as the responsible planning authority to notify neighbouring properties of the proposed Project, as part of the referral process. SCAP will also notify the Local District of Ceduna council as a non-mandatory referral.

During the preparation of this DA Report, the Department of Planning, Transport and Infrastructure (SA) and the Local District Council of Ceduna have been consulted with to ensure awareness of the proposed Project and to ensure an "in principle" agreement of the proposed approval pathway

Flinders Ports is also committed to ensuring that relevant stakeholders and the local community remain informed and aware of the proposed Project. Flinders Ports will be undertaking additional consultation and engagement activities to align with the approval process, as well as throughout the construction period.

Engagement objectives for Flinders Ports for the proposed Project include:

- Maintaining Flinders Ports' social licence to operate through proactive and transparent engagement with key stakeholders and the community in the Ceduna local area
- Making key stakeholders aware of the proposed Project and the details of the proposed scope of works and planned timing
- Preparing and informing stakeholders and the community for the construction period and supporting them during these works.

2 Legislation and Planning Context

2.1 Introduction

This section provides the statutory planning context and applicable approval process for the purposes of this DA Report. It considers the planning requirements of the *Development Act 1993*, as well as other legislative requirements under Commonwealth and state legislation and applicable policies and planning instruments.

2.2 Planning context and assessment process

The *Development Act 1993* is the primary planning legislation governing land use control in South Australia. The proposed Project is subject to the provisions of this Act.

The provisions of the *Development Act 1993* are implemented through local Development Plans.

The proposed Project is located across two Development Plan areas, the District Council of Ceduna Development Plan and the Land Not Within a Council Area (Coastal Waters) Development Plan. The District Council of Ceduna Development Plan is administered by Ceduna Council while the SCAP, as established under the *Planning, Development and Infrastructure Act 2016*, is the responsible planning authority for land outside a council area.

As the jetty is an existing use, works associated with construction are the focus of this DA. The DA Report does not take into account ongoing impacts associated with operation of the Port of Thevenard.

Where a DA is located across two Development Plan areas, the provisions of the Land Not Within a Council Area (Coastal Waters) Development Plan is applicable to the development. As such for this DA, the SCAP is the responsible planning authority.

Following submission of the DA Report to the SCAP, in accordance with Schedule 8 of the *Development Regulation 2008*, SCAP will refer the DA Report to the prescribed bodies for the application, these being the Coastal Protection Board and the Commonwealth Minister for the Environment, responsible for administering the *Commonwealth Historic Shipwrecks Act 1976*.

Additionally, notification to surrounding land owners is required as the proposed Project is assigned Category 2 Notification requirements under the Land Not Within a Council Area (Coastal Waters) Development Plan. Interested bodies will be invited to make comment on the application and should SCAP determine it is required, a Hearing will be held.

SCAP is required to take into account all relevant submissions received and will then determine whether to approve, approve with conditions, or refuse the

application. SCAP is required to act in the manner of a local authority when assessing the application.

The approvals process applicable to the proposed Project is shown in Figure 8.

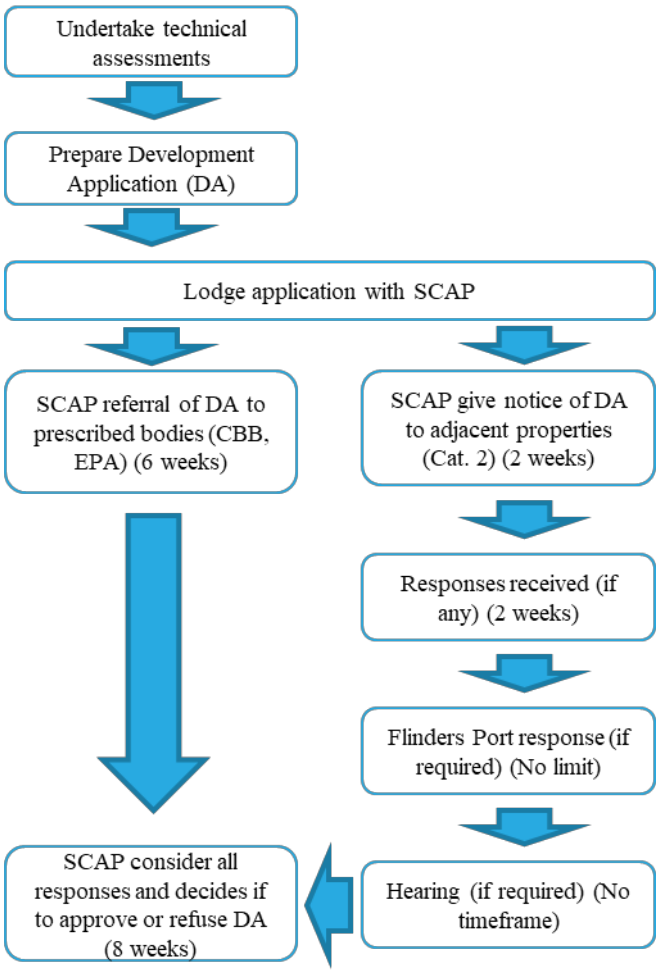

Figure 8: SCAP DA preparation and approvals process

2.3 Commonwealth Legislation

2.3.1 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places. Under the Act, approval is required from the Commonwealth Minister for the Environment and Energy for any proposed action:

- on Commonwealth land which is likely to have a significant impact on the environment generally; and
- that is likely to have a significant impact on a Matter of National Environmental Significance (MNES) protected by the EPBC Act (such as a nationally listed endangered species).

The provisions of the Act relevant to the proposed Project are discussed in Section 3 of this Report.

2.3.2 Native Title Act 1993

The *Native Title Act 1993* recognises the existence of an Aboriginal land ownership tradition where connections to country have been maintained and where actions of government have not extinguished this connection.

The provisions of the Act are discussed in Section 5 of this Report.

2.3.3 Historic Shipwrecks Act 1976

Under the *Historic Shipwrecks Act 1976* any interference with historic wrecks is prohibited. Wreck material must not be damaged, moved on site or taken from a wreck. The remains of ships that have been situated in territorial waters of Australia for 75 years or more are historic shipwrecks for the purposes of this Act.

The provisions of the Act are discussed in Section 5 of this Report. The provisions of the State *Historic Shipwrecks Act 1981* do not apply to this wreck as it is in Commonwealth jurisdiction.

2.4 State Legislation

2.4.1 Development Act 1993

The *Development Act 1993* is the primary planning legislation governing land use control in South Australia. The Act is currently in the process of being repealed and replaced by the *Planning, Development and Infrastructure Act 2016*. This is being undertaken on a staged basis and the provisions impacting the proposed Project are yet to be implemented.

This DA Report has been prepared for the purpose of approval under the *Development Act 1993.*

2.4.2 Environment Protection Act 1993

The *Environment Protection Act 1993* provides for the protection and management of the environment in South Australia including matters such as site contamination, air quality, water quality, noise and waste. A key objective of the Act is to ensure that all reasonable and practicable measures are taken to protect, restore and enhance the quality of the environment, having regard for the principles of ecologically sustainable development and to ‘prevent, reduce, minimise and where possible eliminate harm to the environment’.

The Act has regard for activities including the discharge to marine waters or air. The Environment Protection Authority (EPA) are responsible for issuing authorisation for the carrying out of these activities and issuing associated licenses.

The provisions of the Act relevant to the proposed Project are discussed in Section 6.

2.4.3 Aboriginal Heritage Act 1988

The purpose of the *Aboriginal Heritage Act 1988*, amongst other things, is to ensure the protection and preservation of Aboriginal sites, objects and remains, with the Act administered by the Minister for Aboriginal Affairs and Reconciliation.

Approval would need to be sought to clear or disturb any known sites of Aboriginal heritage significance. Where there is potential for Aboriginal sites to be uncovered during construction, monitoring would be required to be undertaken where natural soil is likely to be disturbed. The proponent would need to ensure construction contractors are aware of this requirement. The Office of Aboriginal Affairs and Reconciliation requires that in the event of archaeological items being uncovered during works, it is contacted immediately.

The provisions of the Act relevant to the proposed Project are discussed in Section 5 of this Report.

2.4.4 Coast Protection Act 1972

The *Coast Protection Act 1972* provides for the conservation and protection of South Australia's beaches and coastal environment. The Act establishes the Coast Protection Board who are the responsible authority for protecting, restoring, developing and managing the coast. The Coast Protection Board would be consulted by the responsible authority (SCAP) during the development assessment process.

While approval is not required under the Act, the provisions relevant to the Act are discussed in Section 4.

2.4.5 National Parks and Wildlife Act 1972

The *National Parks and Wildlife Act 1972* provides for the conservation of wildlife in a natural environment. While approval is not required under the Act, provisions relevant to the Act and the proposed Project are discussed in Section 3.

2.4.6 Marine Parks Act 2007

The *Marine Parks Act 2007* provides for the protection of designated marine parks in South Australian state waters.

Approval is not required under the Act, as the proposed Project and associated shipping channels are outside of the Nuyts Archipelago marine park.

2.4.7 Harbours and Navigation Act 1993

The *Harbours and Navigation Act 1993* applies to coastal and inland waters of the State and has relevance for the proposal in regard to the provision of navigational aids around the marine infrastructure.

Approval is not required under this Act, as the proposed Project does not involve the modification or installation of new navigational aids (this should be confirmed with the Department for Transport, Energy and Infrastructure upon completion of detailed design).

2.4.8 Native Vegetation Act 1991

The *Native Vegetation Act 1991*, amongst other things, controls the clearance of native vegetation in South Australia. The Act is administered by the Native Vegetation Council (and the Department of Environment and Water as the responsible agency). Approval under this Act is required for the removal of native vegetation.

Often there is a requirement to 'offset' the removal of any native vegetation, usually by protecting a separate area of land for conservation. The offset, known as a Significant Environmental Benefit (SEB), needs to provide an environmental gain over and above the damage being done to the native vegetation being removed.

Offsetting options include establishing an 'on-ground' SEB area (re-establishing native vegetation, managing, enhancing or protecting an existing area of native vegetation) or paying into the Native Vegetation Fund. Facilitation of this process is required to be undertaken by an accredited consultant who will to calculate the SEB offset area required (if any).

The provisions of the Act relevant to the proposed Project are discussed in Section 3.

3 Coastal and Marine Ecology

3.1 Overview

This section addresses the potential environmental issues and impacts to marine and terrestrial ecology associated with construction of the proposed Project.

This DA Report section specifically describes:

- The main features of the existing environment in the study area, focusing on important or sensitive ecological resources and the integrity of coastal and marine ecosystems
- Potential impacts to marine and coastal ecology from the construction of the proposed Project
- Proposed management measures to mitigate impacts.

The marine ecology investigations and reporting were undertaken by BMT WBM Pty Ltd on behalf of Arup. A copy of the complete assessment is provided in Appendix B.

In summary, a combination of desktop and field assessments found that the designated Study Area contains seagrass meadows and reef habitat that provide occasional foraging opportunities for a number of species, including EPBC-listed marine species as well as other common marine fauna. The assessments determined however, that the Study Area does not provide any significant breeding, aggregation or feeding habitat for any EPBC-listed marine species. It was noted that there is more extensive and suitable habitat available elsewhere within the broader Ceduna environment.

Overall the assessment determined that with appropriate construction controls such as marine fauna monitoring and operating under exclusion zones, there is not expected to be a significant impact to any protected habitat or fauna species. The construction of additional marine infrastructure will increase the available habitat for biofouling species that populate hard surfaces.

Completion of the proposed Project will not lead to a change in the volume of material exported from the facility or the number of vessel movements. Therefore it is expected that there will be no additional environmental impacts to those existing currently for operation of the Port.

3.2 Study Area

Marine investigations were undertaken in the following three different zones, as shown on Figure 9:

- Zone 1 – Highest sampling effort was under the jetty and proposed launch pad footprint.
- Zone 2 – Moderate sampling effort was undertaken within a 250 m zone surrounding the entire jetty footprint.

- Zone 3 – Spot checks of potential seagrass and reef areas, as identified through preliminary habitat mapping, was undertaken between 250 – 500 m of the entire jetty structure.

While investigations focused on potential impacts to marine values, terrestrial values have also been reviewed for potential construction laydown areas may be placed as shown on Figure 2.

3.3 Assessment Approach

In undertaking an assessment of the proposed Project's potential impact on marine and terrestrial ecology, the following steps were undertaken:

- A desktop review of the regulatory and policy framework for assessment of impacts to marine ecological values and a review of previous studies relevant to marine habitats, assemblages and threatened species known or potentially occurring within the Study Area;
- Undertake field surveys to map marine benthic habitats and characterise epibenthic communities within the Study Area, develop a description of the environmental baseline in relation to marine and coastal terrestrial ecology; and
- Identify and assess potential direct and indirect impacts of the proposed project on marine and terrestrial ecological values, and possible strategies that may be required to minimise the extent and/or severity of those impacts on identified ecological values.

3.4 Conservation Status

Within this Report, the conservation status of a species may be described as Critically Endangered, Endangered, Vulnerable or Rare. These terms are in accordance with the EPBC Act or *National Parks and Wildlife Act 1972 (SA)* (NPW Act). Additionally, species can be listed as cetaceans, marine and/or migratory, which are specifically protected under the EPBC Act. Threatened is a common use term to collectively describe endangered and vulnerable species.

3.5 Existing Conditions

A desktop review of available information, namely Nature Maps SA and the EPBC Protected Matter Search Tool (PMST) has been undertaken in conjunction with a marine field survey to establish the existing coastal and marine ecology in the study area.

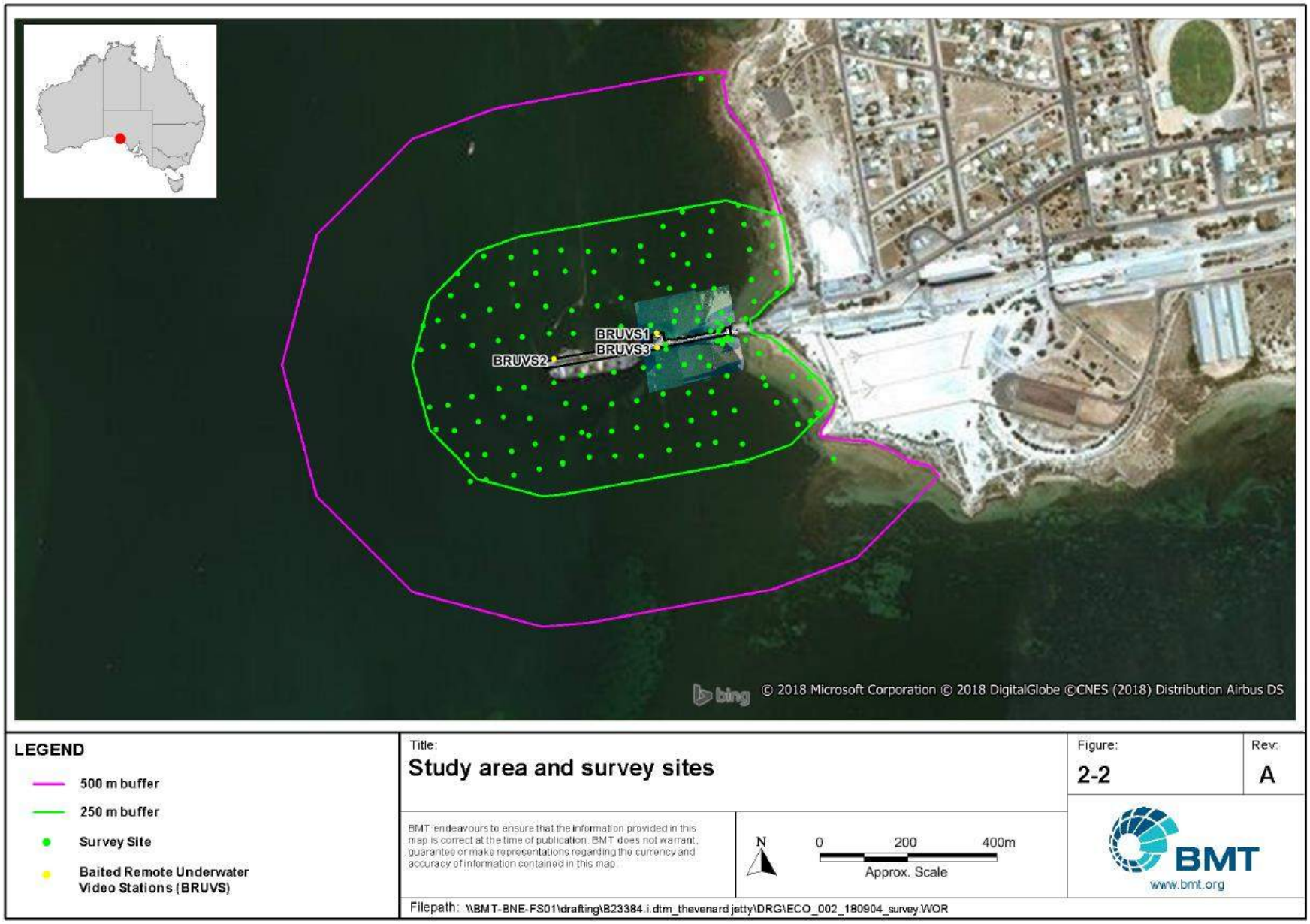

Figure 9 Study area and marine ecology survey sites

3.5.1 Desktop

Protected Matter Search Tool (PMST)

A review of the PMST identified the following Matters of National Environment Significance (MNES) as potentially occurring within a one km radius of the jetty:

- One Threatened Ecological Community (TEC) – Subtropical and Temperate Coastal Saltmarsh
- 33 listed Threatened Species (TS) including 24 birds, 1 fish, 7 mammals, 8 plants, 8 reptiles and 4 sharks
- 43 listed Migratory Species (MS).

In addition to MNES, the PMST also lists additional marine fauna protected by the EPBC Act, including Listed Marine Species (66) and Whales and Other Cetaceans (12). The PMST is predictive only and does not provide certainty that a MNES is present.

Nature Map SA

A review of Nature Maps SA shows benthic habitat classes around the jetty area categorized as dense, continuous seagrass. Seagrass extent becomes patchier with distance from the shore, with areas of bare substrate and macroalgae coverage further offshore. There were also small areas of reef to the northern and south of the jetty and along the foreshore.

Marine fauna species recorded within 5 km of the Thevenard jetty include:

- Grey Plover – Pluvialis squatarola;
- Sooty Oyster Catcher Haematopus fuliginosus (Rare);
- Ruddy turnstone Arenaria interpres (Rare);
- Common Greenshank Tringa nebularia;
- Sharp-tailed Sandpiper Calidris acuminate;
- Red-necked Stint Calidris ruficollis;
- Masked lapwing Vanellus miles;
- Grey-tailed Tattler Tringa brevipes (Rare);
- Curlew Sandpiper Calidris ferruginea (Critically endangered EPBC);
- Australian Pied Oyster Catcher Haematopus longirostris; and
- Leatherback Turtle Dermochelys coriacea.

There is an Australian Sea Lion Colony recorded on the southern side of the Nyuts Archipelago Conservation Park and a migratory bird site near Rocky Point to the north.

Nature Maps SA did not identify any terrestrial native vegetation within the study area.

3.5.2 Field investigations

Marine flora

Seagrass communities are highly productive ecosystems and provide breeding and nursery areas for fish and crustacean species. Mapping of seagrass extent is provided in Figure 10. Within the 250 m buffer zone nominated for the study a total of 177,200 m^2 of seagrass meadows were observed. Within the direct impact footprint of the proposed new jetty structure and launch platform, there was approximately 650 m^2 of seagrass meadows that would be permanently removed.

Similarly to seagrass communities, reefs provide habitat for a number of marine species, including protected and commercial fish species. Rocky reef habitats observed throughout the Project Area are shown on Figure 11, with these reef habitats have been classified into three broad categories, high relief reef, low relief reef and rubble. Beneath the jetty structure the substrate was generally comprised of bare, unconsolidated sediments ranging from silt, sand and coarse gravel/shell grit with razorfish, cockles and sponges observed over these unconsolidated sediments. On the northern side of the jetty an artificial reef structure, defined as high relief, has formed from collapsed sections of the original concrete jetty. Pylons also offered a hard substrate that supported similar ecological communities dominated by sponges and ascidians.

The foreshore area either side of the jetty consists of publicly accessible rocky shelf and narrow sandy beaches. There are no areas of saltmarsh, mangrove or muddy tidal flats that would support significant numbers of migratory shorebirds.

No marine flora observed during field investigations are considered protected under the EPBC Act within the study area.

Marine fauna

A number of marine fauna were observed during the field investigations, including a local population of common bottlenose dolphins and a solitary Australian Sea Lion. Dolphins are not considered a protected species, however the Australian sea lion is considered vulnerable under both the EPBC Act and the South Australian *National Parks and Wildlife Act 1972*. While there are no key breeding colonies for the sea lion in the study area, there is an Australian Sea Lion Colony recorded on the southern side of the Nyuts Archipelago.

No whales, sharks or rays were observed during the field investigations. Whales are unlikely to be found in the shallow waters of the study area. Shark species however are regularly recorded in the area and would likely be supported by rocky reefs within the Ceduna area.

Several species of shorebirds and seabirds were observed during the survey, including Pacific gulls, Silver gulls, Masked lapwing, Australian Pied Oystercatcher and Pied Cormorant. All observed bird species are considered common and are not listed as a threatened species under either the *National Parks and Wildlife Act 1972* or EPBC Act.

Investigations using baited remote underwater video stations (BRUVS) were deployed to survey fish assemblages in the study area. The locations of these

BRUVS are shown on Figure 9. A total of 12 species, which included nine fish and three crustacean were identified. All surveyed fish and crustacean species in the study area are considered common and are not listed as a threatened species under either the *National Parks and Wildlife Act 1972* or EPBC Act.

Terrestrial flora

The Vegetation communities where stockpiling of construction equipment and material may occur were surveyed during the site visit. This survey found that the study area supports patches of *Eucalyptus oleosa*, *Eucalyptus calcareana*, *Myoporum* spp. and *Geijera linearifolia* within roadside verges and access tracks, however no intact or high quality mallee forest or woodland were identified on site.

Disturbed low open coastal shrubland on coastal sandplains which has been subject to regular vehicle access occurs in the north of the study area. The foreshore comprises mixed shrubland. Near-intertidal chenopod communities directly adjacent to the foreshore are part of the Subtropical and Temperate Coastal Saltmarsh Listed as Vulnerable under the *EPBC Act*, however provided construction laydown areas and associated facilities are contained within previously cleared areas where regular vehicle access has removed native shrubland cover, impacts to terrestrial native vegetation communities can be avoided.

No Commonwealth threatened flora species listed under the *EPBC Act* have been recorded in the Study Area during the site visit. No species listed under the *National Parks and Wildlife Act 1972* were recorded on site during the high-level assessment and none are likely to occur given the site's disturbed condition and/or lack of suitable habitat features.

Please refer to Appendix B for a complete list of marine and coastal flora and fauna listed during the desktop and field assessments.

Figure 10: Distribution of seagrass in study area

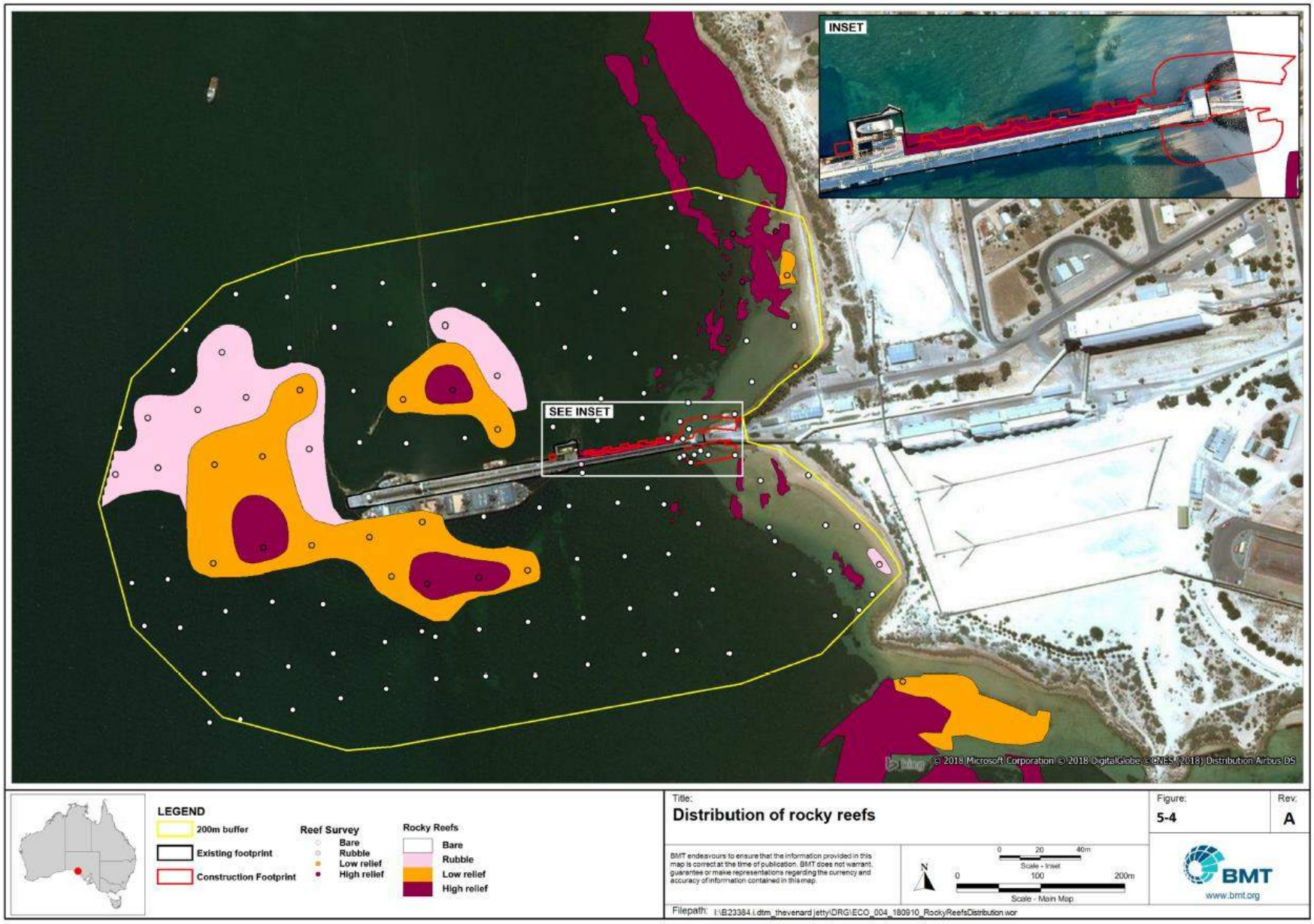

Figure 11: Distribution of rocky reefs in study area

3.6 Potential Impacts

Potential impacts to the marine and terrestrial ecological values identified in this DA Report have been identified based on the following:

- The likely direct or indirect impacts of construction and operational activities
- The importance of the area or species to be disturbed
- Consideration of the sensitivity of the receiving environment to disturbance
- The magnitude of the level of disturbance and its timing/duration
- Cumulative impacts.

The proposed Project is effectively a refurbishment of an existing use, to which, to some extent the environment has already adapted. Species that are within the study area would be used to some level of vessel movement, noise and dust being regularly generated. The proposed works do not change the capacity of the existing infrastructure.

Potential impacts are therefore focused on identifying any additional or cumulative impacts from the new infrastructure proposed and are largely confined to the construction period. These include:

- Direct removal of seagrass or reef habitat as a result of demolition, piling or shading of the seabed
- Direct removal of migratory shorebird habitat
- Direct removal of native vegetation for stockpiling of construction material and equipment
- Changes to coastal hydrodynamics, which alter patterns of erosion and deposition and the extent of seagrass beds
- Underwater noise generated by demolition and piling activity or construction vessel movement
- Artificial light emissions
- Indirect impacts to a marine habitat from a deterioration in water quality from demolition, piling or accidental waste spills
- Introduction of pest species
- Marine fauna collisions or strike.

As defined in Table 1 in determining the scale of impact the importance of an environmental receptor is a key consideration. Impacts to conservation significant communities/species or protected areas are generally considered a higher impact.

Table 1 Ecological impact criteria

Environmental value	High	Medium	Low
Protected habitats	Adverse impacts to the values of an area protected at international or national level e.g. Ramsar Wetland, Commonwealth Marine Area, National Park	Adverse impacts to the values of an area protected at state level e.g. Conservation Park, Marine Park	No significant Adverse impact
Protected Ecological Communities	Adverse significant impact to an Ecological Community protected under the EPBC Act	Adverse significant impact to a vegetation community that wholly or mostly supports a rare, vulnerable or endangered species	No significant adverse impact
Protected Flora or Fauna	Significant Adverse impact to a nationally threatened species	Significant adverse impact to a state threatened species	No significant adverse impact
Fisheries Values	Significant Adverse impact to a commercial fish species	Adverse impact to recreational fishing values	No significant adverse impact

Seagrass beds

Within the 250 m buffer zone nominated for the study a total of 177,200 m^2 of seagrass meadows were observed. Within the direct impact footprint of the proposed new jetty structure there was approximately 650 m^2 of seagrass meadows. These seagrass meadows would be permanently lost as they would be either replaced by infrastructure or shaded, preventing regrowth.

Construction vessels would be deployed within the marine environment during piling and construction activities; these would be anchored to the seabed and could cause some minor loss of seagrass from physical damage.

Upgrading the jetty and providing additional infrastructure has the potential to alter the local hydrodynamics around the jetty, potentially influencing areas of sediment erosion and deposition, and in turn, seagrass extent. Initial desktop assessment of the hydrodynamics indicates that any changes to waves, currents and sediment transport are likely to be insignificant.

The small area of seagrass loss (approximately 650 m^2) predicted to occur is minor in relation to the much larger seagrass areas that surround the Project Area (177,200

m^2). Whilst it currently provides habitat for marine fauna such as fish species, it is not considered critical habitat that is necessary for the survival of local species.

Direct impacts to seagrass are considered a low impact, however a permit to remove native vegetation will still be required.

Reef communities

There should not be any direct impacts to reef habitat within the Project Area; material currently below the water surface will remain in situ and will not be removed. Rather, the placement of new infrastructure will expand the surfaces available for colonisation and increase available habitat.

Direct impacts to reef communities are assessed as being of low impact.

Terrestrial vegetation

No native vegetation communities have been mapped in the Project Area. However, Chenopod shrubland within and directly adjacent to intertidal foreshores are considered part of the Subtropical and Temperate Coastal Saltmarsh community listed as Vulnerable under the EPBC Act. No threatened terrestrial flora species listed under the *National Parks and Wildlife Act 1972* or EPBC Act have been recorded in the Project Area.

Provided this vegetation is not removed however, impacts would be negligible.

Noise impacts

Upgrades to the existing jetty will involve demolition and piling works, which generate underwater noise. Marine fauna (whales, dolphins, seals or turtles) can be reliant on sound for communication and underwater noise levels generated by construction activity can alter their behaviour (avoidance of a noisy location), or in some instances cause injury or death. Cetaceans and pinnipeds that are listed under the EPBC Act are known to frequent the Ceduna area, and would be vulnerable to disturbance from underwater noise.

Mitigation measures (such as setting exclusion zones and having trained marine fauna monitors in place) to protect marine fauna from underwater noise during construction would be required. Shorebirds can also be vulnerable to noise disturbance; the surrounding foreshore habitat is not considered likely to support large numbers of birds.

Operationally, noise generated would not be higher than that already experienced from use of the jetty conveyor and vessel movements.

Provided mitigation measures are in place to protect marine fauna from underwater noise during construction, the impacts are considered low.

Artificial light

Artificial lighting for an extended period of time can attract fish and other species, altering their behaviour. It is intended that after-hours construction for the jetty upgrade does not occur except under unusual circumstances. As the jetty is already lit at night-time due to 24 hour operations (vessel loading), it is unlikely that this project would generate further light nuisance than that already experienced.

Introduction of pest species

Marine pests can be spread through bringing in vessels that have pest species already attached to their hulls. Any equipment brought to site would be required to be cleaned prior to use in accordance with Australian regulations for biosecurity.

Vessel strike

Marine vessels would largely be confined to the immediate jetty area during construction and would not be fast-moving; nevertheless, speed limits shall be placed on vessels to further reduce the risk of marine fauna strikes.

3.7 Construction Management Measures

Flinders Ports understands the importance of minimising disturbance to the marine and terrestrial environment and the responsibility it has to adhere to permit requirements. Flinders Ports will ensure the required Significant Environmental Benefit (SEB) agreement under the Native Vegetation Act is reached and in place, prior to works commencing, to compensate for any loss of seagrass meadows.

Further, management measures, such as those below, are recommended to be put in place to reduce any further potential impacts arising from construction activity.

- Preparation of a Construction Environmental Management Plan which outlines the following:
  - Roles and responsibilities for environmental management;
  - Any legislative obligations;
  - Measures to minimise environmental impacts;
  - Emergency procedures in the event of incidents;
  - Exclusion zone and marine fauna monitoring to be put in place in accordance with the South Australian Underwater Piling Noise Guidelines (2012) during demolition and piling activity;
  - Chenopod shrubland within and directly adjacent to intertidal foreshores is not to be removed during construction, with areas at risk protected from damage through barrier fencing/taping;
  - Vessel and machinery to be maintained to the manufacturers specifications to reduce noise emissions and the likelihood of a spill to the marine environment;
  - Vessels are to be operated at minimum speeds to reduce the likelihood of boat strike; interaction with cetaceans and pinnipeds should be compliant with the Australian Guidelines for Whales and Dolphin Watching (Commonwealth of Australia, 2017) which implements controls for interactions e.g. sets no approach zones, not encouraging bow riding etc; and
  - Should night-time works occur, light spill from vessels or the jetty will be minimised by using directional lighting and light shields, unless there is a safety hazard.

4 Coastal Processes

4.1 Overview

This section describes the potential environmental impacts to coastal processes as a result of construction of the proposed Project. This DA Report section describes:

- The coastal processes baseline, including bathymetry, tidal planes, wind, waves, seabed character and beach character
- Potential impacts to coastal processes due to construction of the proposed Project.

The coastal processes assessment and reporting was undertaking by BMT WBM Pty Ltd on behalf of Arup. The coastal processes assessment is attached as Appendix C. Due to the project being located in the coastal environs, the Report DA will be referred to the Coastal Protection Board, as prescribed body, by SCAP during the referral period.

4.2 Study Area

The coastal processes assessment considered bathymetry, tidal regimes, wind and wave characteristics within Denial Bay. Seabed and beach characteristics were identified for the areas in the vicinity of the Port.

4.3 Assessment Approach

In undertaking an assessment of the proposed Project's potential impacts on coastal processes, the following steps were undertaken:

- Desktop review of the existing environment within the wider Denial Bay and the Project Area, using available bathymetry, tidal planes and meteorology information
- Undertake field surveys to define seabed and beach characteristics and collect sediment samples
- Identify and assess impacts of the proposed Project on coastal processes.

4.4 Existing Conditions

Bathymetry

The Denial Bay bathymetry is typically in the range of five to 10 m below Chart Datum (CD), with areas of shallower shoals. The shipping approach to the Port is via the marked Yatala Channel, which is a curved (s-shaped) route negotiating between adjacent shoals.

Cape Thevenard is a promontory (a point of high land that juts out into the ocean) extending around 3 km westward and connected to the eastern bay coastline and

township of Ceduna by an isthmus (a narrow stip of land connecting two larger landmasses and separating two bodies of water).

The wave growth fetch at Port Thevenard is around seven km to the north-north-east, six km to the west and 10 km to the south. Denial Bay is exposed to the Great Australian Bight to the south-west, however the constrained entrance between Point James and St Peter Island and the shallow bathymetry within Denial Bay would attenuate Southern Ocean swell penetration. The 20 m depth contour lies around 25 km to the wouth-west and an extensive shallow shoal extending above 0 m Lowest Astronomical Tide (LAT) lies between Port Thevenard and open water.

Tidal Planes

The tidal regime at Port Thevenard is classified as diurnal but will be predominantly semi-diurnal during most spring tide phases. Tidal planes are provided in Table 2. The spring tidal range is typically 1 – 1.5 m.

Table 2 Thevenard Tidal Planes (Austide, 2018)

Tidal Plane	Level (m LAT)
Highest Astronomical Tide (HAT)	2.3
Mean Higher High Water (MHHW)	1.7
Mean Lower High Water (MLHW)	1.1
Mean Sea Level (MSL)	1.0
Mean Higher Low Water (MHLW)	1.0
Mean Lower Low Water (MLLW)	0.4
LAT - CD	0.0

Wind

Wind roses for the Bureau of Meteorology site at Ceduna Airport are shown in Appendix C.

The observed wind patterns are strongly seasonal and also exhibit diurnal variation as a result of sea breeze effects. During summer the prevailing morning wind is a moderate (10 – 30 km/h) south-easterly. The prevailing summer afternoon sea breeze is from the south-south-east at 20 – 40 km/h. Afternoon sea breezes are also common during autumn and spring.

Winter wind speeds and directions are more variable, with a greater prevalence of northerly sector winds and more frequent wind speeds in excess of 40 km/h. The highest frequency of strong winds occur in spring, most typically from the westerly or northerly sectors.

Waves

Due to the short fetches and shallow bathymetry within Denial Bay, the wave climate at Port Thevenard is locally-generated by the prevailing winds. During summer the dominant wave direction will be from the south, while in winter the dominant waves will be generated across the fetch to the north-north-west. Due to the limited fetch distances the significant wave heights will typically be less than 1 m and associated wave periods less than 3 seconds.

Seabed character

Port Thevenard sediments are predominantly sandy, with varying quantities of shell rubble and fine silts depending on location. In order to provide vessel berth access to the jetty, the seabed has been dredged for a distance of approximately 150 m on both the northern and southern sides of the jetty head. Rocky reef and rubble patches occur within the dredged berth area. As described in Section 3, the seabed inshore of the jetty head and associated berths is covered with dense seagrass, while the coverage is sparser on the flanks of the dredged berth area.

Beach character

The beaches flanking Cape Thevenard are characterised by intermittent fine sand patches between calcareous rocky outcrops. At the time of the field survey (September 2018) the beach to the south of the jetty had a higher proportion of sand coverage than the beach to the north.

The Cape Thevenard beaches are backed by moderate relief rocky dune/cliff structures. The Port Thevenard jetty protrudes from land at a location where rock and concrete protection has been used to stabilise the upper shoreface. This is likely to have been built upon a naturally rocky outcrop. The upper shoreface rock/concrete protection has been extended some way north of the jetty structure, presumably to mitigate shoreline erosion.

4.5 Potential Impacts

The proposed rock groyne extension, which will extend approximately 25 m further west and 10-15 m further north and south than the current rock protection is likely to result in some change to coastal processes.

The extended rock groyne will continue to act as a beach control point, however the westward extension would not be expected to result in a significant change to sand volumes on the adjacent beach compartments.

There is potential for the extended groyne structure to cause an increase in reflected wave energy in its immediate vicinity, which may result in the indirect disturbance of inshore seagrass from greater wave energy. The existing inshore seagrass limit is located further offshore to the immediate north-west of the existing rock groyne than other locations. This may be due to the combined action of incident and reflected waves generated under strong northerly wind conditions. The extended groyne may therefore result in some inshore seagrass loss in addition to any direct construction impacts.

Historical erosion of the shoreline to the north-east of the existing rock groyne may have required stabilisation of the upper shoreface. The upgraded rock groyne is likely to be of a higher engineering standard than the existing structural protection. While the upgraded groyne structure shouldn't increase the erosion pressure on this section of coastline, maintenance and upgrade of the existing protection may also be required at some point in the future.

Aside from the potential impacts associated with the rock groyne extension, the transmission of waves and currents by the remediated jetty structure should be essentially identical to the baseline case and therefore no further impacts to coastal processes would be expected.

4.6 Construction Management Measures

The proposed coastal processes construction mitigation measures aim to minimise disturbance to the coastal and marine environment. They are considered consistent with those discussed in Section 3.7.

5 Cultural Heritage

5.1 Overview

This section addresses the cultural heritage reporting requirements for the proposed Project, addressing both Indigenous and non-Indigenous cultural heritage values and impacts of the Project area. It identifies the relevant Commonwealth, State, and local legislative requirements and quantifies the likely impacts on the identified values, and subsequently the cultural heritage approval requirements for the proposed Project. This includes:

- Native Title and Aboriginal Heritage
- Non Indigenous Cultural Heritage and Historic Shipwrecks.

5.2 Existing information

Information regarding Indigenous heritage has been sought from the South Australian Government, namely the Department of the Premier and Cabinet – Aboriginal Affairs and Reconciliation (DPC-AAR). A search of the Central Archive was requested on 23 August 2018.

Information pertaining to non-Indigenous heritage was sought from the following resources:

- NatureMaps[1]
- South Australian Heritage Places Database[2]
- Australian National Shipwreck Database[3]

5.3 Indigenous cultural heritage

5.3.1 Native Title Act 1993 (Commonwealth)

Landside, to the highwater mark, the Port is within the native title lands of the Far West Coast Aboriginal Corporation Native Title Determination (SCD2013/002). Seaward from the high water mark, the Port (including the jetty) is within the Far West Coast Sea Native Title claim area (SAD 71/2016).

Works within this area will be required to adhere to duty of care provisions under the *Native Title Act 1993*, including areas where a Native Title claim determination is yet to be made.

[1] http://spatialwebapps.environment.sa.gov.au/naturemaps
[2] http://maps.sa.gov.au/heritagesearch/HeritageSearchLocation.aspx
[3] http://www.environment.gov.au/heritage/historic-shipwrecks/australian-national-shipwreck-database

5.3.2 Aboriginal Heritage Act 1988 (South Australia)

The *Aboriginal Heritage Act 1988* provides for the protection of Aboriginal sites of significance. The Act does not specify if it includes protection for riverbed or seabeds areas.

The SA Department of Premier and Cabinet – Aboriginal Affairs and Reconciliation (DPC-AAR) administers the Act including the Central Archive, which contains the Register of Aboriginal Sites and Objects (the Register). DPC-AAR has undertaken a search of the Central Archive and advised that the Register has no entries for Aboriginal sites within 100 m of the Project area.

It was advised that despite the findings of this search, sites or objects may exist in the proposed Project area. All Aboriginal sites and objects are protected under the Act, whether they are listed in the central archive or not.

As such it is an offence to damage, disturb or interfere with any Aboriginal site or damage any Aboriginal object (registered or not) without the authority of the Premier (the Minister responsible for Aboriginal Affairs and Reconciliation). Section 20 of the Act, any Aboriginal sites, objects or remains, discovered on the land during construction works need to be reported to the Premier. Penalties apply for failure to comply with the Act.

Refer to Section 5.5 on how this issue is to be addressed during construction.

5.4 Non-indigenous cultural heritage

5.4.1 Historic Shipwrecks Act 1976 (Commonwealth)

The *Historic* Shipwrecks *Act 1976* (Commonwealth) requires a permit for any activities that have the potential to damage or interfere with an historic shipwreck or relic, or for any activities requiring entry into a protected zone around a shipwreck.

There is one registered shipwreck protected under the *Historic Shipwrecks Act 1976* within 500 m of the Project area. This shipwreck is currently unaffected by regular shipping activity and unlikely to be impacted by construction activity associated with the proposed Project. Referral to the Minister administering the *Historic Shipwrecks Act 1976* (the Commonwealth Minister for the Department of Environment) is required as part of the DA process.

5.4.2 Development Act 1993

Local heritage provisions of the *Development Act 1993* are administered through the relevant Development Plan, which provides protection for sites of historic significance on land. While the relevant Development Plan for the proposed project is the *Land Not Within a Council Area (Coastal Waters) Development Plan*, consideration would be given to heritage matters listed in the adjacent *District Council of Ceduna Development Plan.*

There are no known places of state or local heritage significance, protected under the *Heritage Places Act 1993* or *Development Act 1993* (administered through the Development Plan) in or near the project area. As such there are expected to be no impacts to non-Indigenous heritage arising from the proposed Project.

5.5 Construction Management Measures

There are not expected to be any potential impacts to Aboriginal cultural heritage during construction, however standard mitigation measures will be in place during construction to ensure compliance with the *Aboriginal Heritage Act 1988.*

Specifically, whilst a Cultural Heritage Management Plan is not required, all employees and contractors will be required to undergo training as part of the site induction process in the procedures to be followed in the event that Aboriginal cultural heritage sites, objects and/or remains are unearthed.

6 Noise and Vibration

6.1 Overview

Airborne and underwater construction noise and vibration impacts from the proposed Project have been assessed against relevant South Australian government policy and best practice guidance.

Operational noise impacts have not been considered as the proposed Project involves as “like for like” replacement of the existing jetty and does not result in any capacity upgrades.

Construction noise impacts from demolition of the existing jetty, piling works, construction works for the new jetty and vehicle movements and loading/unloading within the stockpiling area are predicted to exceed the EPP (Noise) definition of having an “adverse impact on amenity” at the closest noise-sensitive receiver(s) to the works.

Accordingly, demolition and construction works should only occur between 7am and 7pm unless special permission is obtained from the EPA.

Piling during daytime hours will be required in any case to satisfy the requirement for visual observation of marine mammals under the *DPTI Underwater Piling Noise Guidelines (2001)*. The proposed Project intends to only conduct piling activity during daylight hours.

Vibration impacts from the proposed works are predicted to be negligible at all residential receivers.

Significant underwater noise impacts (i.e. physical or hearing damage to marine mammals) from piling would only occur in the immediate vicinity (~10-50 m, depending on species) of the piling works, although some avoidance behaviours may be exhibited at distances of up to 1 km. Adopting the *DPTI Underwater Piling Noise Guidelines (2001)* including a 300 m shut-down zone if any marine mammal approaches the pile, and the use of soft start procedures means that impacts would be extremely unlikely to occur.

Underwater noise impacts from construction shipping would be limited to avoidance behaviour in the immediate vicinity of the noise source.

There would be no significant change in operational underwater noise levels from ships accessing the jetty following completion of the upgrade.

This section discusses the airborne and underwater construction noise and vibration study undertaken.

6.2 Study Area

The construction noise and vibration assessment has considered airborne and underwater construction noise and vibration impacts associated with the demolition and construction activity at the jetty itself as well as the potential noise and vibration associated with the construction laydown areas adjacent the port facility.

In undertaking the study, the assessment has considered the closest residential receivers to the jetty, being residential properties located on Kent Street, Thevenard. These residences are approximately 350 m from the closest point of the jetty, as shown in Figure 2.

6.3 Assessment Approach

This study assessed the potential airborne and underwater construction noise and vibration acoustic impacts of the proposed Project. This has been achieved through a review of:

- The existing noise environment of the study area
- Criteria for assessing impacts from the proposed works on ecological and human noise-sensitive receivers
- Airborne and underwater noise and vibration impacts from the proposed construction works
- The potential ongoing airborne and underwater noise and vibration impacts following completion of the works
- The need for any mitigation measures to reduce identified noise or vibration impacts.

Background noise measurements have not been conducted as part of this DA Report due to the desktop nature of this assessment, and the remote nature of the project site, for which it can be conservatively assumed that existing background noise levels are low. Further, the assessment criteria are absolute criteria which are based on land use and hence the background noise level would not change the outcomes of the assessment.

No underwater noise monitoring has previously been undertaken at the proposed Project area, however this assessment considers potential impacts to marine fauna known to be present in the study area, which includes commercial and recreational fish and shark species, reef invertebrates, seals, dolphins and migratory birds.

6.4 Existing Conditions

Construction noise

Background noise levels have been estimated using the procedure in Appendix A of Australian Standard AS1055.2 *Acoustics – Description and measurement of environmental noise. Part 2: Application to specific situations*, which provides average background noise levels for receivers based on the land use and transportation characteristics of the surrounding area. Category R3 “Areas with medium-density transportation or some commerce or industry” has been assumed as the most representative category, noting the presence of Flinders Ports infrastructure and the rail corridor in the vicinity of receivers.

For receivers in R3 category the following typical background noise levels are provided:

- Day 50 dB(A)
- Evening 45 dB(A)
- Night 40 dB(A)

Note however that the noise impacts from the proposed Project are assessed against fixed noise criteria, and therefore the existing noise levels are only relevant for context of the predicted noise impacts compared to the existing noise environment.

Construction noise requirements in SA are defined by the EPP (Noise) 2007, Part 6 – Special noise control provisions, Division 1 – Construction noise. These provisions are summarised below:

- Construction noise is considered to have an adverse impact on amenity at noise sensitive receivers when the continuous noise source level exceeds 45 dB(A) or the ambient continuous noise level, whichever is higher
- The maximum noise source level exceeds 60 dB(A) or the ambient maximum noise level (that is reached consistently), whichever is higher.

Noise that is considered to have an adverse impact on amenity should not occur on a Sunday or public holiday or during the night-time or evening period (7pm to 7am). This is unless construction must occur to:

- Avoid unreasonable interruption of vehicle or pedestrian traffic movement
- If other grounds exist that the administering agency determines to be sufficient.

Where construction noise is considered to have an adverse impact on amenity all reasonable and practicable measures must be taken to minimise construction noise and its impact.

The existing noise environment is unknown, and therefore as a conservative noise assessment, continuous noise impacts will be assessed against the 45 dB(A) [continuous noise] / 60 dB(A) [maximum noise] criteria.

Underwater Noise

Underwater noise impacts from the dredging and piling activity also have the potential to impact on marine and coastal fauna. In the absence of specific legislative criteria for assessing impacts on marine and terrestrial fauna, a literature review has been conducted to identify the hearing characteristics of species and derive appropriate impact criteria for each species.

Research into the effects of underwater noise on marine animals and plants is frequently inconclusive, and there are difficulties in applying the results of research for one species to another. However, available noise criteria are summarised in the following sections.

Various studies on marine animal behaviour, including reactions to noise, are available in the literature. Sound stimuli range from frequency-specific stimuli to explosions/seismic airguns. These studies have shown that underwater noise can potentially have adverse behavioural or physiological effects on underwater life.

The adverse effects, in ascending level of impact (and in ascending order of noise exposure) are, broadly:

- Auditory masking (the presence of noise may cause important biological sounds to be obscured). This generally has impacts that persist only as long as the masking sound is on operation (i.e. generally short-term except in cases of chronic noise exposure), for example:
  - Missing out on feeding opportunities
  - Impeded communication (social interaction, mating calls, etc.)
  - Decreased ability to detect predators or danger.
- Avoidance behaviour (animals becoming stressed and leaving the vicinity of the noise source). This can have long-term adverse effects on a species, for example:
  - Disruption of migration, breeding or feeding patterns
  - Separation of infant animals from adult animals (and consequent increased vulnerability to predators)
  - In cases of chronic exposure, long-term physiological impacts due to prolonged increase in levels of stress hormones
  - In extreme cases, physical injury or death if behavioural changes lead to vessel collisions or strandings.
- Temporary hearing damage, due to fatigue/exhaustion of the auditory system. Hearing ability recovers over a timeframe of hours or days. This has short-term adverse impacts such as:
  - Increased vulnerability to predators
  - Disorientation (for species that rely wholly or partially on sound for navigation or hunting), reducing ability to feed and increasing the risk of stranding
  - Reduced ability to communicate (disrupting group social behaviour, ability to hear mating calls.).
- Permanent hearing damage, due to cell death of the auditory system (either physical damage to the hearing structures or nerve damage to the auditory nerve). This has similar impacts to temporary hearing damage, but the impacts are permanent rather than short term.
- Physical trauma/injury (especially to gas-containing structures), which can lead to death.
- Fatality.

A summary of impact criteria for marine species is given in Table 3.

Table 3 Summary of approximate Noise Thresholds for Species[4]

Impact	Species	Sound Pressure dB re 1 µPa	Sound Exposure Level dB re 1 $\mu Pa^2 s^2 \cdot s$
50% Mortality (all sizes)	Migratory birds and shorebirds		198 dB
Serious Physical Injury	Marine Mammals	240 dB_{peak}	
	Migratory birds and seabirds (diving)		195 dB (onset of mortality)
Permanent Hearing Damage (PHD)	All species	130 dB_{ht}	135 dB_{ht}
	Whales - Baleen	230 dB_{peak}	198 dB(M_{lf}) (impulsive) 215 dB(M_{lf}) (continuous)
	Whales – Toothed	230 dB_{peak}	198 dB(M_{mf}) (impulsive) 215 dB(M_{mf}) (continuous)
	Pinnipeds	218 dB_{peak}	186 dB(M_{pw})
	Seabirds (airborne)	110 dB(A) (continuous) 125 dB(A) (impulsive)	
	Seabirds (diving)		193 dB
Temporary Hearing Damage (TTS)	Whales – Baleen	224 dB_{peak} 160 dB_{rms} (continuous)	183 dB(M_{lf}) (impulsive) 195 dB(M_{lf}) (continuous)
	Whales – Toothed	224 dB_{peak} 160 dB_{rms} (continuous)	183 dB(M_{mf}) (impulsive) 195 dB(M_{mf}) (continuous)
	Pinnipeds	212 dB_{peak}	171 dB(M_{pw})
	Seabirds (airborne)	93 dB(A) (continuous) 110 dB(A) (impulsive)	
	Seabirds (diving)		190 dB (safe level for no injuries)
Disturbance – Strong (~90% avoidance) (SA)	All species	90 dB_{ht}	
	Marine Mammals	160 dB_{rms} (impulsive) 120 dB_{rms} (continuous)	
	Seabirds (airborne)	72 dB(A)	
Masking	Whales – Toothed and Baleen	115 dB_{rms}	

[4] There are limited studies to determine noise criteria for underwater fauna. These limits are approximate only.

Vibration

There are no legislative requirements with respect to vibration in South Australia. However, guidance for vibration limits for human comfort is provided in the *NSW EPA Assessing vibration: A Technical Guideline 2006 document*, which is referenced in Australian Standards AS2436 as providing standard guidance for vibration from construction activities.

Vibration generating equipment from the proposed Project's construction (i.e. piling activity for the installation of navigational aids) is best characterised as being intermittent vibration sources. It is understood there will be up to a maximum of 16 hollow steel piles to be driven in association with the Port Thevenard Upgrade Project. Establishment and preparation for each pile will limit works to one pile a day, with actual pile driving activities assumed to occur for between two to four hours at any one time.

The Assessing Vibration guideline recommends impact threshold levels to manage vibration impacts from intermittent vibration, using the Vibration Dose Value (VDV) parameter, which is a complicated parameter taking into account both the level of vibration and its duration.

British Standards BS5228.2 also provides guidelines for human comfort, but using a simplified metric (the Peak Particle Velocity), which only takes into account the maximum level of vibration. These are broadly similar to the maximum recommended values for human comfort from the previous Australian Standard, AS2670.2, which is now superseded.

The VDV parameter is more robust, but requires more information and is more difficult to measure, while the PPV parameter is relatively straightforward to apply. Hence, the VDV criteria should be assessed wherever possible, but for some equipment or vibration sources there may not be enough information to calculate VDV at early stages of assessment and a simplified assessment using PPV may be necessary. Hence, criteria for both parameters are presented, but the VDV criteria should take precedence for any more-detailed future studies where it is practicable to assess VDV. Vibration impact criteria are given in Table 4.

For intermittent vibration, the following impact threshold values are recommended based on BS5228.2 and the Assessing Vibration guideline.

Table 4 Vibration impact criteria for construction vibration – Human Comfort

Impact Category	PPV (mm/s)	VDV ($m/s^{1.75}$)		Subjective Impact (from BS5228.2)
		Day (0700-2200)	Night (2200-0700)	
Negligible	PPV ≤ 0.3	VDV ≤ 0.2	VDV ≤ 0.13	Vibration just perceptible
Minor	0.3 < PPV ≤ 1.0	0.2 < VDV ≤ 0.4	0.13 < VDV ≤ 0.26	Vibration perceptible, potential for complaint
Moderate	1.0 < PPV ≤ 10	0.4 < VDV ≤ 0.8	0.26 < VDV ≤ 0.52	Complaints likely
Major	PPV > 10	VDV > 0.8	VDV > 0.52	Vibration likely intolerable

Building Damage

There is little reliable data on the threshold of vibration-induced damage in buildings. Although vibrations induced in buildings by ground-borne excitation are often noticeable, there is little evidence that they produce even cosmetic damage. This lack of data is one of the reasons that there is variation between international standards, why the British Standards Institution (BSI) did not provide guidance before 1992 and why there are still no International Organisation for Standardisation (ISO) guidance limits.

Guidance on limiting vibration values for structural damage are typically defined with reference to either DIN 4150 or BS 7385-2: 1993. Given the relatively large distances to properties and associated low risk of structural damage from marine construction, combined with the fact that human response to vibration will be the limiting factor for vibration, the proposed Project has been assessed against criteria defined in BS 7385-2: 1993 as shown in Table 5.

Table 5 Cosmetic damage criteria as defined in BS 7385-2:1993

Type of Building	Peak Particle vibration velocity for cosmetic damage from transient vibration, mm/s	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50mm/s at 4 Hz and above	
Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

6.5 Potential Impacts

A study of expected noise levels has been conducted based on reference to previous assessments and screening calculations to define the expected zones of impact for each noise source. No detailed computer noise modelling has been conducted. This section outlines the potential noise and vibration impacts.

Airborne construction noise levels from all activities have been predicted at the nearest affected noise sensitive receptors for the weather conditions described in Table 6. Meteorological corrections have been calculated using the CONCAWE noise model implemented in a spreadsheet noise model.

Table 6 Assessed weather conditions

Meteorological Condition	Wind Speed (m/s)	Temperature (°C)	Humidity (%)	Pasquil Stability Category	CONCAWE Meteorological Category
Neutral	0	20	80	Neutral (D)	4
Adverse	6.5	15	80	Neutral (D)	6

Airborne Noise – Demolition

Demolition activity will be associated with the demolition and removal of the existing jetty. The source location for demolition will range between 350 m – 500 m from the nearest sensitive receiver.

Demolition activities have been modelled as a sound power level of $L_{eq,activity}$ 124 dB(A) / L_{max} 135 dB(A) (based on data for breaking concrete from BS 5228 and AS 2436). These have been corrected for a typical 15-minute assessment period assuming that the breaker is operational 80% of a typical assessment period. Predicted construction noise levels at the nearest residential receivers on Kent Street are:

- $L_{eq,15min}$ 59-62 dB(A) [neutral] / 64-67 dB(A) [adverse]
- L_{Amax} 71-75 dB(A) [neutral] / 77-79 dB(A) [adverse]

The range of predicted noise levels includes both the closest and furthest source locations along the jetty works (i.e. 350-500 m). These exceed the 45 dB(A) L_{Aeq} / 60 dB(A) L_{Amax} definition of "adverse impact" for construction noise under the EPP (Noise).

This indicates that demolition works should only occur between 7 am and 7 pm, unless special permission from the EPA is obtained. All "reasonable and practicable" mitigation measures should be implemented to reduce noise impacts from piling.

Maximum noise levels from demolition are not expected to cause significant disturbances to bird populations, with the predicted maximum noise levels at the migratory bird site at Rocky Point in the range 34-40 dB(A), which is significantly below the 72 dB(A) L_{Amax} threshold for impacts.

Although noise levels in the immediate vicinity of the wharf would exceed the 72 dB(A) L_{max} threshold, the habitat value of the shoreline area adjacent to the jetty is limited and therefore significant impacts to migratory birds are unlikely to occur.

Airborne Noise – Piling Activity

Piling activity will be associated with the construction of the new jetty (up to a maximum of 16 individual piles). The source location for piling will range between 350 m – 500 m from the nearest sensitive receiver.

Piling activities have been modelled as a sound power level of $L_{eq,activity}$ 117 dB(A) / L_{Amax} 134 dB(A) for piling and associated work boats (based on data from BS 5228 and AS 2436). These have been corrected for a typical 15-minute assessment period assuming that the piling rig is operational 50% of a typical assessment period. Predicted construction noise levels at the nearest residential receivers on Kent Street are:

- $L_{eq,15min}$ 51-54 dB(A) [neutral] / 56-59 dB(A) [adverse]
- L_{Amax} 70-74 dB(A) [neutral] / 76-78 dB(A) [adverse]

The range of predicted noise levels includes both the closest and furthest source locations along the jetty works (i.e. 350-500 m). These exceed the 45 dB(A) L_{Aeq} /

60 dB(A) L_{Amax} definition of "adverse impact" for construction noise under the EPP (Noise).

This indicates that piling works should only occur between 7 am and 7 pm, unless special permission from the EPA is obtained. All "reasonable and practicable" mitigation measures should be implemented to reduce noise impacts from piling.

Maximum noise levels from piling are not expected to cause significant disturbances to bird populations, with the predicted maximum noise levels at the migratory bird site at Rocky Point in the range 33-39 dB(A), which is significantly below the 72 dB(A) L_{Amax} threshold for impacts.

Although noise levels in the immediate vicinity of the wharf would exceed the 72 dB(A) L_{max} threshold, the habitat value of the shoreline area adjacent to the jetty is limited and therefore significant impacts to migratory birds are unlikely to occur.

Airborne Noise – Installation of Jetty Structure

Construction activity will be associated with the construction of the new jetty (including lifting, concreting works, and noise from installation of the new jetty structure, as well as associated work boat movements). The source location for construction will range between 350 m – 500 m from the nearest sensitive receiver.

Piling activities have been modelled as a sound power level of $L_{eq,activity}$ 110 dB(A) for jetty construction (based on data from BS 5228 and AS 2436). Predicted construction noise levels at the nearest residential receivers on Kent Street are:

- $L_{eq,15min}$ 47-50 dB(A) [neutral] / 52-55 dB(A) [adverse]

The range of predicted noise levels includes both the closest and furthest source locations along the jetty works (i.e. 350-500 m). These exceed the 45 dB(A) L_{Aeq} definition of "adverse impact" for construction noise under the EPP (Noise).

This indicates that construction works should only occur between 7 am and 7 pm, unless special permission from the EPA is obtained. All "reasonable and practicable" mitigation measures should be implemented to reduce noise impacts from construction.

Airborne Noise – Stockpiling Area

Construction materials will be stockpiled in an area off West Terrace located to the north of the jetty. Noise from vehicle movements on the site plus loading/unloading activities has been predicted. The closest point of approach for the proposed stockpiling area is approximately 50 m from the nearest receiver on West Terrace.

Stockpiling area activities have been modelled as a sound power level of $L_{eq,activity}$ 114 dB(A) for loading/unloading haul trucks and a sound power level of L_{max} 112 dB(A) for haul truck movements on site (based on data from BS 5228 and AS 2436). Predicted construction noise levels at the nearest residential receivers on West Terrace are:

- $L_{eq,15min}$ 50 dB(A) / L_{Amax} 69 dB(A)

Note that due to the short source-receiver distance there is no significant change in noise levels under different meteorological conditions. These exceed the 45 dB(A) L_{Aeq} definition of "adverse impact" for construction noise under the EPP (Noise).

This indicates that construction works should only occur between 7 am and 7 pm, unless special permission from the EPA is obtained. All "reasonable and practicable" mitigation measures should be implemented to reduce noise impacts from construction.

Vibration – Piling

Vibration levels from piling are dependent on the hammer energy, which in turn is related to the hammer mass and drop height. These factors will be determined as part of the detailed planning of construction activities. The TRL guidance recommends the use of the following relationship for the prediction of upper bound vibration velocity levels from piling works;

$$v_{res} \leq k_p \left[\sqrt{W} / r^{1.3} \right]$$

Where vres is the resultant PPV velocity level (mm/s), W is the nominal hammer energy (J), r is the distance from the source (m) and kp is an empirical scaling factor based on ground conditions. Soft cohesive soil has been used as the basis of calculating vibration levels as being representative of the channel bed.

Predicted PPV velocity levels in Table 7 have been calculated for nominal typical hammer energies to the nearest potentially affected residential receptors (350-500 m). Results are presented in table for varying nominal hammer energies.

Table 7 Predicted construction vibration levels – Piling

Location	Nominal Hammer Energy (W)(kJ)	Predicted PPV velocity level (mm/s)
Kent Street Receivers	25	0.05-0.08
	45	0.07-0.10
	65	0.08-0.13

Predicted vibration impacts on residential receptors are calculated to be in the range PPV < 0.3 for all nominal hammer energies. This corresponds to a "negligible" impact for both human comfort and building damage.

Underwater Noise – Piling

The waveform from a piling impact involves reflection and reverberation effects, including resonance of the pile as it is struck, and secondary noise generation from the seafloor by vibration travelling down the pile. Some piling methods cause additional secondary noise pulses from the piling hammer "bouncing" on the pile head. Typical piling time history data and secondary pile 'bounces' are shown in Figure 12 below.

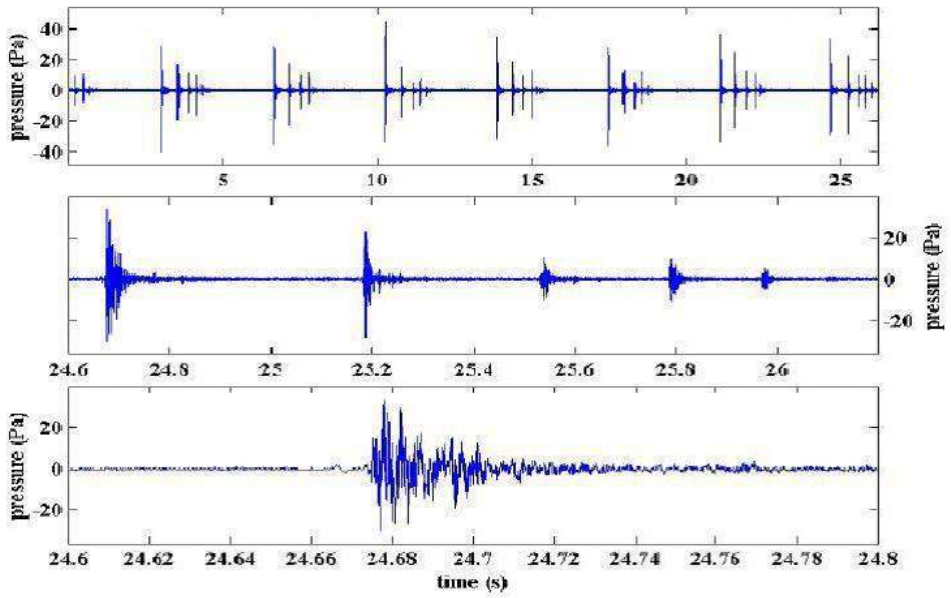

Figure 12 Typical piling time history data, from McCauley et al (2002) showing secondary pile "bounces". The middle and bottom plots are zoomed-in plots of the last piling pulse in the upper plot showing the "bounces" (middle) and the primary impact (bottom).

The dominant frequency range is between 100 Hz and 1 kHz) (Finneran 2002) as demonstrated by the example spectra in Figure 13.

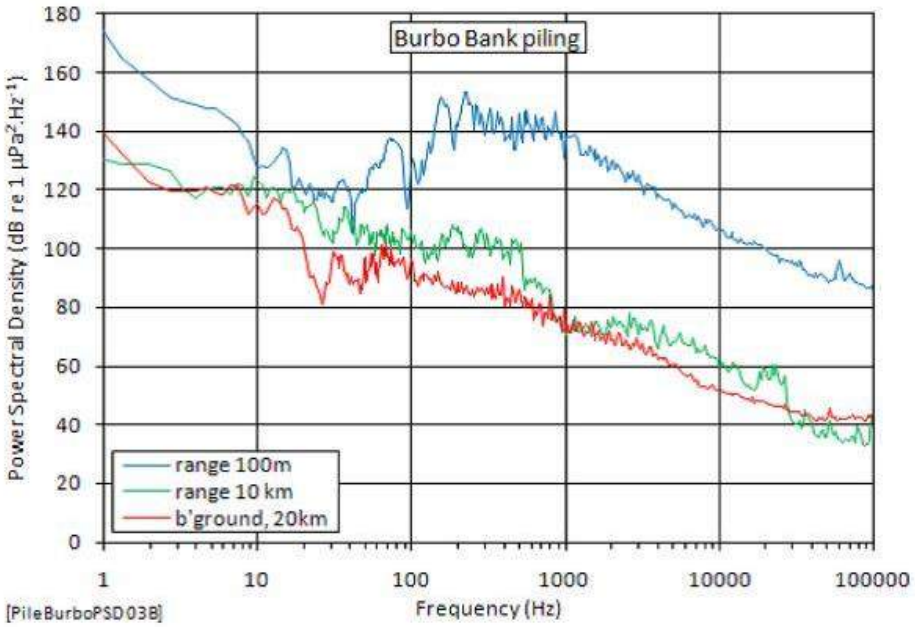

Figure 13 Frequency spectra of impact piling (4.3 m diameter pile) in shallow water, adapted from Nedwell et al (2007b). Blue curve is at approximately 100 m from source; green curve is at approximately 10 km from source, red curve is background noise at approximately 20 km from source

Noise from the impact of piling hammers is directly correlated to the pile diameter (Diederichs et al 2008), as shown in Figure 14.

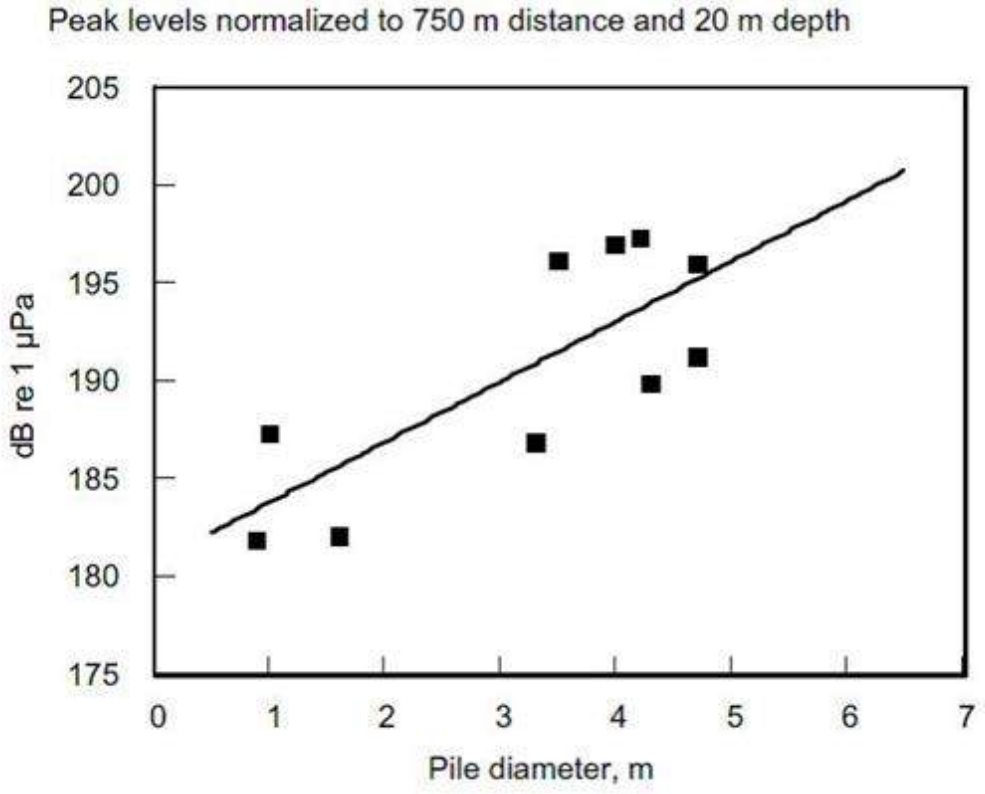

Figure 14 Approximate relationship between pile diameter and peak sound pressure level (normalised to 20 m water depth and 750 m distance from source), from Diederichs et al (2008)

Peak noise levels from large-diameter (4–5m) piles were recorded at approximately 240–250 dB re 1 µPa (peak) and 200–215 dB re 1 µPa²s SEL at 1m (Diederichs et al 2008).

A medium diameter pile (similar to previous marine construction projects, e.g. Port Bonython have been assumed which equates to a nominal source level of approximately 230 dB re 1 µPa at 1m (peak) and 200 dB re 1 µPa²·s at 1m (SEL), using the spectra presented in Nedwell et al (2007b) for shallow-water piling.

Detailed underwater noise predictions were beyond the scope of this assessment, however the transmission loss in shallow water for the proposed Project were assumed to be the same as for previous port construction projects, e.g. Port Bonython.

Using this data, piling noise is expected to have negligible impacts on marine mammals (dolphins, seals and whales), with hearing damage limited to the immediate vicinity of the piling rig (~10 m for whales, ~30 m for seals and ~50 m for dolphins). The use of exclusion zones as required by the *DPTI Underwater Piling Noise Guidelines (2001)* would mean that these impacts would be extremely unlikely ever to occur.

Although behavioural changes (avoidance) are expected for marine mammals, these are predicted to be limited to the local vicinity of the piling rig (at a distance of up

to 1 km depending on the metric considered) and hence not considered likely to have significant long-term impacts, especially the shallow waters in the project area which mean visits by threatened marine mammals would be rare.

Impacts on chelonians are predicted to consist of strong avoidance behaviour within ~300 m of the piling rig. Although the sensitivity of chelonians to low-frequency noise is poorly understood, available information suggests that chelonians are no more sensitive than low-frequency cetaceans and therefore the impact distances for whales (~10 m) for hearing damage would also describe hearing damage to turtles.

Vessels

During the construction phase of the proposed Project, including piling, propeller noise from workboats associated with the navigational aid relocation will likely be the dominant vessel source.

Boats fitted with outboard motors can produce relatively intense sound levels, due to the small propeller size and fast rotation of the propeller, which is not as hydrodynamically efficient and causes higher noise levels due to cavitation. Outboard motors are the most common propulsion type for small boats in Australian waters.

Outboard motors produce broadband noise with many strong tonal components, over a frequency range up to 6 kHz. Peak source levels are approximately 150–180 dB re 1µPa at 1m range.

The available data indicates that worst-case source levels are approximately 180 dB re 1 µPa at 1m for small outboard-motor powered boats. The following source levels were used for prediction:

- Small work boat 180 dB re 1µPa at 1m
  (dominant frequencies 300 Hz–5 kHz)

Noise levels from construction vessels may cause avoidance behaviour from marine mammals within ~150–200 m of the vessel. This avoidance behaviour is unlikely to cause significant disruption to marine mammals and indeed may assist in avoiding the potential for ship strikes.

No auditory or physical damage to marine mammals is predicted to occur for construction vessels.

Once the proposed Project is operational, shipping impacts will be negligible as there is not proposed to be any increase in shipping traffic.

6.6 Construction Management Measures

A number of construction management measures as included in the *DPTI Underwater Piling Noise Guidelines (2001)* are recommended to be considered for the proposed Project:

- Construction work should occur during the day (7am – 7 pm)
- Adopt safety zones around the sound source and monitor for animals entering these zones, shutting down the sound source if necessary if the

animal continues to approach the source. For the proposed Project, the required observation zone for all marine mammals is 1.5 km and the shut-down zone 300 m for piling.

- Undertake a soft start of ten minutes at the beginning of piling and after any prolonged (>30 minute) break in piling.

Further, additional mitigation measures should be considered where feasible for piling in the vicinity of residential receivers, including using a resilient pad (dolly) between the pile and hammer head in order to reduce airborne noise impacts, as recommended by BS5228.

7 Construction related impacts

Potential impacts arising from the proposed Project that need to be addressed are limited to the construction activities. The operational impacts from the proposed Project will be similar to those impacts due to the existing operations of the Port.

In addition to the potentially key construction impacts associated with ecology and coastal processes discussed in Section 3 and Section 4, there are some other potential construction related impacts including transport, noise and vibration, air quality, water quality and waste. These are considered to be minor; however, will still need to be appropriately addressed.

These potential impacts and suggested mitigation measures are discussed below.

7.1 Traffic and Transport

Traffic and Transport related construction impacts stemming from the proposed Project are likely to come from the following sources:

- Construction workforce travel to and from site
- Delivery of plant, materials and equipment to facilitate construction
- Removal of material following demolition of the existing concrete jetty.

As a small rural settlement with a combined population of approximately 3000 residents, the Ceduna / Thevenard area does not currently experience any substantial traffic congestion. Figure 15 shows estimated daily traffic volumes for the primary Thevenard and Ceduna Road network. The existing two way traffic volumes on Thevenard Road is approximately 2,300 vehicles per day. This is well within available capacity and well below the threshold at which capacity related traffic delays would form.

It is anticipated that at its peak, this project will require a construction workforce of approximately 30 to 40 persons. Subject to the selected contractor, this workforce will be drawn from a combination of local residents and non-local workers staying in accommodation in Ceduna. Travel to site will be via Thevenard Road, with off street parking provided within the construction site compound.

Given this relatively small workforce, the provision of off street parking and existing low traffic volumes, it is not expected that construction workforce related travel will generate any significant traffic impacts requiring mitigation measures to be implemented.

The transport of bulky materials to site, including piles and large structural steel members, is anticipated to be via barge from a major port such as Adelaide or interstate. As such, these deliveries will not touch the local road network and subsequently will not contribute to any traffic impacts. The remainder of materials and plant will be delivered via multi-combination heavy vehicle using the existing road network (exact configurations are yet to be determined). Similarly, removal of demolition materials will be via heavy vehicle.

Figure 15: Traffic volume estimates (source: Location SA)

Under existing transfer operations, grain is delivered to Port Thevenard via the road network using multi combination heavy vehicles. As such, the road network leading to and from the port is gazetted for vehicles up to a 36.5 m higher mass limit road train, as shown on Figure 16. It is not anticipated that any construction activity relating to this project will require a vehicle exceeding these dimensions. Therefore, no mitigation measures will be required to facilitate heavy vehicle deliveries to site.

It is anticipated that at the peak of construction activity, the project will generate between 5 and 10 heavy vehicle movements per hour. Relative to the available capacity in the surrounding road network, this is a small volume of traffic and is not expected to generate any significant capacity related impacts. Additionally,

given Thevenard Road is designed to accommodate significant heavy vehicle volumes, it is considered unlikely that transport activity related to this project would create any significant road maintenance impacts. It is not anticipated this will occur very frequently given the nature of the works.

There is a low risk of construction activity impacting the traffic and transport network to an extent that it would cause a permanent impact to residents or businesses in the Thevenard / Ceduna locality.

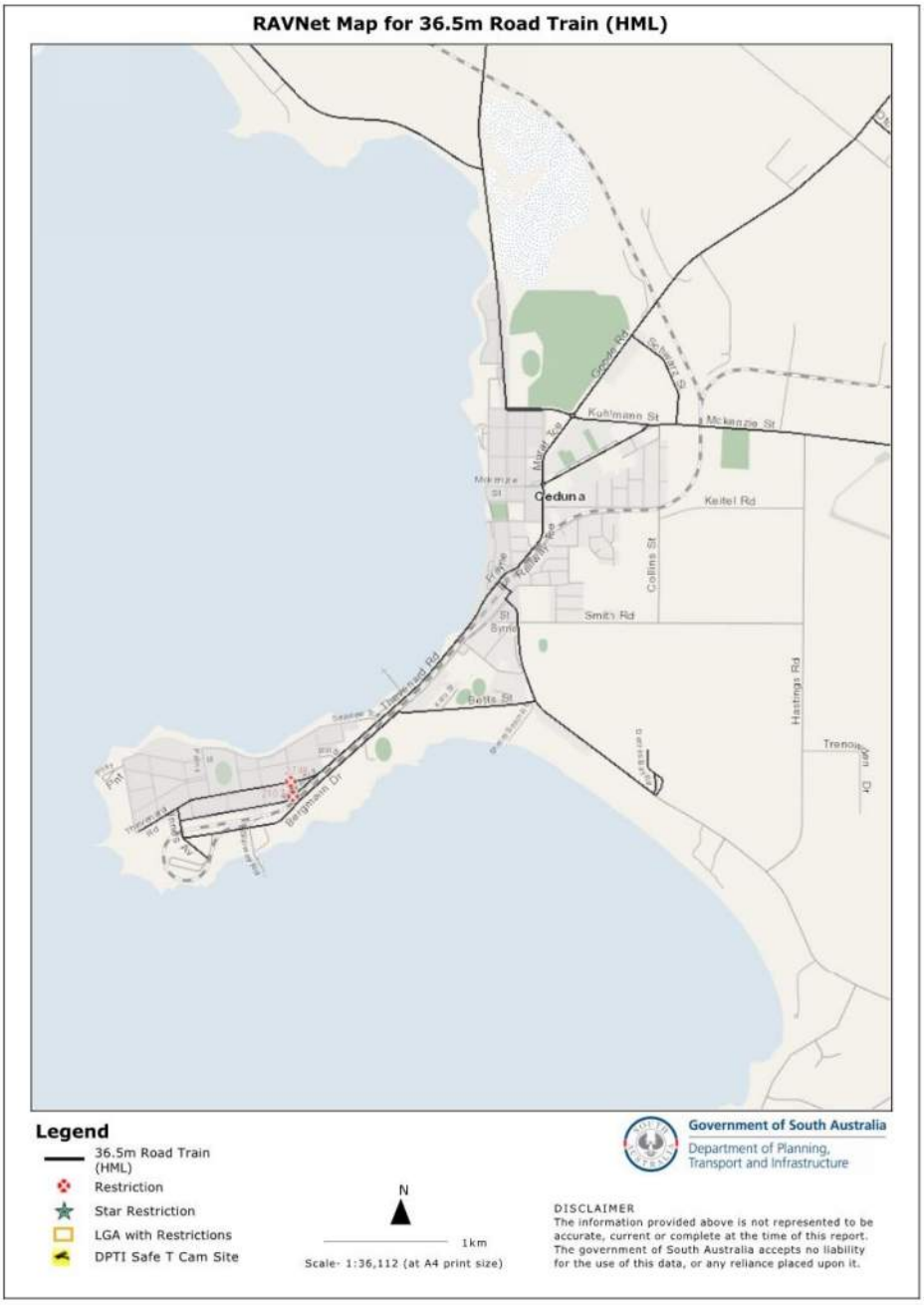

Figure 16: 36.5 m Road Train (HML) routes (DPTI RAVnet)

7.2 Air Quality

Air quality impacts associated with the proposed Project area expected to be minimal and typical of a normal construction project. It is anticipated that any potential air quality impacts arising from the proposed Project's construction will be related to diesel exhaust from construction vehicles and dust from demolition activity.

Diesel exhaust from construction vehicles is expected to be minimal and localised to the Port environs. While greater than typical day to day activities, the nature and location of the activity, at distance from any sensitive receptors, is capable of being dispersed with minimal impact.

Demolition of the existing concrete jetty will be a potential source of dust, particularly on days of moderate to high winds. This activity will need some form of dust suppression to confine the dust to the jetty area, and prevent impact to both the marine environment and local industrial area. The contractor will be required to identify and provide appropriate controls that are commonly used for such activities (eg dust extraction or water suppression on cutting equipment, with prevention of runoff in the case of water suppression).

With such measures in place, there would be a very low risk of construction activities reducing air quality to an extent that it would cause significant impact to the environment or community amenity.

7.3 Water Quality

Marine ecology would be the most significantly impacted aspect of the environment arising from any potential impacts to water quality.

As mentioned in the previous section, the use of water for dust suppression during concrete cutting will need to be appropriately managed to prevent run off the marine environment.

Other potential impacts to water quality arising from demolition and piling activity may generate small, localised sediment plumes during seabed disturbance. The nature of the material to be disturbed is sandy, therefore any plumes generated would be minor and temporary only; they would be expected to settle rapidly. Nevertheless, mobile fauna such as fish species may be temporarily displaced.

Seagrass beds are vulnerable to a loss of light availability, which can be experienced when turbid plumes are created. The minor nature of disturbance would not be expected to generate plumes of sufficient duration or volume that seagrass loss would be experienced.

Accidental spills from construction equipment can also occur if it is not maintained or operated effectively; standard control measures such as regular maintenance, training of staff in correct use and having spill kits available should be sufficient in minimising any impacts to water quality.

There should be no changes to operational water quality once the jetty restoration has been completed.

There is a low risk of construction or operations reducing water quality to an extent that it would cause a permanent impact to habitat or marine fauna that utilise the Project Area or the environment at large.

7.4 Waste

A number of wastes will be generated during the construction phase. Most of these materials are classified as inert waste (ie concrete, steel). The contractor will be required to ensure that these materials are recycled and/or disposed of in accordance with EPA requirements.

8 Construction Environment Management Plan (CEMP)

This section provides a series of suggested draft CEMP measures for the preferred construction contractor to consider. These are provided in Table 8.

This list of construction mitigation measures is not exhaustive, on the basis that any final construction methodology will not be available until appointment of a preferred contractor following the tendering process. It is also anticipated that the determination of this DA Report will further inform any CEMP measures.

This list does however incorporate construction mitigation measures identified in various sections of this DA Report, where potential impacts are expected to occur. The intent of these CEMP measure is for best practice construction and management procedures to be applied in order to mitigate and manage identified potential construction environmental impacts.

Table 8 Draft CEMP measures

Management Action	Responsibility	Timing
Roles and responsibilities for environmental management	Contractor	Prior to construction works commencing
Any legislative obligations	Contractor	Prior to construction works commencing
Measures to minimise environmental impacts	Contractor	Prior to construction works commencing
Emergency procedures in the event of incidents	Contractor	Prior to construction works commencing
Exclusion zone and marine fauna monitoring to be put in place in accordance with the South Australian Underwater Piling Noise Guidelines (2012) during piling activity	Contractor	Prior to construction works commencing
Chenopod shrubland within and directly adjacent to intertidal foreshores are not to be disturbed. At risk areas are to be protected from damage through barrier fencing/taping	Contractor	Prior to construction works commencing

Management Action	Responsibility	Timing
Areas for site offices, car parking, machinery access and stockpiling will be contained within designated areas that are clearly demarcated	Contractor	Prior to construction works commencing
All management staff and supervisors will be inducted into the flora and fauna obligations of the project as set out in this control plan, and will be made aware of approved works areas and exclusion zones	Contractor	Prior to construction works commencing
All applicable staff and contractors will be inducted and trained in cultural heritage procedures so they are aware of their obligations under the SA Aboriginal Heritage Ac	Contractor	Prior to construction works commencing
Vessel and machinery to be maintained to the manufacturers specifications to reduce noise emissions and the likelihood of a spill to the marine environment	Contractor	Prior to construction works commencing
Vessels are to be operated at minimum speeds to reduce the likelihood of boat strike; interaction with cetaceans and pinnipeds should be compliant with the Australian Guidelines for Whales and Dolphin Watching (Commonwealth of Australia, 2017) which implements controls for interactions e.g. sets no approach zones, not encouraging bow riding etc	Contractor	Prior to construction works commencing
Should night-time works occur, light spill from vessels or the jetty will be minimised by using directional lighting and light shields, unless there is a safety hazard	Contractor	Prior to construction works commencing
Adopt the following criteria included in the *DPTI Underwater Piling Noise Guidelines (2001)*: • Construction work should occur during the day (7am – 7 pm) • Adopt safety zones around the sound source and monitor for animals entering these zones, shutting down the sound source if necessary if the animal continues to approach the source. For the proposed Project, the required observation zone for all marine mammals is 1.5 km and the shut-down zone 300 m for piling.	Contractor	During construction works

Management Action	Responsibility	Timing
• Undertake a soft start of ten minutes at the beginning of piling and after any prolonged (>30 minute) break in piling.		

Monitoring: Audits will be undertaken by Flinders Ports of the construction activity during the works to ensure documentation and performance against the general requirements are being met.

Reporting:

- Report of environmental compliance to be prepared by contractor each month and provided to Flinders Ports.
- Develop a complaints response procedure that covers environmental complaints. Record all complaints received by the contractor or Flinders Ports related to environmental issues such as noise, air or water quality, including investigations undertaken, conclusions formed and actions taken. For complaints received by contractor, provide notification about the complaint and any associated response to Flinders Ports in a timely fashion
- Keep records of all monitoring results required by Flinders Ports.

Corrective action: Corrective action will be required in the context of findings of the audits or in the context of any issues raised by regulatory bodies. Corrective actions may also be required because of complaints from the community in accordance with the complaint response process outlined above.

Appendix A Plans and Elevations

SITE LAYOUT PLAN
SCALE 1 : 1000

TENDER ISSUE
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REV.	DATE	DESCRIPTION	DRAFT.	ENG.	CHKD.
A	06.04.18	ISSUED FOR 40% REVIEW	RS	ST	
B	23.05.18	ISSUED FOR 70% REVIEW	RS	ST	
C	06.07.18	ISSUED FOR 95% REVIEW	RS	ST	
D	23.07.18	ISSUED FOR 100% REVIEW	RS	EP/ST	DM
E	06.09.18	ISSUED FOR TENDER	RS	DM	DM

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SITE LAYOUT PLAN

A1

DRAWING NUMBER
Job Number PER171662 Sheet No. S001 Rev. E

Design ST Drawn RS

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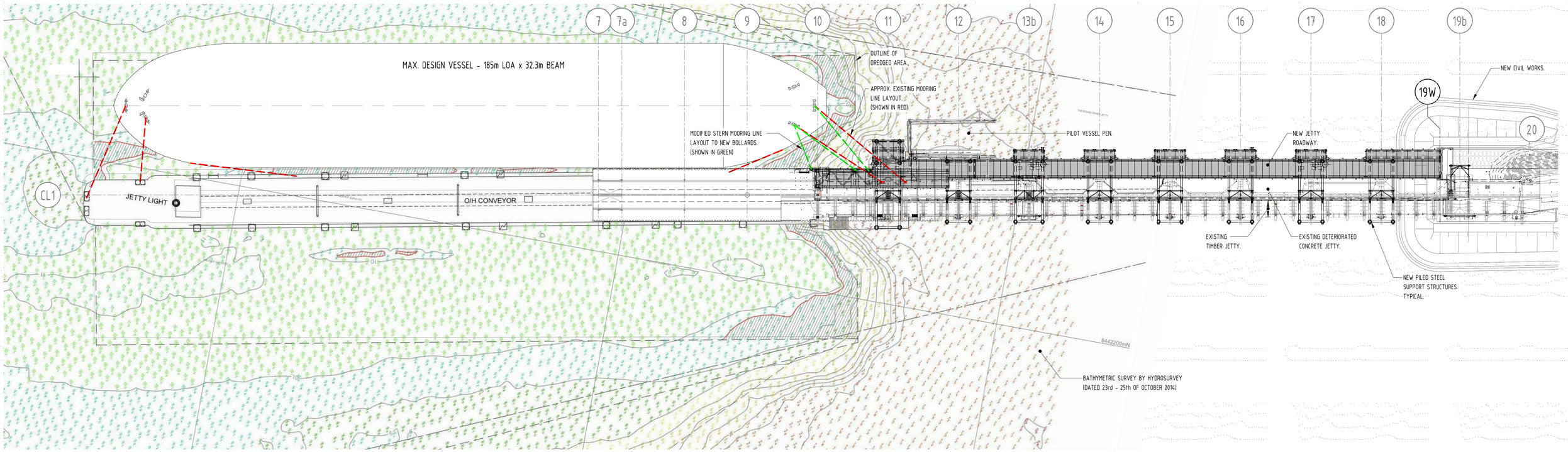
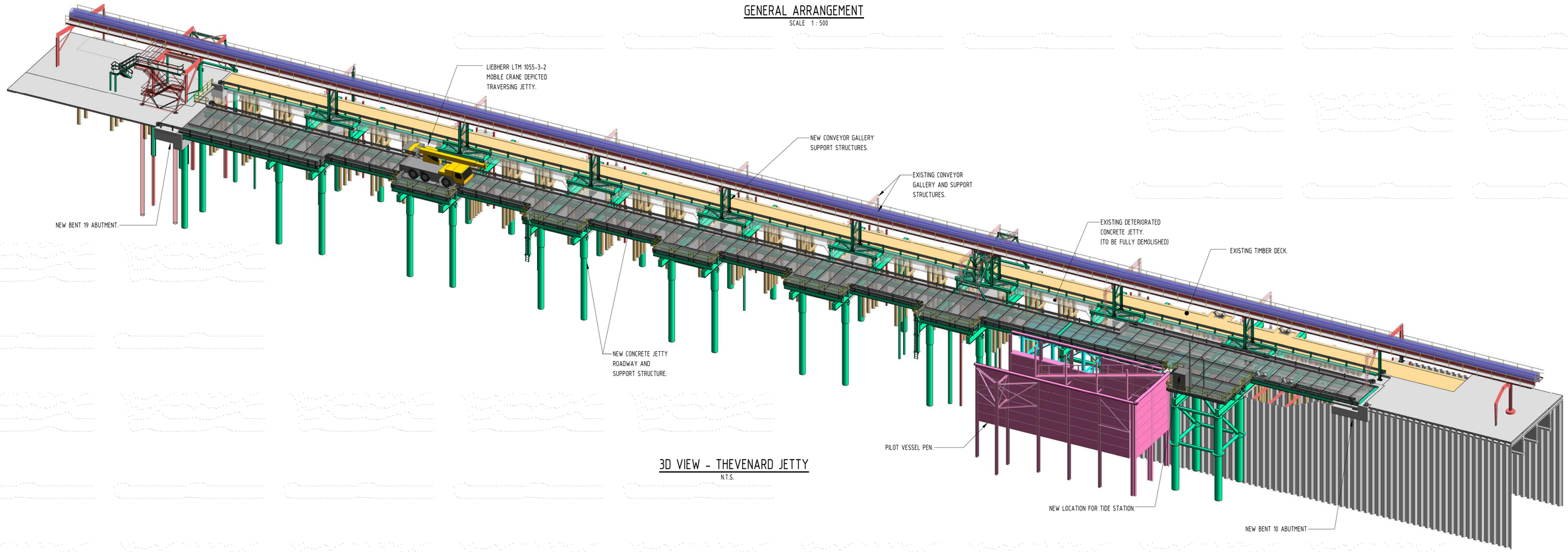


GENERAL ARRANGEMENT

SCALE 1 : 500



3D VIEW - THEVENARD JETTY

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D	23.07.18	ISSUED FOR 100% REVIEW	RS	EP/ST	DM
E	06.09.18	ISSUED FOR TENDER	RS	DM	DM

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GENERAL ARRANGEMENT - SHEET 1

A1

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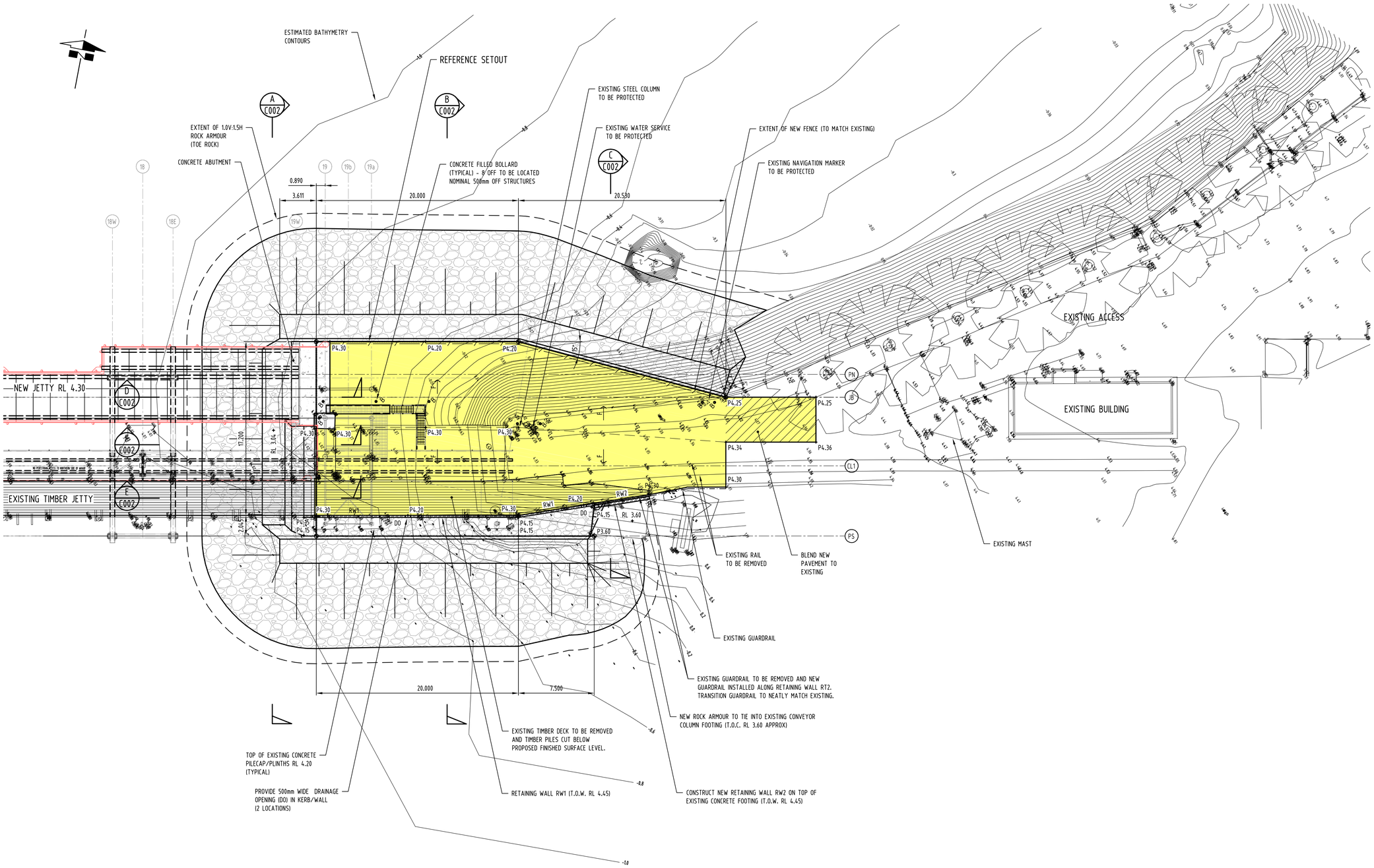
Job Number PER171662 Sheet No. S002 Rev. E

Design ST Drawn RS



PLAN
SCALE 1:200

LEGEND:

- EXISTING SURFACE SPOT LEVEL
- P4.15 — FINISHED DESIGN SURFACE LEVEL
- RW — RETAINING WALL
- DIRECTION OF SURFACE FALL
- FIXED STEEL BOLLARD
- NEW PAVEMENT

NOTES

GENERAL

1. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE
2. ALL LEVELS ARE TO AUSTRALIAN HEIGHT DATUM
3. ALL COORDINATES ARE MGA ZONE 53
4. BASE SURVEY INFORMATION HAS BEEN PROVIDED BY AEROMETRIX PTY LTD - JOB No. 'Thevenard-WharfJetty 2018-Jan'
5. DRAWINGS TO BE READ IN CONJUNCTION WITH THE SPECIFICATION.
6. ALL EXISTING SERVICES ARE TO BE LOCATED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF WORK.
7. GRADE SURFACE EVENLY BETWEEN DESIGN SPOT LEVELS SHOWN

SCALE BAR (m)
1:200

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D	06.10.2018	ISSUED FOR TENDER	RP	DM	DM

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LAND RECLAMATION SEAWALL PLAN

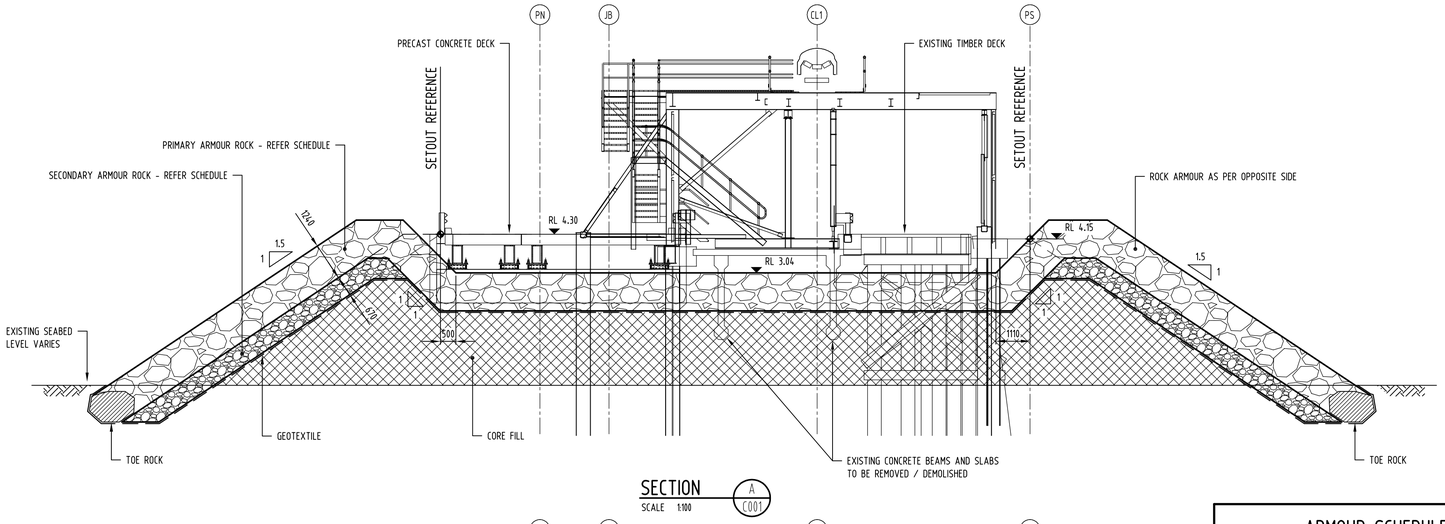
A1

DRAWING NUMBER
Job Number Sheet No. Rev.
PER171662.C001 D

Design RP
Drawn RP

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE
2. ALL LEVELS ARE TO AHD



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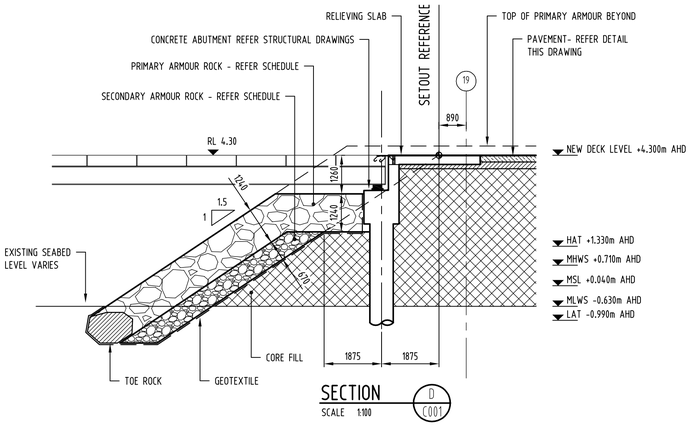

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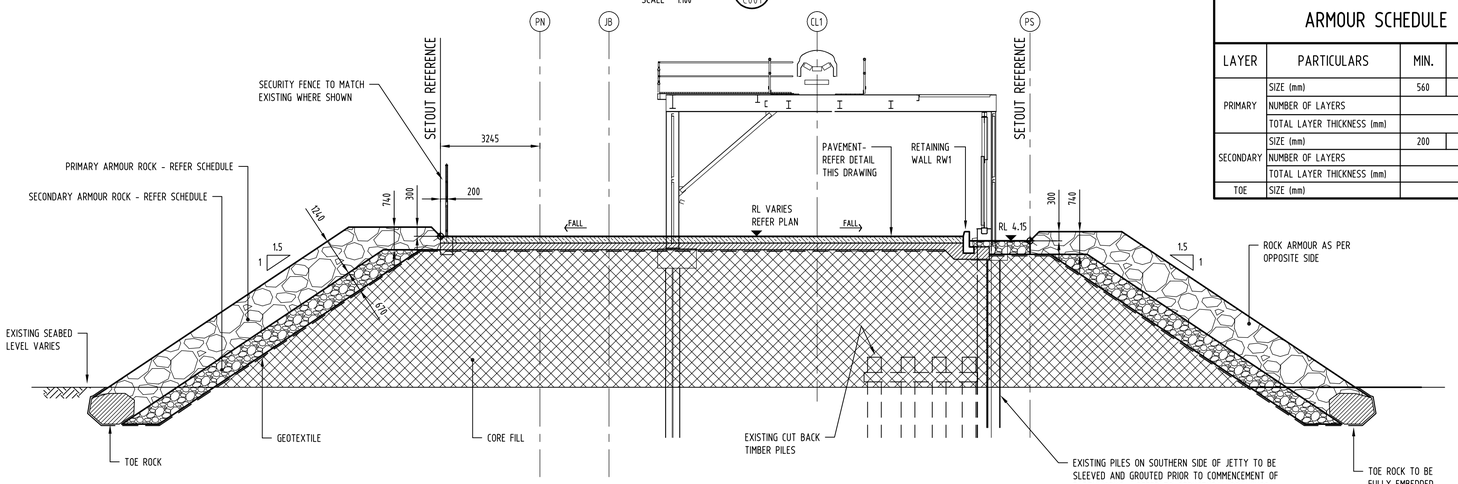
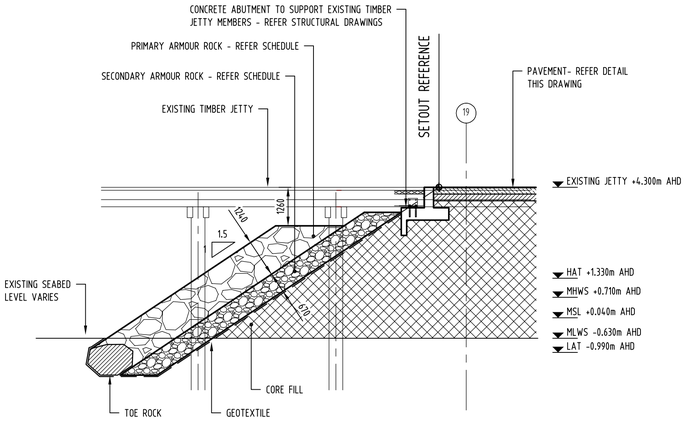


SECTION B -
SCALE 1:100

ARMOUR SCHEDULE

LAYER	PARTICULARS	MIN.	50	MAX.
PRIMARY	SIZE (mm)	560	740	930
	NUMBER OF LAYERS	2		
	TOTAL LAYER THICKNESS (mm)	1240		
SECONDARY	SIZE (mm)	200	400	600
	NUMBER OF LAYERS	2		
	TOTAL LAYER THICKNESS (mm)	670		
TOE	SIZE (mm)	1200		



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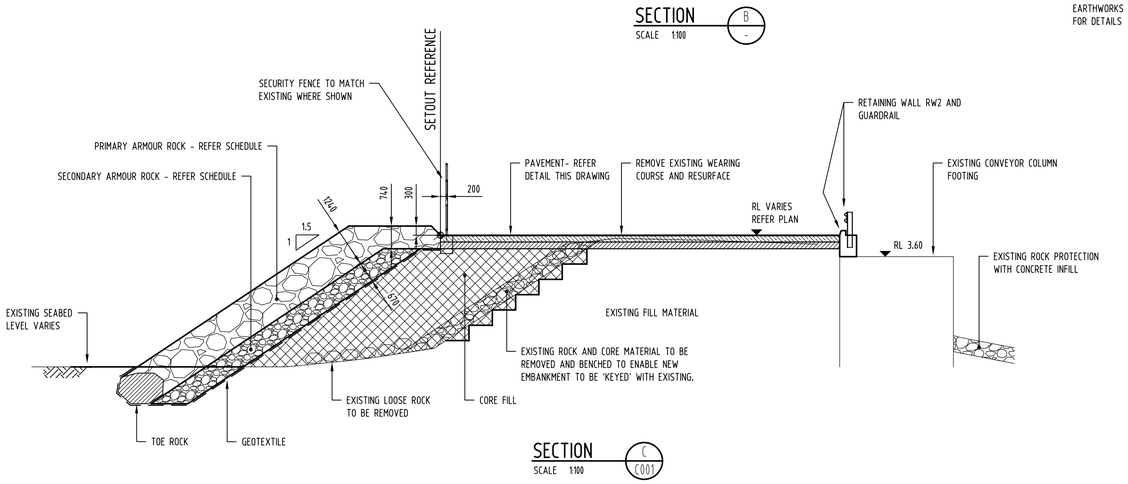

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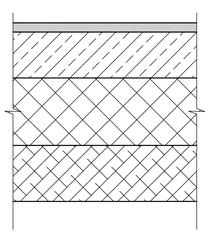
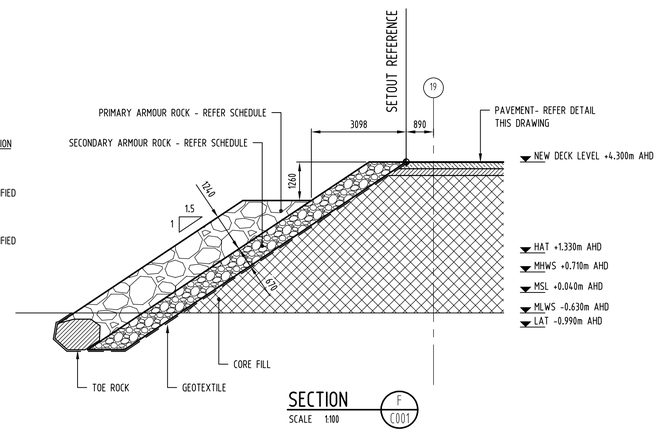


THICKNESS	TYPE	COMPACTION
20mm	14/10/7 TRIPLE SPRAY SEAL	
200mm (IN TWO EQUAL LAYERS)	FINE CRUSHED ROCK PM1/20 QG	98% MODIFIED
220mm (IN TWO EQUAL LAYERS)	QUARRY RUBBLE PM2/20 QG	96% MODIFIED
VARIES	CORE FILL	

TYPICAL PAVEMENT DETAIL



SECTION F C001
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LAND RECLAMATION - SEAWALL SECTIONS

A1

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Job Number PER171662 Sheet No. C002 Rev. C

Design ??
Drawn RP

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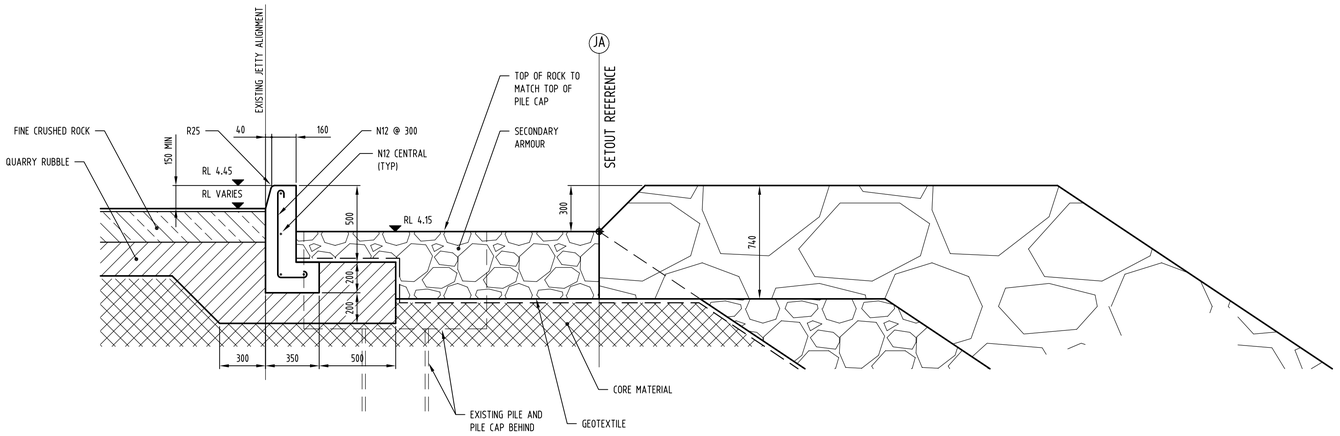
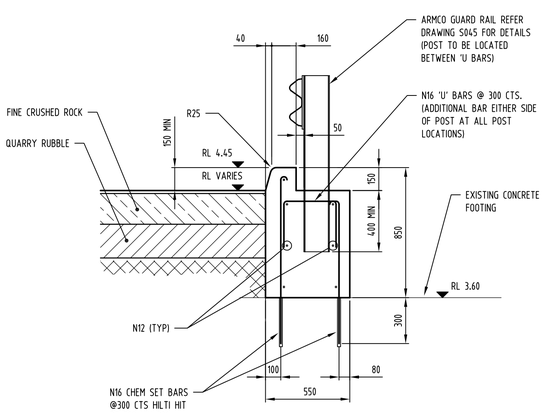


RW1-TYPICAL SECTION

SCALE 1:20

(PROVIDE TOOLED JOINTS @ 3m CTS)



RW2-TYPICAL SECTION

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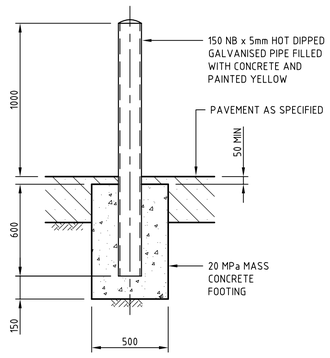

FIXED BOLLARD DETAIL

SCALE 1:20

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE
2. ALL LEVELS ARE TO AHD
3. FOR CONCRETE AND SEAWALL NOTES REFER DRAWING PER171662 A002

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C	06.09.2018	ISSUED FOR TENDER	RP	DM	DM

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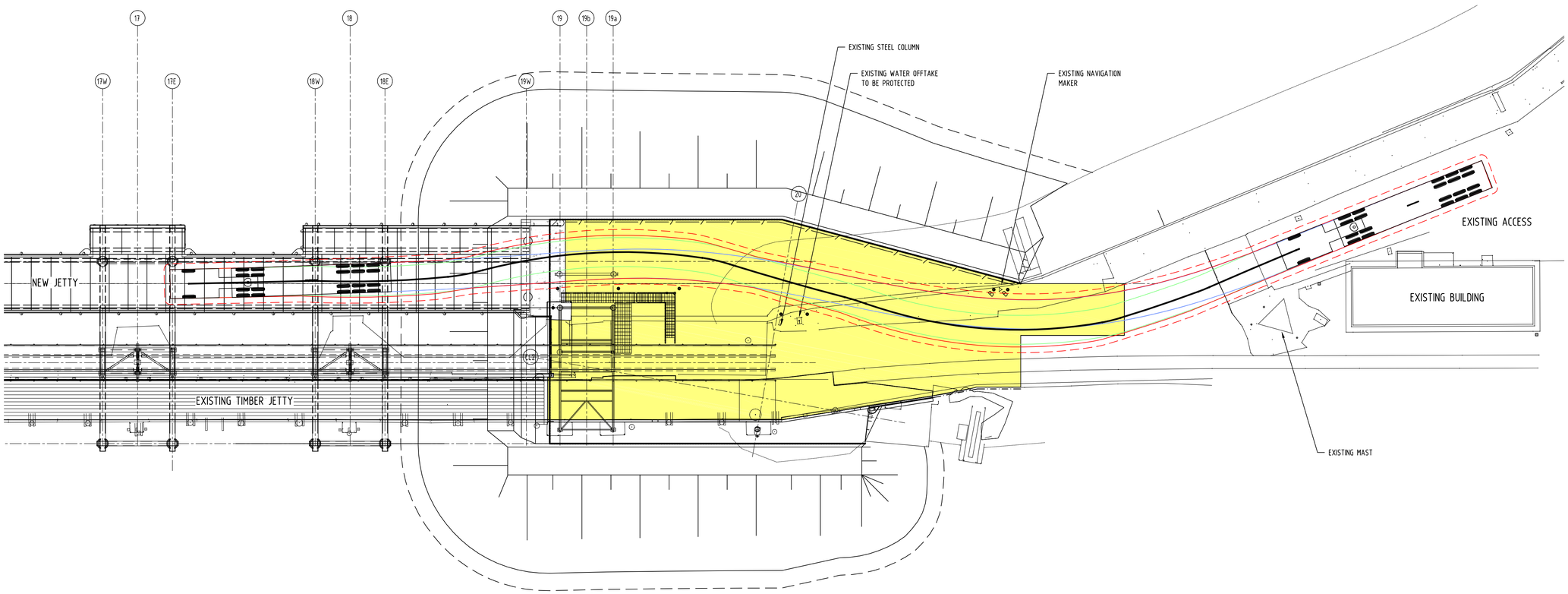
LAND RECLAMATION - DETAILS

A1

DRAWING NUMBER
Job Number Sheet No. Rev.

Design ST Drawn RP

PER171662 C003 C



PLAN - FORWARD MOVEMENT IN

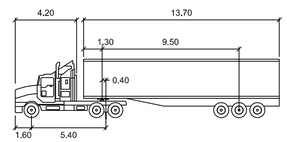
SCALE 1:200

NOTES:

1. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

LEGEND

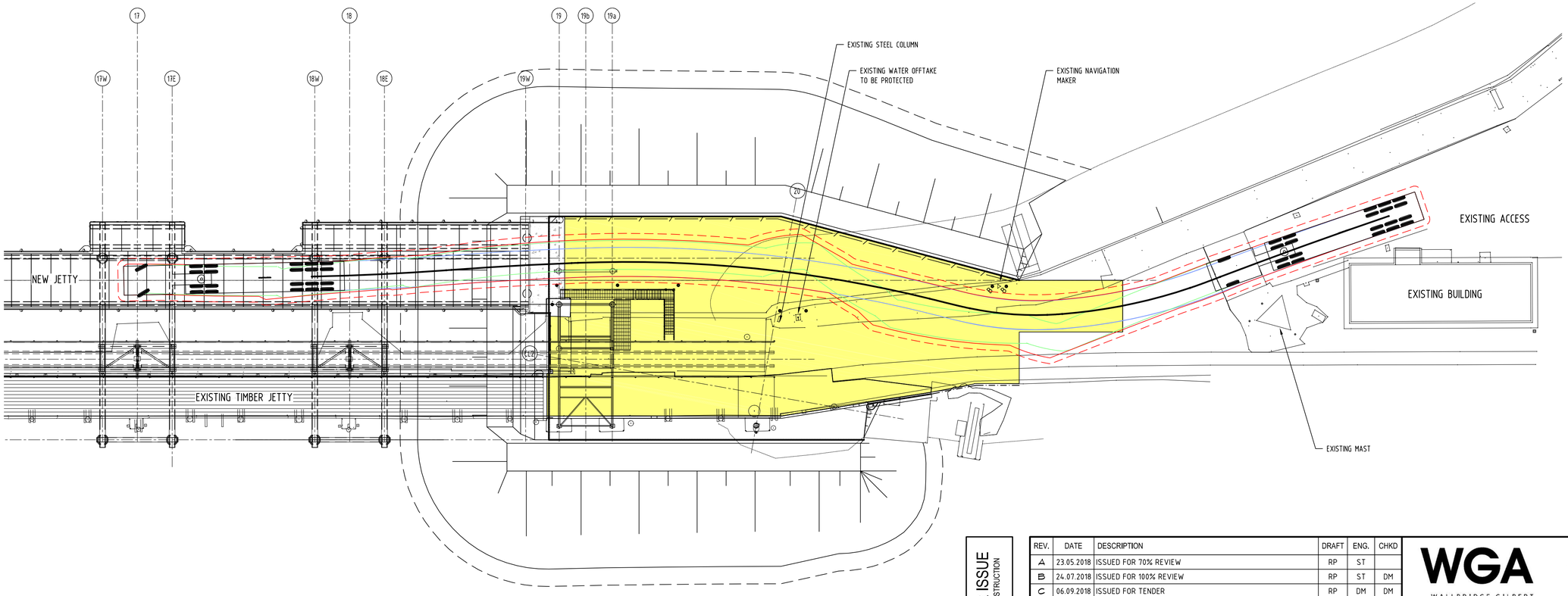
- FRONT WHEEL PATH
- REAR WHEEL PATH
- VEHICLE BODY
- 500mm VEHICLE BODY CLEARANCE



AV

meters

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 28.3
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		



PLAN - REVERSING MOVEMENT OUT

SCALE 1:200

4 2 0 4 8

SCALE BAR (m)
1:200

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VEHICLE TURNPATHS 1 OF 2

A1

DRAWING NUMBER
Job Number Sheet No. Rev.

Design RP Drawn RP PER171662 C011 C

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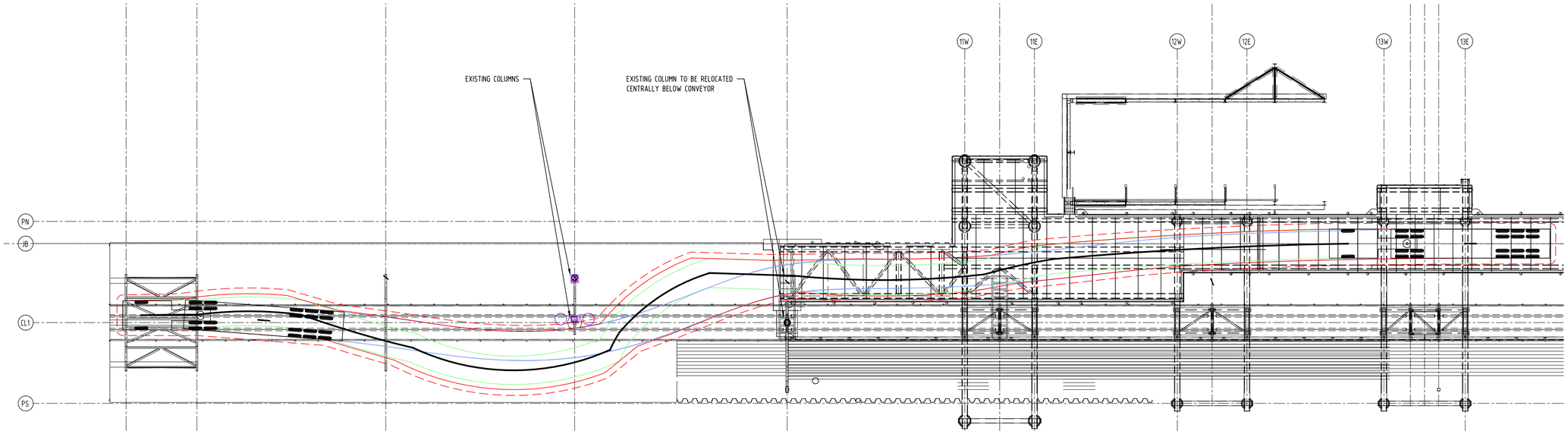


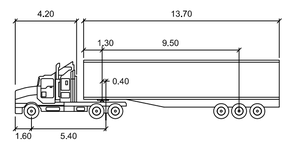
PLAN - FORWARD MOVEMENT IN
SCALE 1:200

NOTES:

1. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

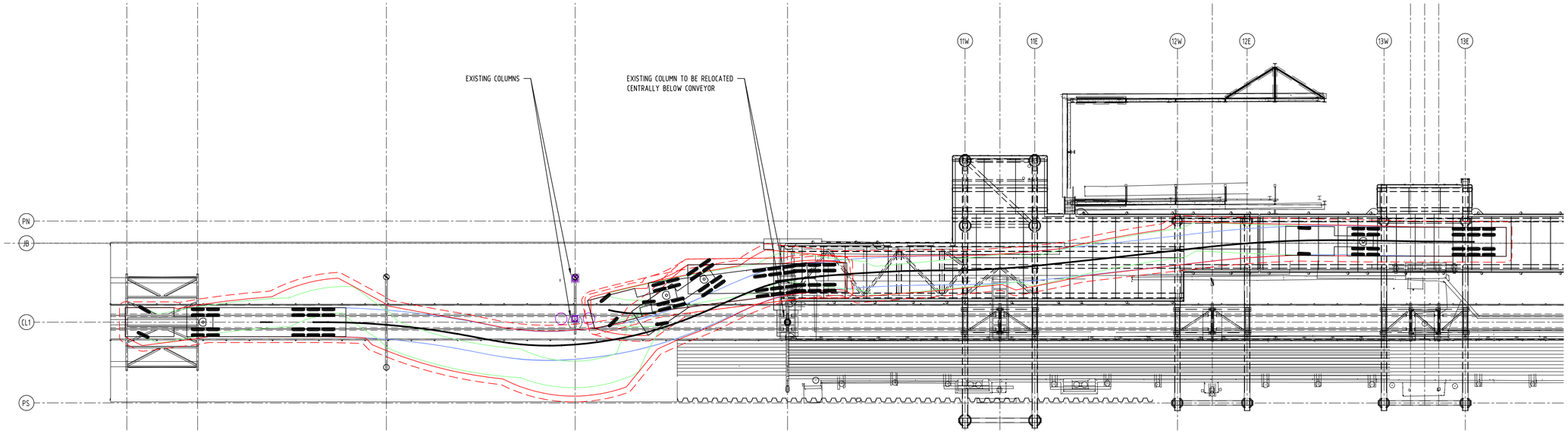
LEGEND

- FRONT WHEEL PATH
- REAR WHEEL PATH
- VEHICLE BODY
- 500mm VEHICLE BODY CLEARANCE



AV

	meters		
Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 28.3
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		



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VEHICLE TURNPATHS 2 0F 2

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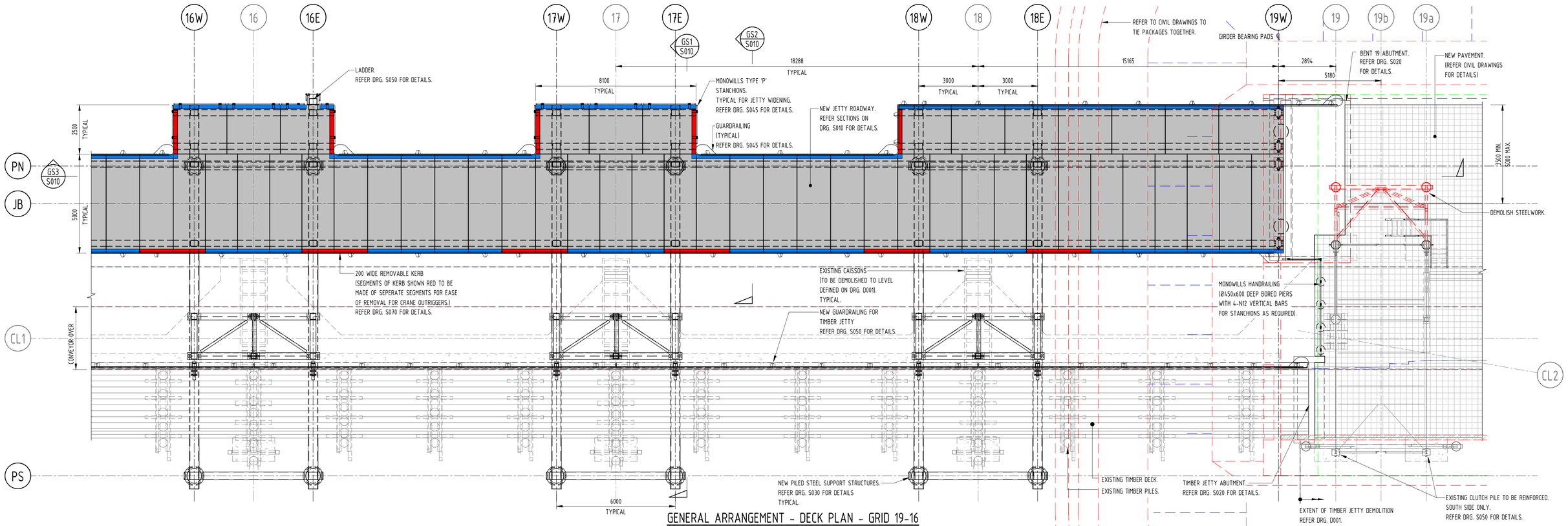

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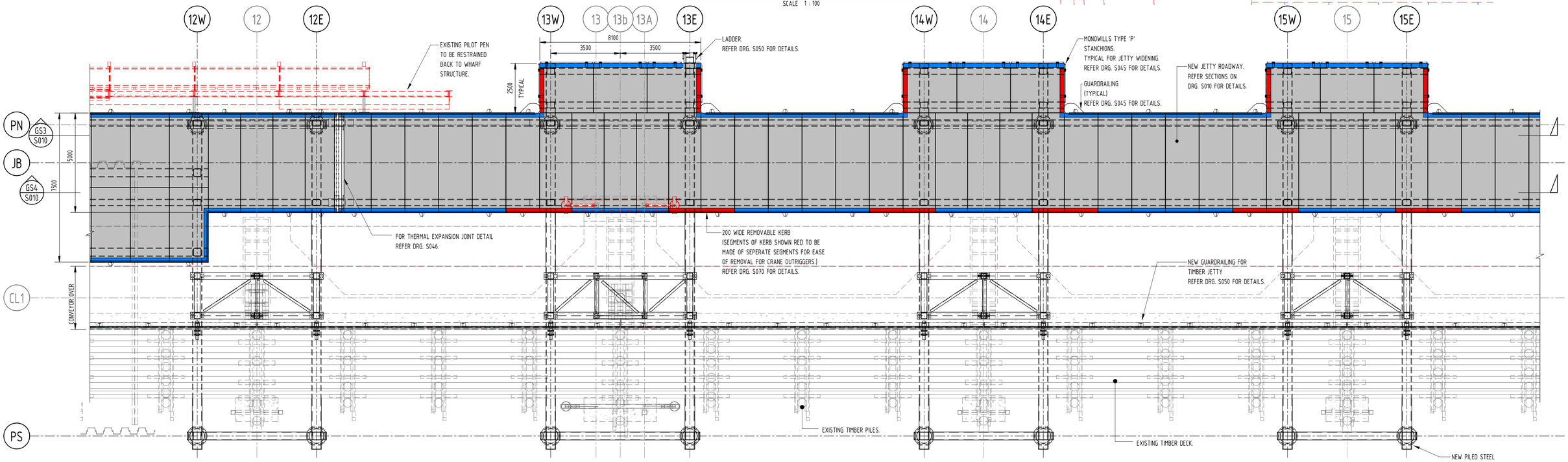

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JETTY GENERAL ARRANGEMENT - SHEET 1

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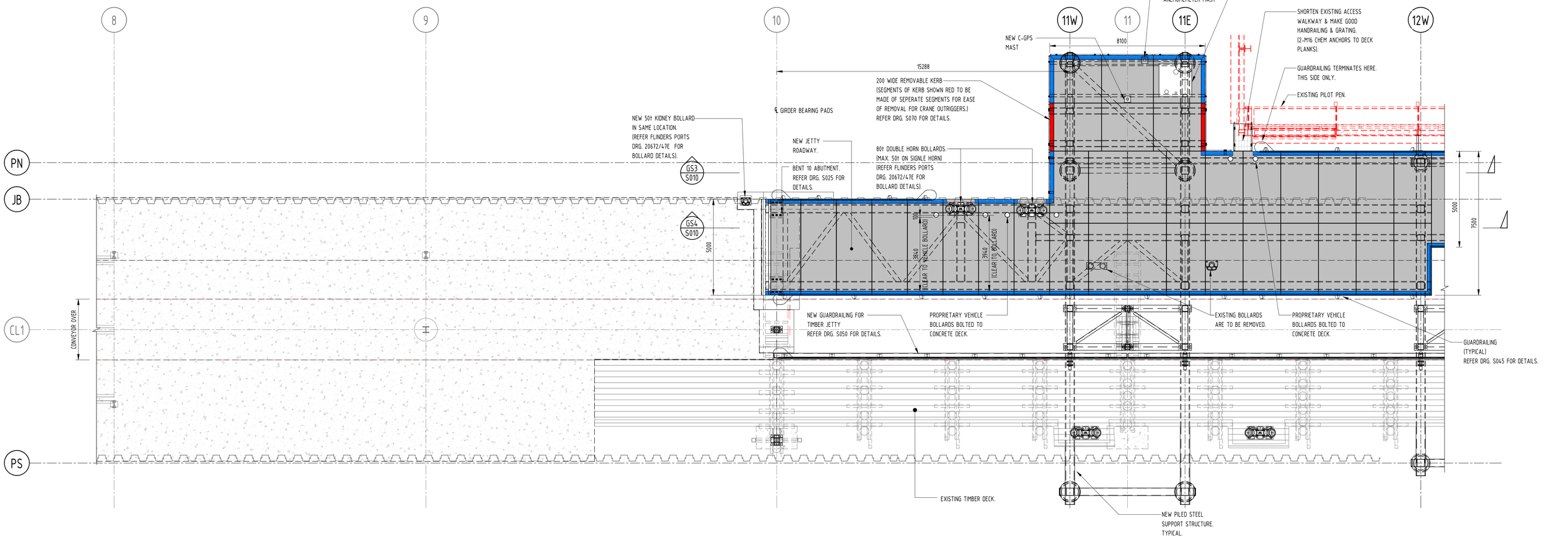

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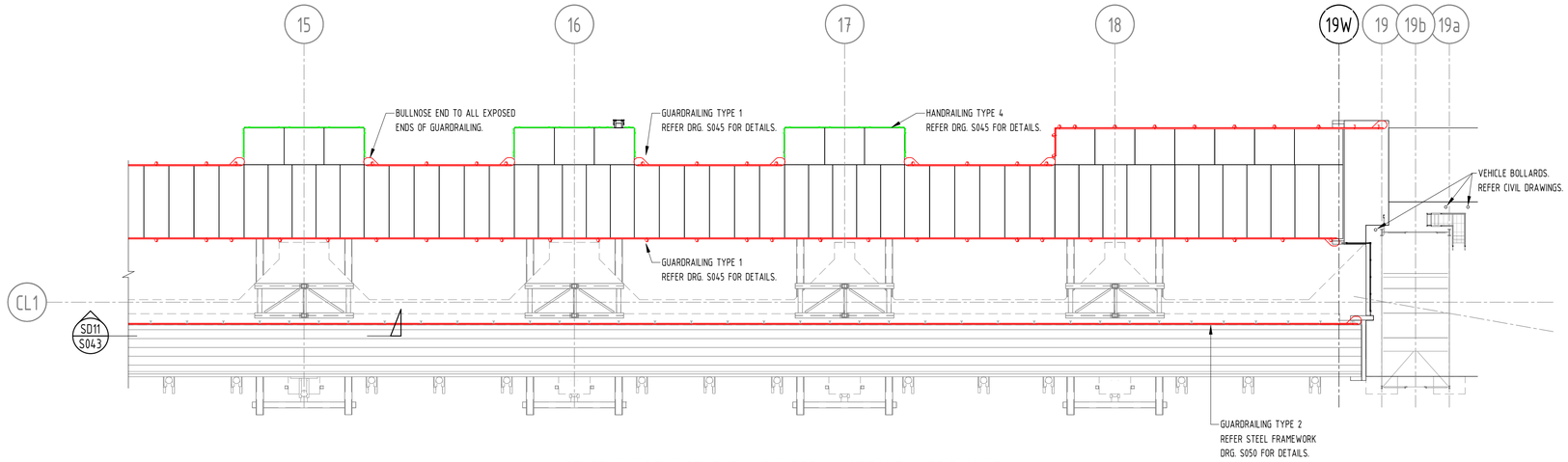

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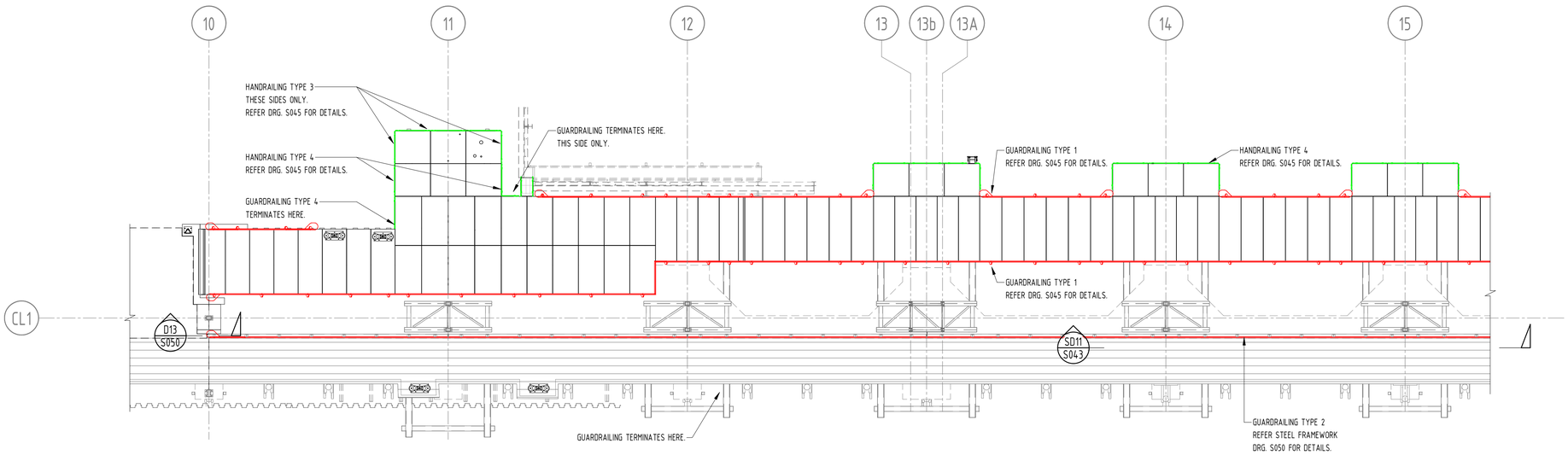

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GUARDRAIL GA PLAN - SHEET 1

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Job Number PER171662 Sheet No. S007 Rev. C

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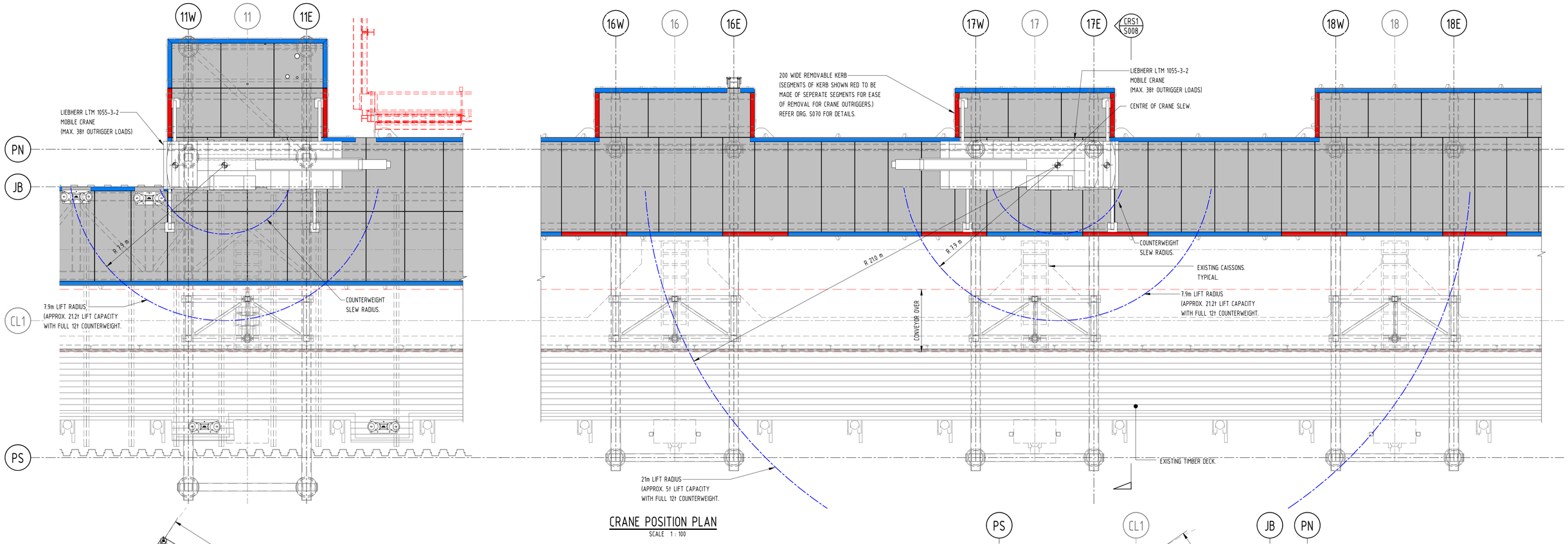
Drawn RS



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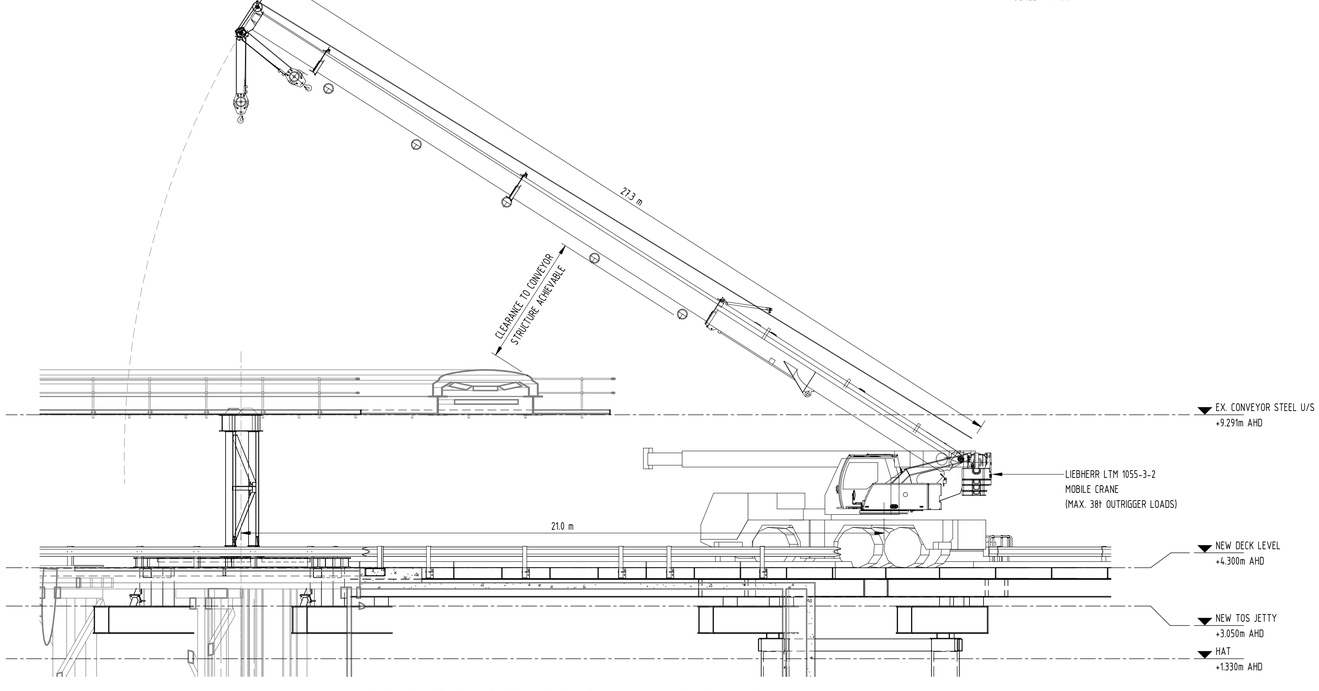

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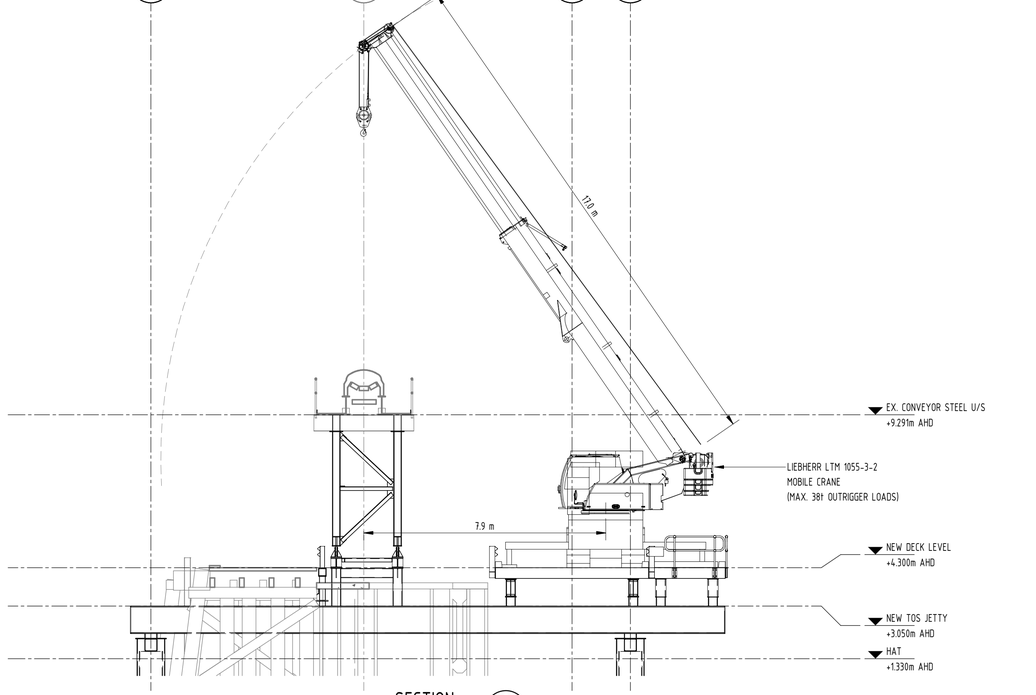

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CRANE LIFTING PLAN

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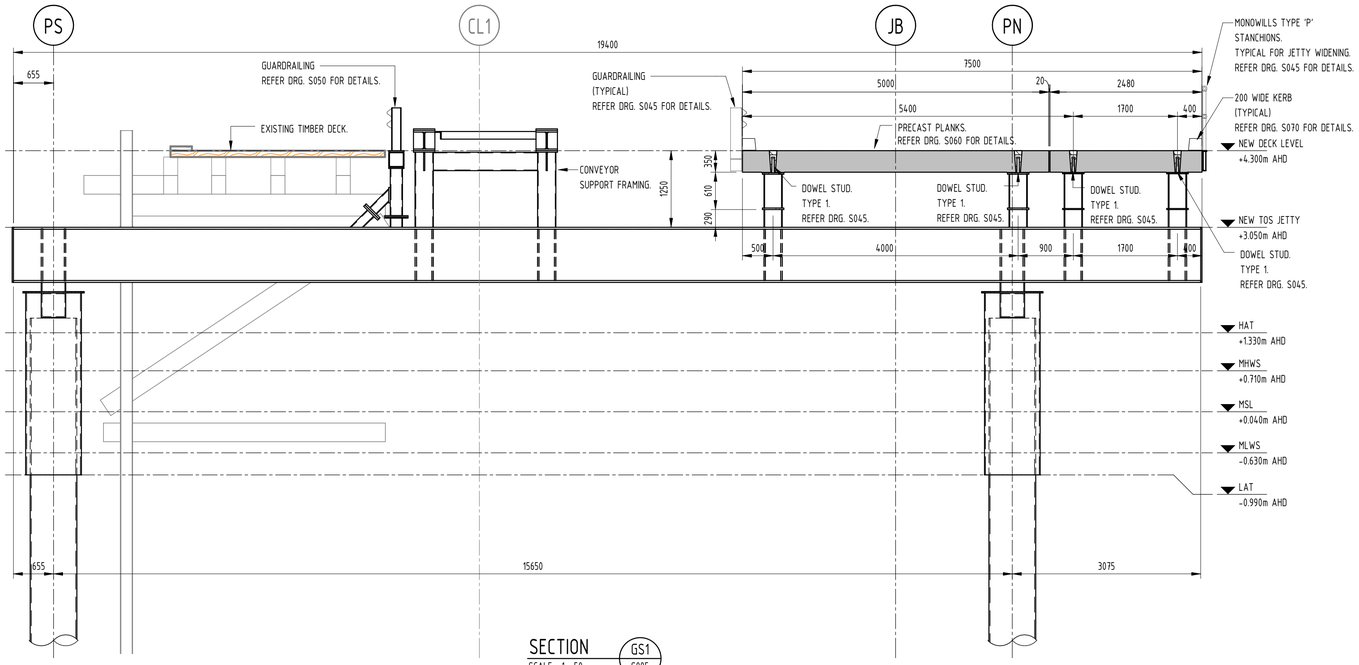

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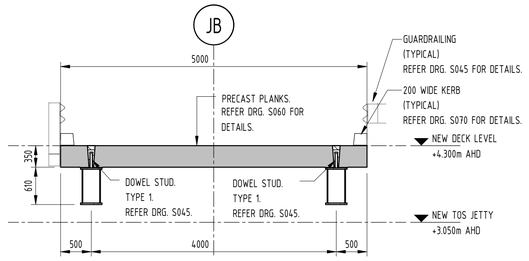
TYPICAL TRANSVERSE SECTION THROUGH WIDENED JETTY



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TYPICAL TRANSVERSE SECTION THROUGH JETTY

(HRT)		
+3.26m PRE DIGITAL (1934)		+2.27m
+3.30m NTC DIGITAL (2007)		+2.31m
+2.32m (HAT)		+1.33m
+1.70m (MHWS)		+0.71m
+1.03m (MSL)		+0.04m
+0.36m (MLWS)		-0.63m
+0.00m (LAT)		-0.99m
(LRT)		
-0.46m PRE DIGITAL (1985)		-1.45m
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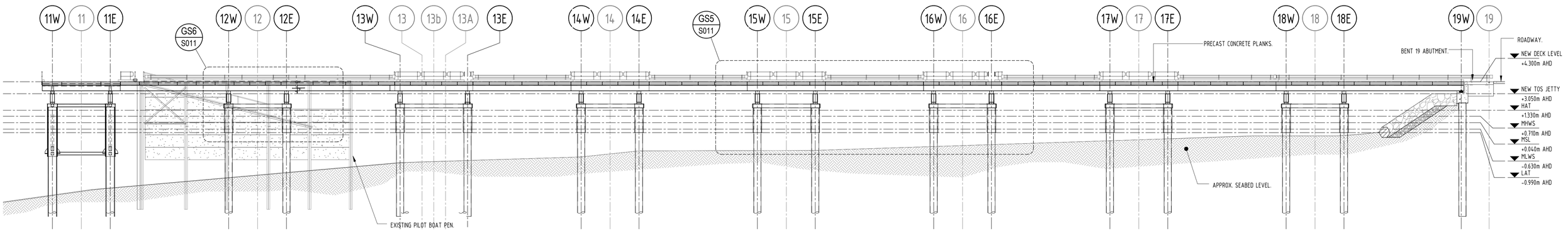
CD		AHD

DATUM & TIDAL LEVELS



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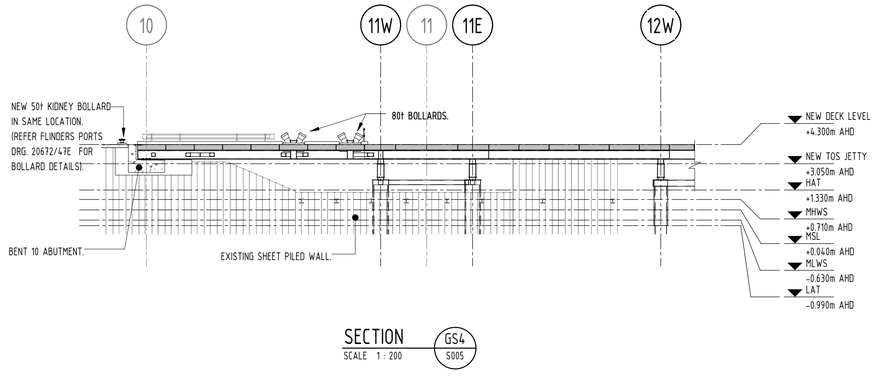
TYPICAL LONGITUDINAL SECTION THROUGH JETTY



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GENERAL ARRANGEMENT SECTIONS - SHEET 1

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Appendix B Ecology Assessment

Port Thevenard Upgrade Project - Marine Ecology Assessment

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Date: October 2018
Confidential

Document Control Sheet

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Document:	R.B23384.001.01.marine ecology baseline.docx
Title:	Port Thevenard Upgrade Project - Marine Ecology Assessment
Project Manager:	Lisa McKinnon
Author:	Daniel Moran, Grace Bourke & Lisa McKinnon
Client:	Arup
Client Contact:	John Haese
Client Reference:	

Synopsis: **An assessment of the marine ecological environment at and adjacent to wharf areas planned for upgrade works.**

REVISION/CHECKING HISTORY

Revision Number	Date	Checked by		Issued by	
00 – Draft	14th September 2018	DLR		DTM	
01 - Final	3rd October 2018	DLR		LCM	

DISTRIBUTION

Destination	Revision										
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Arup	PDF	PDF									
BMT File	PDF	PDF									
BMT Library	PDF	PDF									

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Contents

1 Introduction

1.1 Background

Thevenard is located on the Eyre Peninsula, 793 km west of Adelaide, South Australia, and 3 km south-west from the centre of Ceduna. Port Thevenard (the port), is located at the headland of the Thevenard peninsula and is operated by Flinders Ports.

The proposed Project Area includes the jetty structure and the adjacent landside parcel which provides access from Thevenard Road and West Terrace (Figure 1-1). The jetty is characterised by north and south common user berths, both fed from the same loader which is owned by Viterra. The jetty has a direct connection to the Viterra Silos located east of the berth. Port access is from Thevenard Road and West Terrace.

The jetty was originally constructed in 1919 and is approximately 360 m long, consisting of a 235 m long concrete section extending from shore out to a 125 m long jetty head. The jetty has been modified since construction. Currently, the jetty supports a conveyor structure, with support locations coinciding with the pier locations of the jetty head and original concrete jetty. On land, the conveyor is supported on A-frame trestles and single columns that are founded on reinforced concrete footings. The concrete and timber jetty structures are largely independent of one another, with the exception that the conveyor trestles are supported by piers from both jetties.

The proposed Project is a “like for like” replacement of the 235 m section of deteriorating concrete jetty, between the shoreline and jetty head. The jetty is at risk of being condemned if these works are not carried out, thus are considered essential maintenance.

The existing concrete jetty cannot be rehabilitated and therefore requires demolition in order to minimise the risk of future uncontrolled collapse, which has potential to cause harm to port users, the jetty itself and the environment. Works will not include any dredging but piling activity will occur. There is potential for minor turbid plumes to be caused by piling activity and installation of a launch platform on the northern shoreline of the jetty.

Construction materials and equipment will be stored onshore, at the locations shown in Figure 1-2.

1.2 Study Aim and Objectives

In support of the proposed works and associated development approvals under the *Planning, Development and Infrastructure Act 2016*, there is a need to characterise the marine ecological values on areas at the jetty and in adjacent areas that could be affected by direct or indirect impacts (i.e. underwater noise). The objectives of this report are to:

- Identify environmental legislation relevant to the impact assessment;
- Provide a baseline description of marine habitats, flora and fauna in the Project Area; and
- Describe potential impacts of the works on marine ecological values.

Specifically, these components consist of the tasks listed below:

- Describe the regulatory and policy framework for assessment of impacts to marine ecological values;

- Review previous studies relevant to marine habitats, assemblages and threatened species known or potentially occurring within the Project Area;
- Undertake field surveys to map marine benthic habitats and characterise epibenthic communities within the Project Area;
- Based on the above, provide a description of the environmental baseline of the Project Area in relation to marine ecology; and
- Identify and assess potential direct and indirect impacts of the project on marine ecological values, and possible strategies that may be required to minimise the extent and/or severity of those impacts on identified ecological values.

While investigations have focused on potential impacts to marine values, terrestrial values have also been reviewed where it has been identified stockpiling/laydown areas may be placed.

Figure 1-1 Indicative proposed Project Area

Figure 1-2 Possible construction storage areas

Figure 1-3 Site Layout Plan

2 Relevant Legislation

2.1 Commonwealth Legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

Under the EPBC Act, an action that will, or is likely to have, a significant impact on a Matter of National Environmental Significance (MNES) should be referred to the Australian Government. A significant impact is defined as 'an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts. There are nine MNES:

- World heritage properties;
- National heritage places;
- Wetlands of international importance (listed under the Ramsar Convention);
- Listed threatened species and ecological communities;
- Migratory species;
- The Great Barrier Reef Marine Park;
- Commonwealth Marine Areas;
- Nuclear actions; and
- A water resource in relation to coal seam gas development and large coal mining development.

There are listed threatened species and migratory species that occur within the Project Area (refer to Section 4.2 for further detail).

Actions that are 'likely' to have a significant impact on MNES are determined to be a 'controlled action', that may require further assessment and approval. To be 'likely', it is not necessary for a significant impact to have a greater than 50% chance of happening, it is sufficient if a significant impact is a real or not remote chance or possibility (Commonwealth of Australia, 2013). Actions may sometimes be considered to not be a controlled action, thus avoiding further assessment provided they are undertaken in a 'particular manner'. Figure 2-1 shows the possible decision pathways taken by DoE to assess the project under the EPBC Act.

The Australian Government have released the Significant Impact Guidelines 1.1 (DoE, 2013) to assist in determining whether a proposed action is considered a significant impact. The Guidelines outline a 'self-assessment' process to assist persons in deciding whether or not a referral is required. To make a decision on whether or not to refer an action, the following should be considered:

- Are there any MNES located in the area of the proposed action?
- At its broadest scope, is there potential for impacts, including indirect impacts, on MNES?
- Are there any proposed measures to avoid or reduce impacts on MNES?

- Are any impacts of the proposed action on MNES likely to be significant (important, notable, or of consequence, having regard to their context or intensity)?

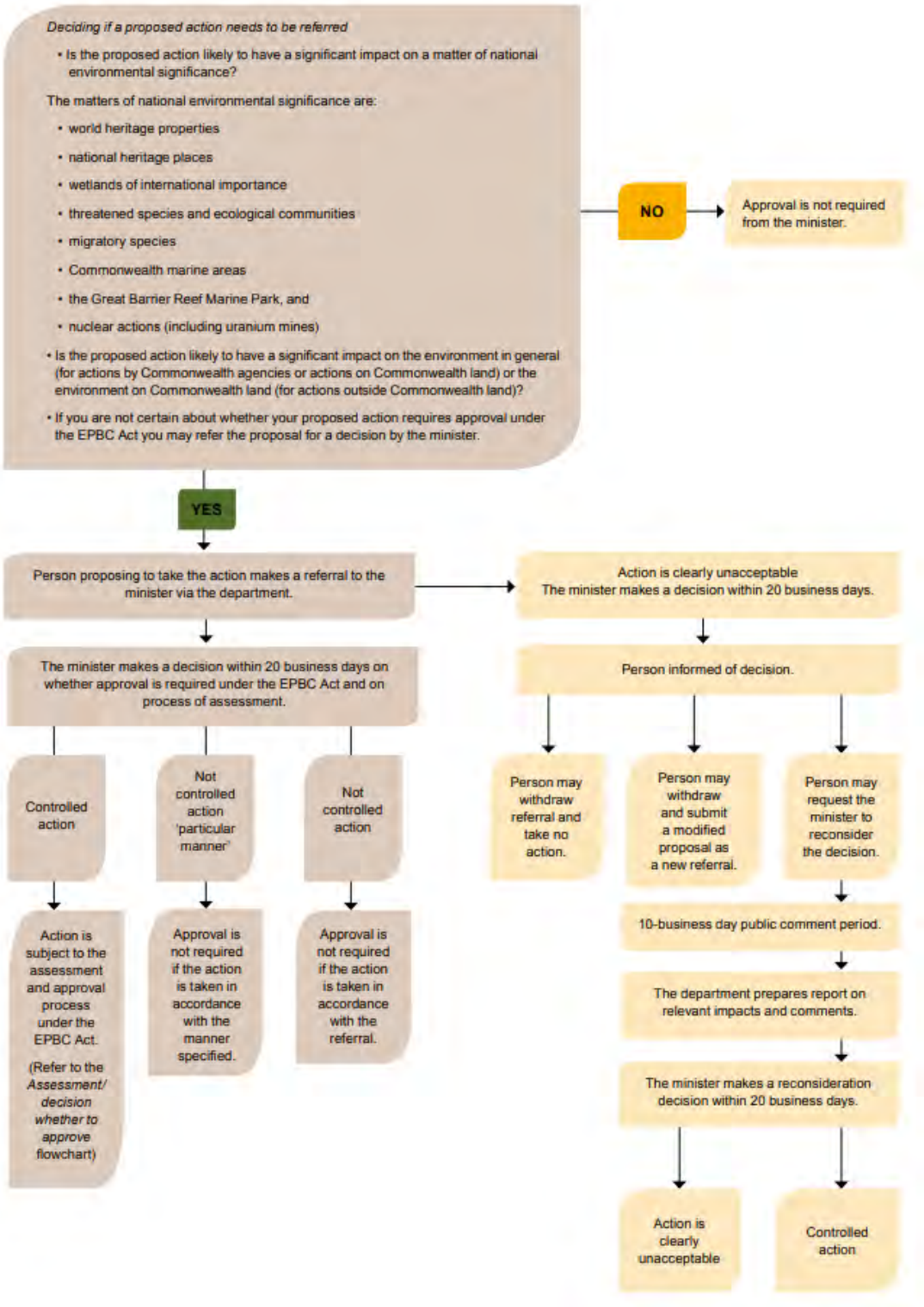

Figure 2-1 EPBC Act Referral Assessment Process

2.2 State Legislation

2.2.1 Planning, Development and Infrastructure Act 2016

This report has been prepared to support a development application under the *Planning, Development and Infrastructure Act 2016* (PDIA). Most of the site sits outside of the Ceduna Local Government Area and is located in 'Land Not Within a Coastal Area (Coastal Waters). It is therefore assumed that the State Assessment Panel (SCAP) is the relevant authority under the PDIA Act.

2.2.2 Native Vegetation Act 1999

Under the *Native Vegetation Act 1999* (NVA), approval is required before causing substantial damage to native plants; seagrass is classed as a native plant, and its removal will require a clearance permit. As a condition of approval, it is likely that removal of seagrass will attract the requirement for an offset; the offset needs to provide a Significant Environmental Benefit (SEB), meaning it needs to provide an environmental gain over and above the damage being done in the clearing activity. Because seagrass will be permanently removed where the new infrastructure is placed, and will not regrow, a financial settlement is likely to be the preferred pathway to achieving a SEB.

2.3 Local Legislation

The jetty upgrade sits mostly outside of the Ceduna Local Government Area; any stockpiling areas would be subject to the Ceduna Council Development Plan (2012). The western edge of the Thevenard Peninsula is zoned for Industrial Purposes; the works would be consistent with this land use and is not considered a change in use.

3 Methodology

3.1 Searches for Threatened and Migratory Marine Species and Previous Habitat Mapping

The following existing information sources were reviewed to determine potential values of the Project Area for threatened and migratory marine species:

- Protected Matters Search Tool (PMST). The PMST is online publicly accessible tool (http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf) to search for matters protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). For a selected area, the tool generates a list of protected matters that may occur in or near the area. Details regarding the PMST are provided in http://www.environment.gov.au/webgis-framework/apps/pmst/pmst-help.jsf#help. Figure 3-1presents the results of PMST search conducted on the 23rd August 2018, with a boundary of 1km from the proposed infrastructure footprint (contained in Appendix A).
- Atlas of Living Australia (ALA).
- NatureMaps (Department for Environment and Water), which provided mapping of seabed habitats and protected marine areas. Searches were conducted at the web portal (https://data.environment.sa.gov.au/NatureMaps/Pages/default.aspx) for the following layers:
    (a) Estuary habitats;
    (b) Benthic mapping;
    (c) Fauna and flora site locations;
    (d) Fauna colonies;
    (e) Protected areas; and
    (f) SA vegetation.
- Reports and publications, as outlined in Section 9 and referenced in the body of this report.

3.2 Preliminary Habitat Mapping

A preliminary marine habitat map was developed using the following sources:

- Google maps/Bing satellite imagery; and
- 10 cm satellite imagery for the site provided by Flinders Port.

Satellite imagery was imported into Mapinfo Professional (version 12.5) and representative areas of potential seagrass and reef habitat maps were digitised based on changes in colour and texture. This mapping was validated in field surveys as described below.

3.3 Field Surveys

3.3.1 Survey Timing and Design

A field survey was conducted on 27 and 28 August 2018.

Sampling was conducted in three survey strata (Figure 3-2). The survey effort (and sampling approaches – see Section 3.3.2) varied among strata as follows:

- Zone 1 - Highest sampling effort was under the jetty and proposed launch pad footprint.
- Zone 2 - Moderate sampling effort was undertaken within a 250 m zone surrounding the project footprint.
- Zone 3 - Spot checks of potential seagrass and reef areas, as identified through preliminary habitat mapping, was undertaken between 250 - 500 m of the jetty structure.

All sampling was carried out using the commercial charter vessel *"The Spirit of the West"*. Location and navigation to the sampling sites was undertaken using handheld GPS loaded with customised backmaps providing GIS information for the Project Area.

3.3.2 Sampling Techniques

Sampling was conducted using the following survey techniques:

- Tethered, high definition underwater video system. This technique was used at seabed areas adjacent to the existing jetty. A remotely operated high-definition underwater video camera system with a live surface feed was deployed to collect visual imagery of the seabed (where water visibility permitted) at sites in Zone 2 and 3. At each survey point, seagrass density and composition were estimated by a marine ecologist based on methods in McKenzie (2003).
- Remotely operated underwater vehicles (ROVs). Because of the deterioration of the existing jetty and WHS concerns, ROVs were used to sample areas beneath and immediately adjacent to the wharf structure (Zone 1). Video footage of the seabed and pylons was inspected in real time by a marine ecologist.
- Extractive sampling. Seagrass was sampled using a van Veen grab sampler to confirm species identifications made from video footage. The presence of benthic algae, macroalgae and/or seagrass wrack and other debris in samples was also recorded. The vessel master marked the specific location of each survey point using a handheld Garmin GPS and notes were recorded regarding the benthic communities present.
- An unmanned aerial vehicle (UAV), or drone, was flown to provide current aerial imagery for the Project Area.

LEGEND

- 500 m buffer
- 250 m buffer
- Survey Site
- Baited Remote Underwater Video Stations (BRUVS)

Title:

Study area and survey sites

Figure: 3-1

Rev: A

N

0 200 400m

Approx. Scale

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3.3.3 Data Analysis

A combination of GIS techniques were used to develop mapping of benthic habitat types (seagrass and reef) within the Project Area. In deep water environments and areas where poor water visibility impeded aerial and satellite image quality the distribution of seagrass was interpolated between known values at each survey location to develop approximate boundaries of seagrass and reef habitat types. A validation approach was also used whereby suitable survey sites examined in the field were used to provide ground-truthing of available aerial imagery. This approach allowed mapping of the current seagrass extent in shallow nearshore areas and effective differentiation of seagrass meadows from bare substrates, benthic microalgae (BMA), macro algae, seagrass wrack and other debris in these locations. Examples of benthic communities observed during the field survey are provided in Appendix B.

Seagrass meadows were classified using percent cover data based using the nomenclature in Carter *et. al.* (2015) as presented in Table 3-1.

Table 3-1 Seagrass meadow landscape categories (Carter *et. al.* 2015)

Meadow landscape category	Description
Isolated seagrass patches	The majority of area within the meadows consisted of unvegetated sediment interspersed with isolated patches of seagrass
Aggregated seagrass patches	Meadows are comprised of numerous seagrass patches but still feature substantial gaps of unvegetated sediment within the meadow boundaries
Continuous seagrass cover	The majority of area within the meadows comprised of continuous seagrass cover interspersed with few gaps of unvegetated sediment

3.3.4 Fish Surveys

Baited Remote Underwater Video Stations (BRUVS) were deployed at three sites (Figure 3-2) at the jetty structure to assess marine fish diversity and abundance at the Project Area. The first 30 minutes of footage from each station were assessed to generate species richness and abundance scores. The time to the first observation at each site was also recorded.

3.3.5 Weather Conditions

There were several small to moderate rainfall events in the month prior to the survey (Figure 3-1) and extended periods of strong winds affecting the region. Water clarity was favourable for the greater part of the survey window however strong winds and poor water quality affected the survey site from the late morning on 28 August.

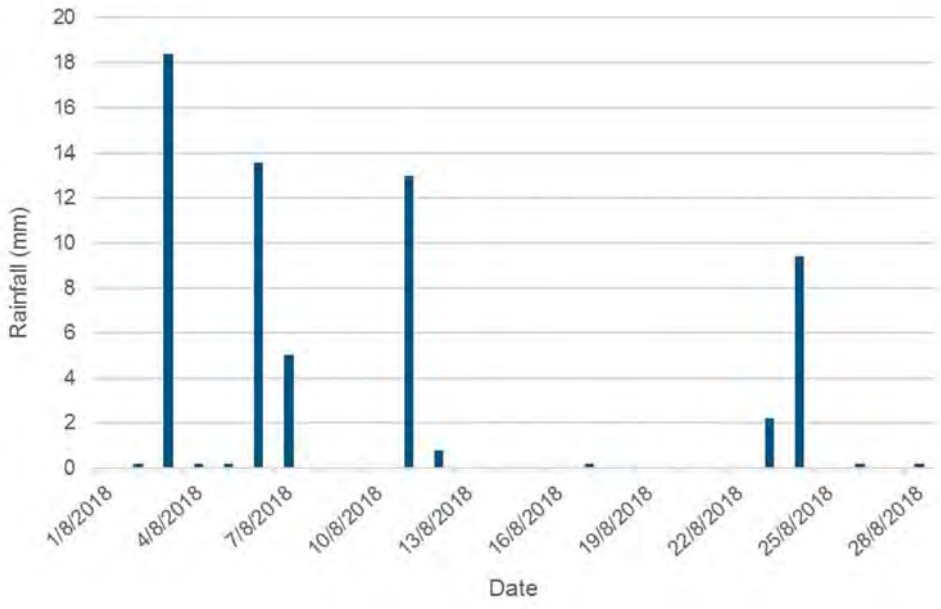


Figure 3-2 Rainfall recorded at Ceduna Airport (station number 18012) prior to the survey

3.4 Impact Assessment

Section 6 identifies potential construction and operational impacts to both marine and terrestrial ecological values identified from desktop investigations and field surveys. An assessment of the scale of impact has been included; potential impacts have been categorised as High, Medium or Low as defined in below.

Table 2 Ecological Impact Criteria

Environmental Value	High	Medium	Low
Protected Habitats	Adverse impacts to the values of an area protected at international or national level e.g. Ramsar Wetland, Commonwealth Marine Area, National Park	Adverse impacts to the values of an area protected at state level e.g. Conservation Park, Marine Park	No significant adverse impact
Protected Ecological Communities	Adverse significant impact to an Ecological Community protected under the EPBC Act	Adverse significant impact to a vegetation community that wholly or mostly supports a rare, vulnerable or endangered species	No significant adverse impact
Protected Flora or Fauna	Significant Adverse impact to a nationally threatened species.	Significant adverse impact to a state threatened species	No significant adverse impact
Fisheries Values	Significant Adverse impact to a commercial fish species	Adverse impact to recreational fishing values	No significant adverse impact

4 Ecological Values and Sensitivities

4.1 Overview

The Project Area is located within Denial Bay, an open embayment on Thevenard Peninsula. An arch of islands, known as the Nuyts Archipelago, stretches south-west of the Peninsula. A sandy beach lies to the direct north of the port, and low rocky buffs form the northern and southern sides of Cape Thevenard.

Nature Maps SA shows benthic habitat classes around Thevenard Peninsula (Figure 4-1), which are based on interpretation of ortho-rectified aerial photographs. The jetty lies within an area categorised as dense, continuous seagrass. Seagrass extent becomes patchier with distance from the shore. Areas of bare substrate and macroalgae coverage occur further offshore, as well as some small areas of reef to the northern and south of the jetty and along the foreshore.

The tidal flats, seagrass meadows and reefs around Ceduna provide habitat for commercial and recreational fish and shark species including King George Whiting, Snapper, West Australian Salmon and Tommy Ruff (Australian Herring). There is also a diverse array of marine invertebrates found around reefs, including Southern Rock Lobster, Southern Calamari, Giant Cuttlefish, Maori Octopus, Greenlip and Blacklip Abalone, and Purple Sea Urchin.

Figure 4-1 Benthic Habitat Mapping, Nature Maps SA

4.2 Matters of National Environmental Significance

The Protected Matter Search Tool (PMST) identified the following MNES as potentially occurring within a 1km radius of the upgrade works:

- One Threatened Ecological Community (TEC) - Subtropical and Temperate Coastal Saltmarsh.
- Thirty-three listed Threatened Species (TS) including 24 birds, 1 fish, 7 mammals, 8 plants, 8 reptiles and 4 sharks (as listed in Table 4-1).
- Forty-three listed Migratory Species (MS).

In addition to MNES, the PMST also lists additional marine fauna protected by the EPBC Act, including Listed Marine Species (66) and Whales and Other Cetaceans (12). The PMST is predictive only and does not provide certainty that a MNES is present.

4.2.1 Threatened Ecological Communities

Chenopod shrubland within and directly adjacent to intertidal foreshores of the Thevenard Peninsula are considered part of the Subtropical and Temperate Coastal Saltmarsh community listed as Vulnerable under the *EPBC Act*. Whilst this habitat occurs near the Project Area, it would not be disturbed either directly or indirectly during works.

4.2.2 Threatened Species

Whales, including the Southern Right Whale, are regularly sited around Ceduna over the winter months, where the protected bays along the coast offer shelter. Sea lions, bottle nose dolphins and Great White Sharks are regularly sited. Reef habitats also provide habitat for Leafy and Weedy Sea dragons.

The Ceduna region hosts both resident and migratory wading birds which feed on exposed sand and mud habitats. There are at approximately 17 species of internationally protected species of migratory shorebirds found in the Ceduna region; the primary habitat area for shorebirds is an area of mangrove and saltmarsh habitat around the Davenport Creek mouth, approximately 15km from the Project Area.

Species that are identified as threatened under the EPBC Act are documented in Table 4-1; the table identifies the likelihood of occurrence within the Project Area. The shoreline surrounding the jetty provides limited habitat opportunities for threatened and migratory shorebirds, which is reflected in species records. Higher numbers of shorebirds are recorded around Davenport Creek, to the west (based on NatureMaps records).

Table 4-1 EPBC Threatened Species potentially occurring in the Project Area

Scientific Name	Common Name	Status (Comm.)	Status (SA)	Likelihood of Occurrence
Birds				
Calidris canutus	Red Knot	Endangered	-	Possible. Occurs in intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours. Ceduna Bays are a noted site of international importance (Bamford, 2008).
Calidris ferruginea	Curlew Sandpiper	Critically Endangered	-	Possible. Occurs in intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms.
Calidris tenuirostris	Great Knot	Critically Endangered	Rare	Unlikely. Generally absent from the southern coastline. Prefers sheltered coastal habitats, with large intertidal mudflats or sandflats.
Charadrius leschenaultia	Greater Sand Plover	Vulnerable	Rare	Unlikely. Not found in numbers west of Streaky Bay. Prefers sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons
Diomedea antipodensis	Antipodean Albatross	Vulnerable	-	Possible, limited to rare vagrants in small numbers
Diomedea epomophora	Southern Royal Albatross	Vulnerable	-	Possible, limited to rare vagrants in small numbers
Diomedea sanfordi	Northern Royal Albatross	Endangered	Endangered	Possible, limited to rare vagrants in small numbers

Scientific Name	Common Name	Status (Comm.)	Status (SA)	Likelihood of Occurrence
Leipoa ocellate	Malleefowl	Vulnerable	Vulnerable	Unlikely. Inhabits scrubland and woodland dominated by mallee and wattle species
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit	Critically Endangered	Rare	Possible. Forages in coastal habitats such as interidal sandflats, banks, mudflats, estuaries.
Macronectes giganteus	Southern Giant-Petrel	Endangered	Vulnerable	Possible, limited to rare vagrants in small numbers
Macronectes halli	Northern Giant Petrel	Vulnerable	-	Possible, limited to rare vagrants in small numbers
Numenius madagagascariensis	Eastern Curlew	Critically Endangered	Vulnerable	Possible, but rare. Associated with sheltered coasts including estuaries, harbours and intertidal mudflats/sandflats
Pachyptilla turtur subantarctica	Fairy Prion	Vulnerable	-	Unlikely. Rarely occurs in South Australia
Pedionomus torquatus	Plains-wanderer	Critically Endangered	Endangered	Unlikely. Inhabits sparse grasslands
Pezoporus occidentalis	Night Parrot	Endangered	Endangered	Unlikely. Inhabits arid and semi-arid inland regions.
Pheobetria fusca	Sooty Albatross	Vulnerable	Endangered	Possible, limited to rare vagrants in small numbers
Sternula nereis nereis	Australian Fairy Tern	Vulnerable	Endangered	Possible. Nested sandy beaches and embayments.
Thalassarche cauta cauta	Shy Albatross	Vulnerable	Vulnerable	Possible, limited to rare vagrants in small numbers
Thalassarche impavida	Campbell Albatross	Vulnerable	-	Possible, limited to rare vagrants in small numbers
Thalassarche melanophris	Black-browed Albatross	Vulnerable	Vulnerable	Possible, limited to rare vagrants in small numbers
Thinornis rubricollis rubricollis	Hooded Plover (eastern)	Vulnerable	Vulnerable	Possible. Found on wide beaches, creek mouths and inlet entrances.

Scientific Name	Common Name	Status (Comm.)	Status (SA)	Likelihood of Occurrence
Mammals				
Balaenoptera musculus	Blue Whale	Endangered	Endangered	Possible. Known to aggregate at the Bonney Upwelling in the Great Australian Bight.
Eubalaena australis	Southern Right Whale	Endangered	Vulnerable	Likely between late April and November. The nearest aggregation area is Fowler Bay to the west of Ceduna.
Megaptera novaeangliae	Humpback Whale	Vulnerable	Vulnerable	Unlikely. Not within species core range.
Neophoca cinerea	Australian Sea Lion	Vulnerable	Vulnerable	Present. Recorded as present during site survey.
Plants				
Caladenia tensa	Greencomb Spider-orchid	Endangered	-	Unlikely. Terrestrial species.
Reptiles				
Caretta caretta	Loggerhead Turtle	Endangered	Endangered	Unlikely. Uncommon in SA.
Chelonia mydas	Green Turtle	Vulnerable	Vulnerable	Unlikely. Uncommon in SA.
Dermochelys coriacea	Leatherback Turtle	Endangered	Vulnerable	Present. Common in temperate waters (Hutchinson 2018).
Sharks				
Carcharodon carcharias	Great White Shark	Vulnerable	-	Likely to occur. Often sited in waters of the Great Australian Bite.

4.3 Protected Areas

There are three Conservation Parks within 10 km of the jetty; the Nuyts Archipeligeo, Laura Bay and Whittelbee Conservation Parks.

4.4 Fauna Records

Nature Maps SA provides spatial location information for fauna sites held within the Biological Data Base of South Australia. Species recorded within 5km of the Thevenard jetty include:

- Grey Plover - *Pluvialis squatarola;*
- Sooty Oyster Catcher *Haematopus fuliginosus (*Rare);

- Ruddy turnstone *Arenaria interpres* (Rare);
- Common Greenshank *Tringa nebularia;*
- Sharp-tailed Sandpiper *Calidris acuminate;*
- Red-necked Stint *Calidris ruficollis;*
- Masked lapwing *Vanellus miles;*
- Grey-tailed Tattler *Tringa brevipes* (Rare);
- Curlew Sandpiper *Calidris ferruginea* (Critically endangered EPBC);
- Australian Pied Oyster Catcher *Haematopus longirostris; and*
- Leatherback Turtle *Dermochelys coriacea.*

There is an Australian Sea Lion Colony recorded on the southern side of the Nyuts Archipelago Conservation Park and a migratory bird site near Rocky Point to the north.

5 Field Investigations

5.1 Marine Habitat

Benthic habitats in the Project Area were surveyed using underwater video and benthic sampling apparatus to determine dominant benthic habitat types at sampling locations (Figure 3-2). The nature of the substrate and dominant ecological communities at each location were documented and used to develop maps outlining the distribution of these communities within the Project Area. Maps were developed using a variety of GIS techniques to provide the best product given logistical and environmental constraints.

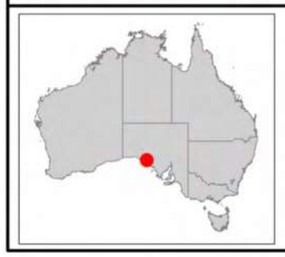
5.1.1 Seagrasses

Seagrass communities are highly productive ecosystems and provide breeding and nursery areas for fish and crustacean species. Mapping of seagrass extent is provided in Figure 5-1. Within the 250 m buffer zone nominated for the study a total of 177,200 m^2 of seagrass meadows were observed. Within the direct impact footprint of the proposed new jetty structure and launch platform, there was approximately 127 m^2 of seagrass meadows that would be permanently removed.

Sampling indicated that the dominant benthic habitat type in the Project Area were *Posidonia* seagrass meadows. The most abundant species was likely *Posidonia sinuosa*[1], however other species including *P. australis* and *P. coriacea* may have also been present. *Posidonia australis* seagrass meadows in the Manning-Hawkesbury ecoregion are listed as endangered under the EPBC Act, but are not a threatened ecological community in South Australia.

In addition, other perennial seagrasses including *Zostera muelleri* and *Heterozostera tasmanica* were present in isolated and aggregated patches and the ephemeral seagrass *Halophila australis* was recorded in deeper water environments.

[1] Note that is difficult to identify *Posidonia* species from video footage, particularly without the full root structure. The brown colouring and smooth nature of the rhizome indicates the likely presence of *Posidonia sinuosa* dominant within mixed *Posidonia* communities.



LEGEND

- 200m buffer
- Existing footprint
- Construction Footprint

Seagrass % survey

- 0 to 1
- 1 to 10
- 10 to 40
- 40 to 70
- 70 to 100

Seagrass community type

- Bare
- Zostera dominated
- Posidonia dominated
- Halophila/Heterozostera dominated

Seagrass % cover

- Bare
- 1-10%
- 10-40%
- 40-70%
- 70-100%

Title:

Distribution of seagrass

Figure: 5-1

Rev: A

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

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Scale - Inset

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5.1.2 Reef

Rocky reef habitats were observed throughout the Project Area. Rocky reef habitat was classified into three broad categories:

- High relief reef;
- Low relief reef; and
- Rubble.

Rubble communities were predominantly composed of gravel/cobble sized stones and shell pieces in a loose aggregation. Rubble was also often observed in the interstitial spaces within high and low relief reef areas. High and low relief reef were comprised of fixed rocky structures of varying height and complexity. Reef habitat areas are shown in Figure 5-4 and representative photographs of these reef categories are provided in Appendix A. Reef habitats were mapped using the same methods described for seagrass as described in Section 1.

Reef communities within the Project Area were generally low in their structural and ecological complexity. Rocky reefs were typically dominated by turfing algae and macroalgae species including *Sargassum* sp., *Cystophora* sp., *Hormosira sp.* and other filamentous algae species. *Colpomenia sp.*, *Bryopsis sp*. and a number of other species were also observed in low abundance. Typical members of intertidal and subtidal fouling communities were also observed including barnacles, oysters (Pacific oysters *Crassostrea gigas* and the Native flat oyster *Ostrea angasi*), sponges and ascidians.

Reefs provide habitat for a number of protected marine species and commercial fish species.

Beneath the jetty structure the substrate was generally comprised of bare, unconsolidated sediments ranging from silt, sand and coarse gravel/shell grit dominated. Razorfish, cockles and sponges were observed occurring over these unconsolidated sediments. On the northern side of the jetty an artificial reef structure has been formed from collapsed sections of the original concrete jetty. Hard substrates here were dominated by barnacles and oysters above LAT and by *Sargassum* sp. in the subtidal zone (Figure 5-2). Pylons also offered a hard substrate that supported similar ecological communities dominated by sponges and ascidians (Figure 5-3).

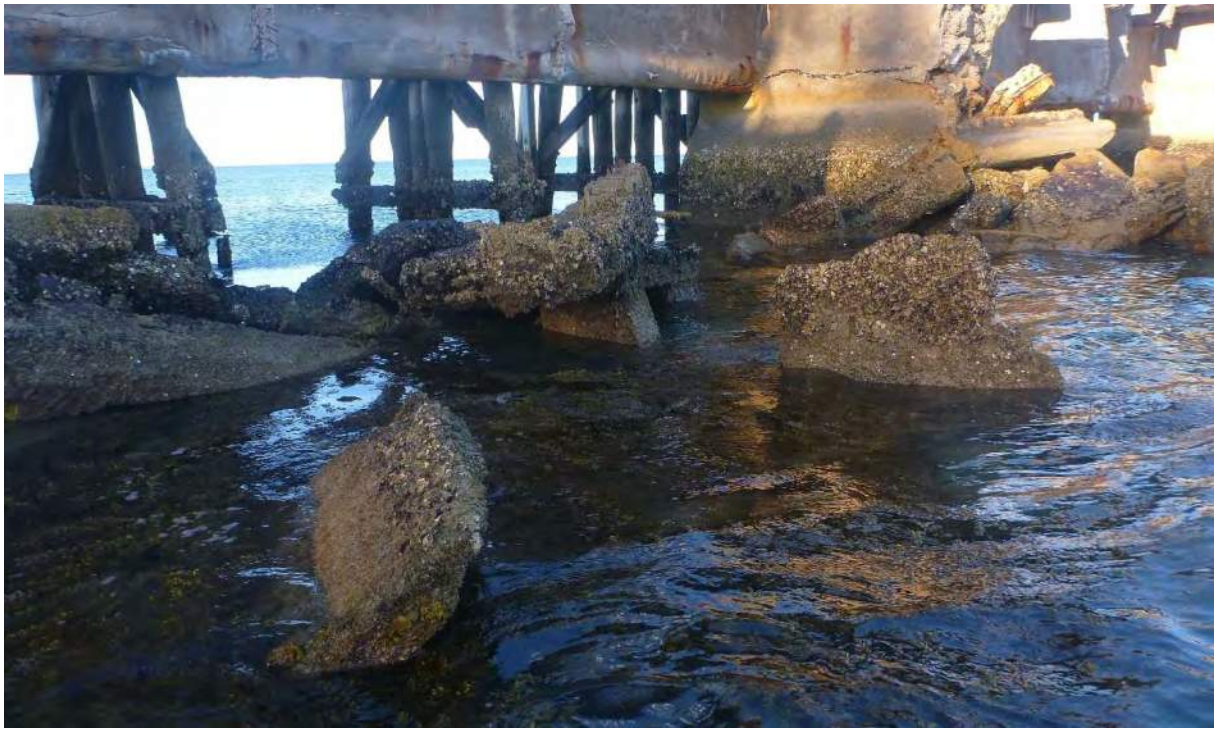
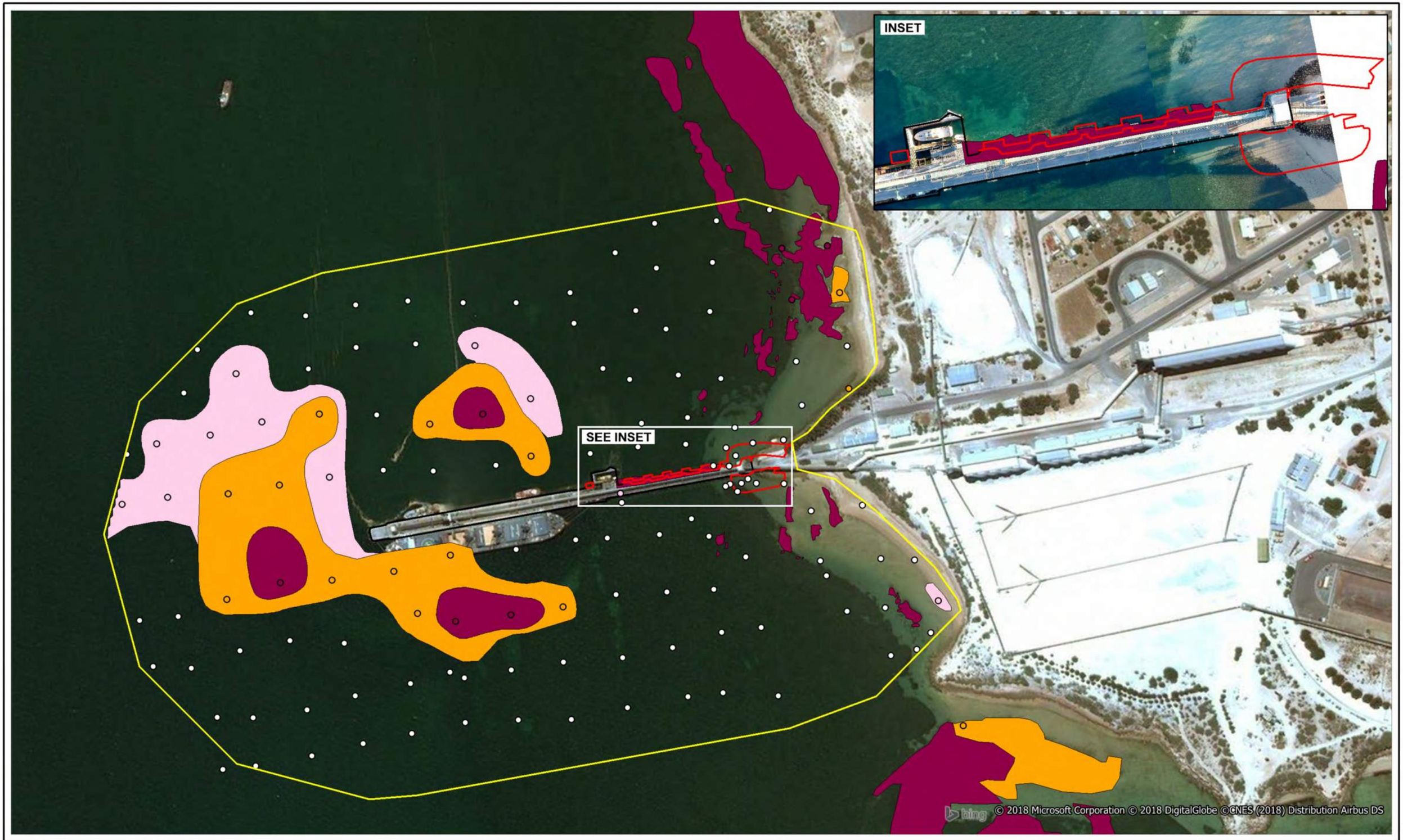
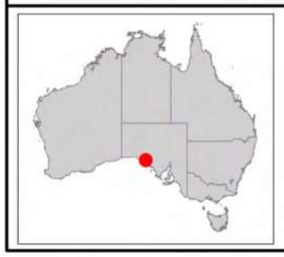


Figure 5-2 Artificial reef structure formed from collapsed sections of the original concrete jetty

Figure 5-3 Jetty pylons with fouling community dominated by sponges and ascidians





LEGEND

- 200m buffer
- Existing footprint
- Construction Footprint

Reef Survey

- Bare
- Rubble
- Low relief
- High relief

Rocky Reefs

- Bare
- Rubble
- Low relief
- High relief

Title:

Distribution of rocky reefs

Figure: 5-4

Rev: A

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5.1.3 Foreshore

The foreshore area either side of the jetty consists of publicly accessible rocky shelf and narrow sandy beaches. There are no areas of saltmarsh, mangrove or muddy tidal flats that would support significant numbers of migratory shorebirds. Shorebirds typically prefer (1) shallow and exposed mud with a range of water depths (s) extensive feeding areas that allow a large population to forage (3) open areas suitable for roosting and nesting, where they can observe the approach of predators (4) low levels of human disturbance, in areas with poor accessibility.

5.2 Marine Fauna

5.2.1 Whales

No whale species were observed during the field survey. The Southern Right Whale, listed as endangered under the EPBC Act is commonly found along the southern coast line of South Australia, particularly at the Head of the Bight which is a known aggregation and calving area for the species between May and November each year. They are not likely to occur in the shallow waters adjacent to the jetty however.

5.2.2 Dolphins

A local population of common bottlenose dolphins (*Tursiops truncatus*) were observed on both days of field survey (Figure 5-5). These dolphins are known to be part of a resident pod made up of approximately 30 individuals (pers comm Perry Will). During the survey, up to 12 individuals were observed at any one time. The common bottlenose dolphin is not listed as a threatened species under either the NPW Act or EPBC Act.

Figure 5-5 Common bottlenose dolphins (*Tursiops truncatus*) adjacent to Thevenard Jetty

5.2.3 Pinnipeds

A solitary Australian Sea Lion (*Neophoca cinerea*) was observed on both days of field survey (Figure 5-6). It has been reported to frequent the area and is well known to locals ("Nigel the seal") (pers comm Perry Will). The species is Vulnerable under both the EPBC Act and NPW Act, with its biggest threat considered to be incidental bycatch from commercial fishing activity (Goldsworthy *et al.* 2015). As discussed in Section 4.4 there are no key breeding colonies for this species in the Project Area, however there is a key Australian Sea Lion Colony recorded on the southern side of the Nyuts Archipelago.

Other seals also reported to occasionally haul up on the jetty structure (pers comm Perry Will – skipper and Andrew Wilkins – FP).

Figure 5-6 Australian Sea Lion (*Neophoca cinerea*) adjacent to Thevenard Jetty

5.2.4 Sharks and Rays

No sharks or rays were observed during the field survey. Shark species are regularly recorded in the area however and would likely be supported by rocky reefs within the Ceduna area.

5.2.5 Shorebirds/seabirds

Several species of shorebirds and seabirds were observed during the survey. Pacific gulls (*Larus pacificus*), both juveniles and adults, were observed near the Puckridge Boat Ramp (Figure 5-7). Other common birds including the silver gulls (*Chroicocephalus novaehollandiae*), Masked Lapwing (*Vanellus miles*), Australian Pied Oystercatcher (*Haematopus longirostris*) and Pied Cormorant (*Phalacrocorax varius*) were also reported in the area. All observed bird species are considered common and are not listed as a threatened species under either the NPW Act or EPBC Act.

Figure 5-7 Pacific gull *Larus pacificus*, juvenile (above) and adults (below)

5.3 Fish Communities

Baited remote underwater video stations (BRUVS) were deployed to survey fish assemblages. A total of 12 species, which included nine fish species and three crustacean species were identified at the three BRUVS locations as shown on Figure 3-2. BRUV1 and BRUV2 were deployed on 27 August, while BRUV3 was deployed on 28 August. Fish and crustacean species observed from the deployed BRUVS are listed in Table 5-1. Fish assemblages were dominated by the silver

trevally (*Pseudocaranx georgianus*), Australian herring (*Arripis georgianus*) and little weed whiting (*Neoodax balteatus*). Large schools of the silver trevally occurred at station BRUV1 and BRUV2 and the Australian herring occurred in a large school at BRUV2. The commercially important species King George whiting (*Sillaginodes punctatus*) was observed in low abundances at both station BRUV1 and BRUV2. The crustacean species were dominated by the seagrass swimmer crab (*Nectocarcinus integrifrons*), which was the only species that was recorded at all three BRUVS locations. The surf crab (*Ovalipes australiensis*) and blue swimmer crab (*Portunus pelagicus*) were also observed at BRUV2.

All recorded fish and crustacean species are considered common within the Project Area and are not listed as a threatened species under either the NPW Act or EPBC Act. Video screen shots from the three locations are shown in Figure 5-8 to Figure 5-10.

Species richness and abundance was quantified for each BRUV station data based on standardised unit effort (the first 30 minutes of video). Station BRUV3 had the lowest richness and abundance overall while stations BRUV1 and BRUV2 had similar richness and maximum abundance (Figure 5-11). Station BRUV1 was located on sandy substrate with abundant algae macrohabitat, station BRUV2 was located on a shelly rubble habitat with no reef or macroalgae habitats and station BRUV3 was located on shelly rubble with moderate relief reef structure and some macroalgae growth. Station BRUV2 had the simplest structural habitat conditions, however, it had the highest species richness and abundance. It is likely the low species richness and abundance observed at station BRUV3 was due to the windy conditions that prevailed on 28 August, rather than lack of suitable habitat.

The time taken before the first observation occurred at five and 10 seconds at BRUV3 and BRUV2 stations, respectively (Figure 5-12). The first observations at BRUV1 station was slightly longer at 90 seconds and is likely related to the sandy sediment that created a sediment plume on settling, as the species abundance and richness was similar to BRUV2.

Table 5-1 Fish and Crustacean Taxa Observed from BRUVS Deployed

Family	Species Name	Common Name	BRUV 1	BRUV 2	BRUV 3
Labridae	*Neoodax balteatus*	little weed whiting	✓		✓
Pinguipedidae	*Parapercis haackei*	wavy grubfish	✓		✓
Kyphosidae	*Scorpis aequipinnis*	sea sweep	✓	✓	
Sillaginidae	*Sillaginodes punctatus*	King George whiting	✓	✓	
Carangidae	*Pseudocaranx georgianus*	silver trevally	✓	✓	
Girellidae	*Girella zebra*	zebrafish	✓	✓	
Arripidae	*Arripis georgianus*	Australian herring		✓	
Platycephalidae	*Platycephalus bassensis*	Southern sand flathead		✓	
Mullidae	*Upeneichthys sp.*	goatfish		✓	
Portunidae	*Nectocarcinus integrifrons*	seagrass swimmer crab	✓	✓	✓
Portunidae	*Ovalipes australiensis*	surf crab		✓	
Portunidae	*Portunun pelagicus*	blue swimmer crab		✓	

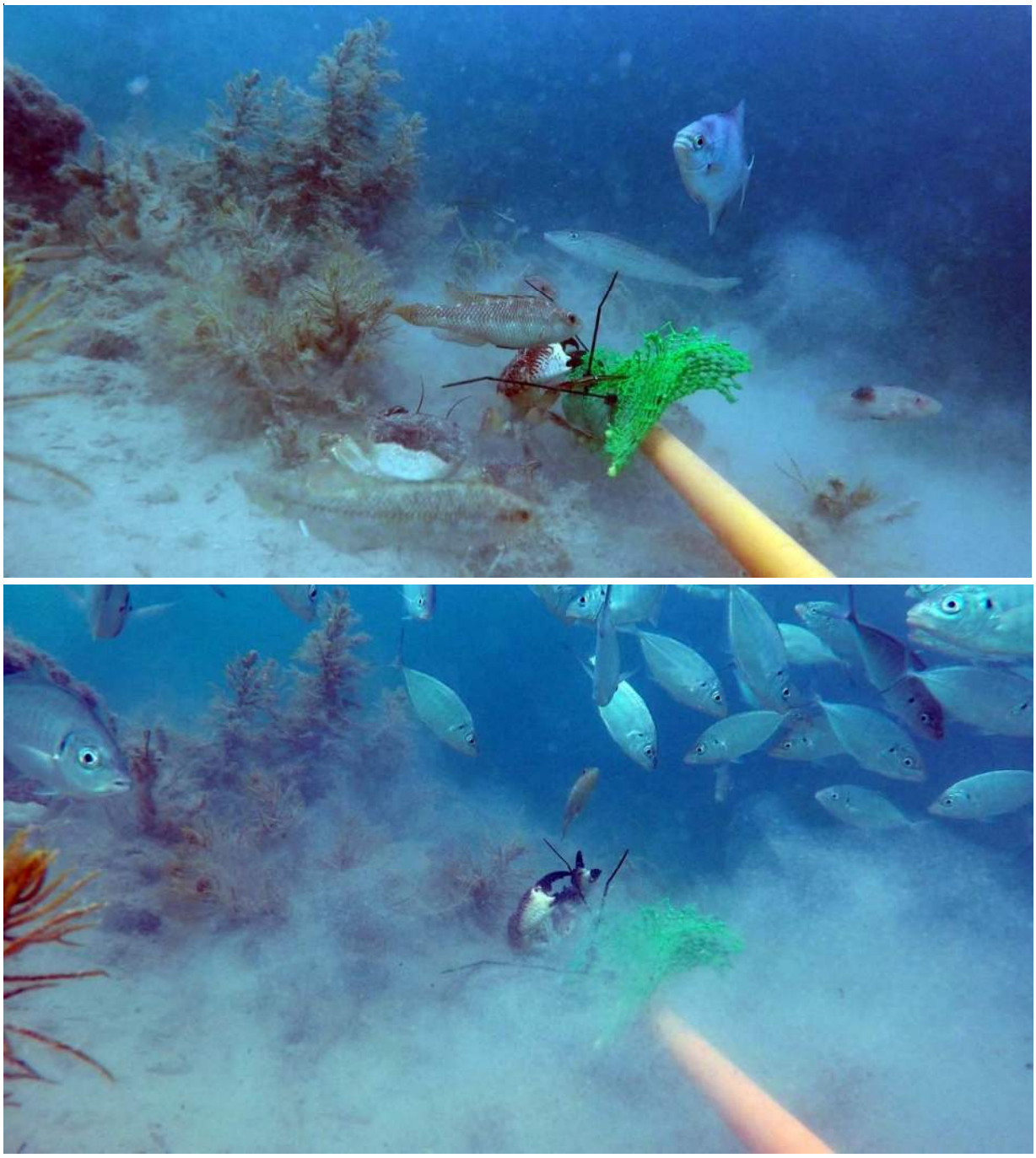

Figure 5-8 Fish and crustacean assemblages at Station BRUV1. Seagrass swimmer crab (*Nectocarcinus integrifrons*), King George whiting (*Sillaginodes punctatus*), little weed Whiting (*Neoodax balteatus*) and sea sweep (*Scorpis aequipinnis*) (top); seagrass swimmer crab and school of silver trevally (*Pseudocaranx georgianus*) (bottom).

Figure 5-9 Fish and crustacean assemblage at Station BRUV2. School of sea sweeps (*Scorpis aequipinnis*) (top); surf crab (*Ovalipes australiensis*) and blue swimmer crab (*Portunun pelagicus*) with fish assemblage of sea sweeps, silver trevally (*Pseudocaranx georgianus*), zebrafish (*Girella zebra*) and Australian herring (*Arripis georgianus*) (bottom).

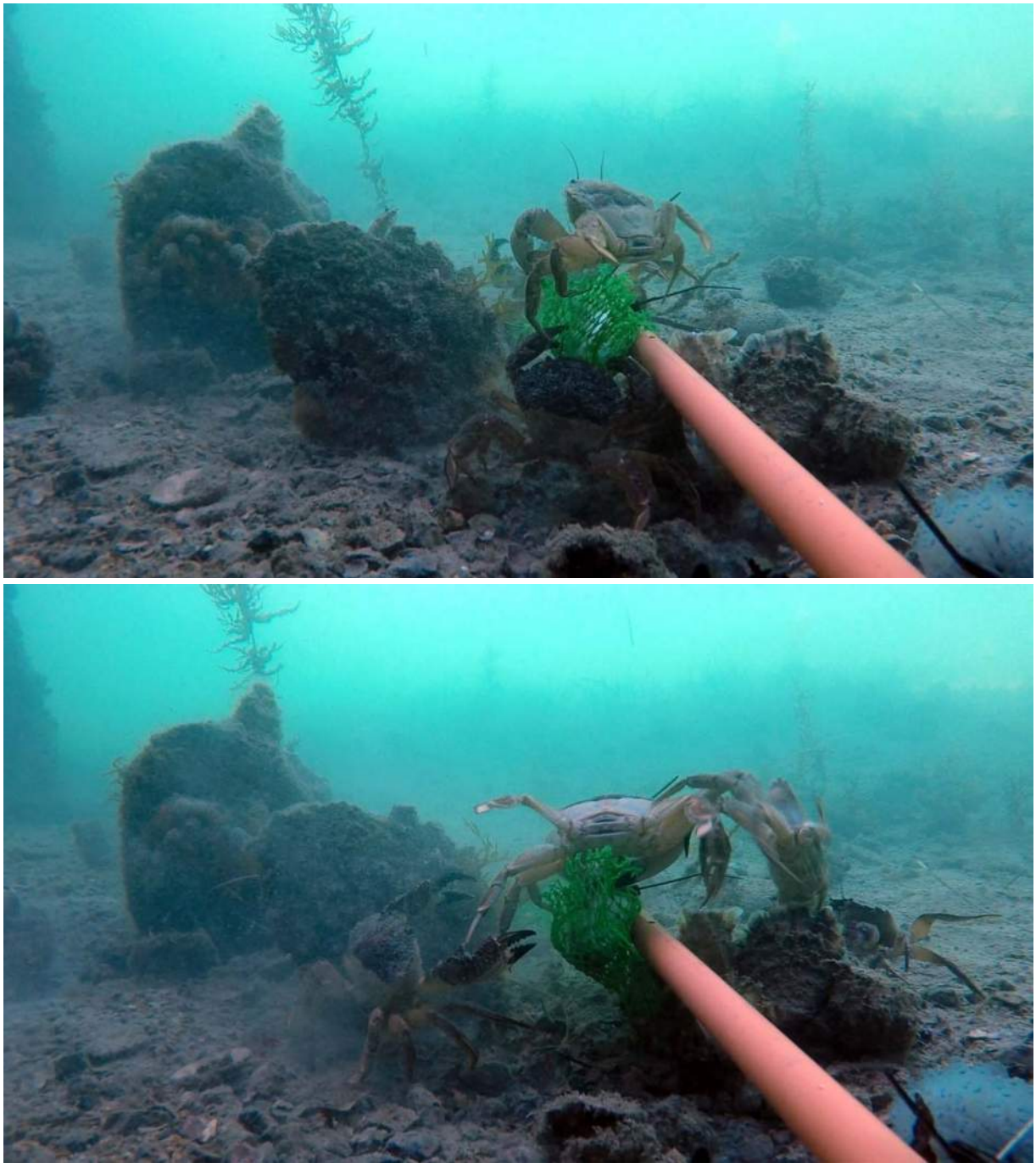

Figure 5-10 Fish and crustacean assemblage at Station BRUV3. Seagrass swimmer crabs (*Nectocarcinus integrifrons*) and wavy grubfish (*Parapercis haackei*) (top); Seagrass swimmer crabs (bottom).

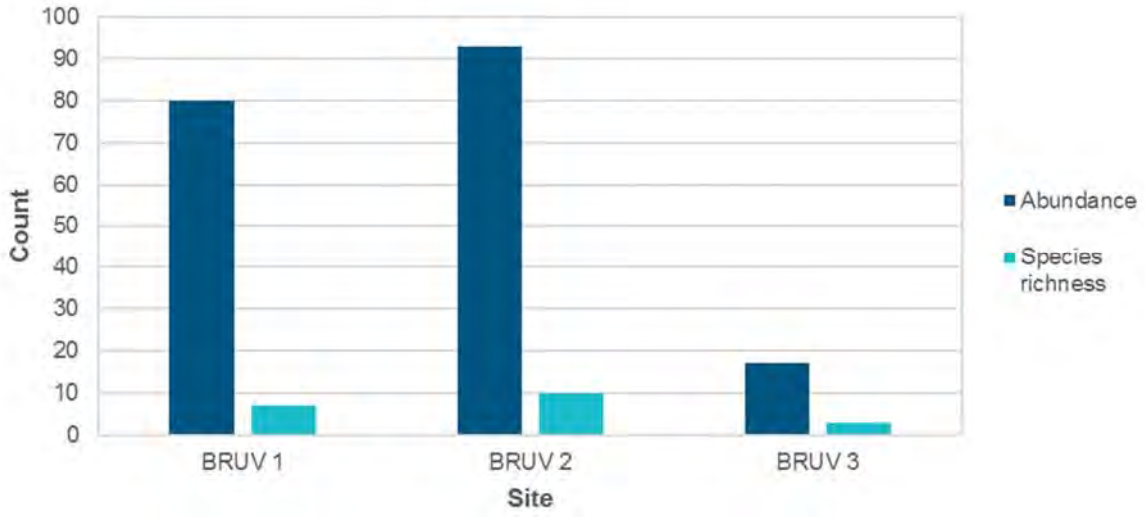

Figure 5-11 BRUVS Metrics including Abundance and Species Richness

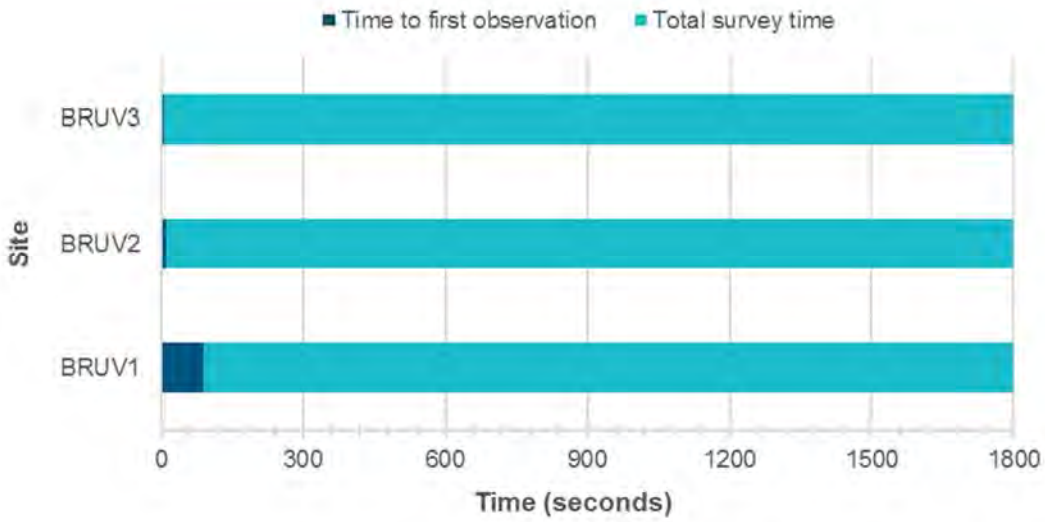

Figure 5-12 Time (seconds) prior to first observation made at each BRUV site

5.4 Terrestrial Vegetation

5.4.1 Vegetation Communities

Vegetation communities where stockpiling of construction equipment and material may occur were surveyed during the site visit. The Thevenard Peninsula has been extensively cleared and filled for industrial development. Native vegetation is restricted to narrow roadside copses of eucalypt plantings and natural regeneration and disturbed patches of low open coastal shrubland with minor chenopod shrubland patches on the sand plains.

No native vegetation communities have been mapped in the Project Area on NatureMaps (refer to Figure 5-13). Patches of low open coastal shrubland and chenopod shrubland have been retained outside the site comprising the following:

- Coastal Shrubland (Vegetation Group Code: EP4002) typically *Atriplex cinerea, Olearia axillaris* low open shrubland over *Spinifex hirsutus, Cakile maritima* ssp. *maritima, Carpobrotus rossii, Threlkeldia diffusa, Tetragonia implexicoma* on foredunes; and
- Chenopod/Samphire Shrubland (CT0054) typically *Tecticornia* spp. low shrubland within the inter-tidal zone.

Chenopod shrubland within and directly adjacent to intertidal foreshores are considered part of the Subtropical and Temperate Coastal Saltmarsh community listed as Vulnerable under the *EPBC Act*.

The site supports patches of *Eucalyptus oleosa, Eucalyptus calcareana, Myoporum* spp. and *Geijera linearifolia* within roadside verges and access tracks. No intact or high quality mallee forest or woodland were identified on site. Disturbed low open coastal shrubland on coastal sandplains which has been subject to regular vehicle access occurs in the north of the site. The foreshore comprises mixed shrubland. Near-intertidal chenopod communities directly adjacent to the foreshore are part of the Subtropical and Temperate Coastal Saltmarsh Listed as Vulnerable under the *EPBC Act*. Provided accommodation facilities are contained within previously cleared areas where regular vehicle access has removed native shrubland cover (refer to Figure 5-14), impacts on native vegetation communities can be avoided.

Figure 5-13 NatureMaps Vegetation Mapping (accessed 11/09/18)

LEGEND

- Cleared
- Coastal Shrubland
- Foredune Vegetation

Title:

Vegetation Communities

Figure: 5-14

Rev: A

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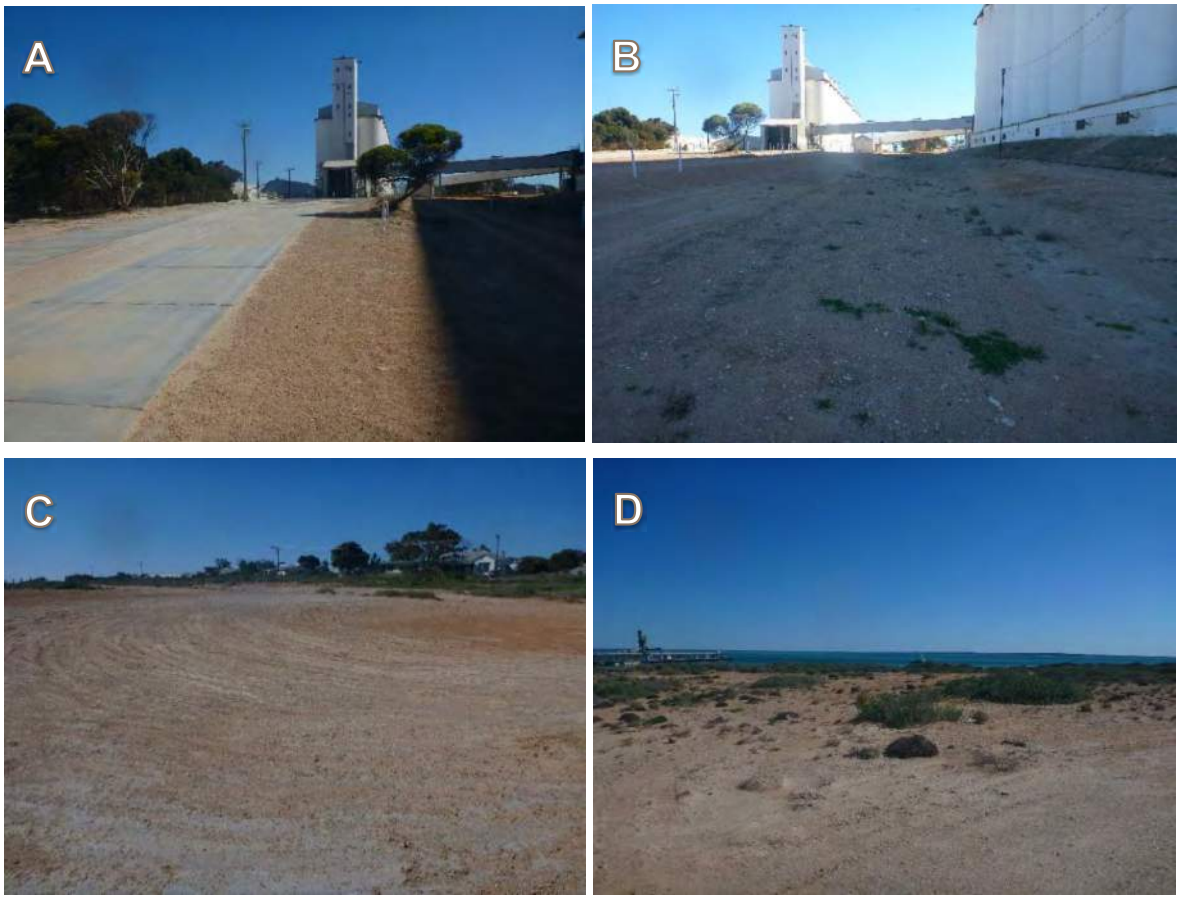

Figure 5-15 Terrestrial site photos. Roadsite verges (A and B); Disturbed Coastal /Chenopod Shrubland (C) and Coastal / Chenopod Shrubland (D)

5.4.2 Threatened Species

No federally threatened flora species listed under the *EPBC Act* have been recorded in the Project Area during the site visit. No species listed under the *National Parks and Wildlife Act 1972* were recorded on site during the high-level assessment and none are likely to occur given the site's disturbed condition and/or lack of suitable habitat features (refer to Table 5-2).

Table 5-2 Potential Threatened Flora Species Recorded in the Project Area

Species	Status under *National Parks and Wildlife Act 1972.*	Preferred Habitat
Austrostipa plumigera	R	Grass growing on calcrete and calcareous loams. Has been recorded in the Ceduna vicinity (ALA).
Eremophila gibbifolia	R	Grows in powdery clay or sandy loam in mallee scrub. No records in the vicinity of the Project Area.
Leiocarpa pluriseta	R	Mixed mallee shrubland and woodland. Was recorded in the vicinity of the Project Area in the 1960's (ALA).
Melaleuca leiocarpa	R	Grows in rocky lateritic soils and red sand on hillsides, outcrops and sandplains. Has been recorded in the Ceduna vicinity (ALA).
Poa drummondiana	R	Grass of sand dunes, scree slopes, outcrops. Was recorded in the vicinity of the Project Area in 1983 (ALA). 
Prasophyllum catenemum	E	Known from a small area of the coast where it grows in shrubland which is often engulfed by unstable sand dunes. No records in the vicinity of the Project Area.
Santalum spicatum	V	Hemi-parasitic on Acacias. No records in the vicinity of the Project Area.
Scaevola myrtifolia	R	Sandy or clayey soils, often over limestone. Has been recorded in the Ceduna vicinity (ALA).
Templetonia battii	R	Grows in sandy and loamy soils, usually on limestone, in shrubland and woodland. Has been recorded in the Ceduna vicinity (ALA).

6 Potential Impacts

Potential impacts to the marine and terrestrial ecological values identified in this report have been identified based on the following:

- The likely direct or indirect impacts of construction and operational activities;
- The importance of the area or species to be disturbed;
- Consideration of the sensitivity of the receiving environment to disturbance;
- The magnitude of the level of disturbance and its timing/duration; and
- Cumulative impacts.

The project is effectively an extension of an existing industrial use, to which, to some extent the environment has already adapted. Species that are within the Project Area would be used to some level of vessel movement, noise and dust being regularly generated. The proposed works do not change the capacity of the existing infrastructure i.e. it does not allow for an increase in vessel activity or shipment loads.

Potential impacts are therefore focused on identifying any additional or cumulative impacts from the new infrastructure proposed and are largely confined to the construction period.

These include:

- Direct removal of seagrass or reef habitat as a result of demolition, piling or shading of the seabed;
- Direct removal of migratory shorebird habitat;
- Direct removal of native vegetation for stockpiling of construction material and equipment;
- Changes to coastal hydrodynamics, which alter patterns of erosion and deposition and the extent of seagrass beds;
- Underwater noise generated by demolition and piling activity or construction vessel movement;
- Artificial light emissions;
- Indirect impacts to a marine habitat from a deterioration in water quality from demolition, piling or accidental waste spills;
- Introduction of pest species; and
- Marine fauna collisions or strike.

As defined in Table 2 in determining the scale of impact the importance of an environmental receptor is a key consideration. Impacts to conservation significant communities/species or protected areas are generally considered a higher impact.

6.1 Disturbance of Seagrass Beds

The dominant benthic habitat type in the Project Area were perennial seagrass belonging to the Posidoniaceae family. *Posidonia sinuosa* was the likely dominant species, however other Posidonia species may have also been present. The ecological community of Posidonia seagrass meadows

are not listed in the current Project Area or more broadly in South Australia. Other perennial seagrasses including *Zostera muelleri* and *Heterozostera tasmanica* were present in isolated and aggregated patches and the ephemeral seagrass *Halophila australis* was found in deeper water environments.

Within the 250 m buffer zone nominated for the study a total of 177,200 m^2 of seagrass meadows were observed. Within the direct impact footprint of the proposed new jetty structure there was approximately 127 m^2 of seagrass meadows. These seagrass meadows would be permanently lost as they would be either replaced by infrastructure or shaded, preventing regrowth.

Construction vessels would be deployed within the marine environment during piling and construction activities; these would be anchored to the seabed and could cause some minor loss of seagrass from physical damage.

Upgrading the jetty and providing additional infrastructure has the potential to alter the local hydrodynamics around the jetty, potentially influencing areas of sediment erosion and deposition, and in turn, seagrass extent. Construction of the rock groyne, will likely increase wave refraction around the structure (refer to Coastal impacts report, BMT). It is estimated that will cause an indirect disturbance of approximately 656m^2 of dense posidonia seagrass meadow (Refer to Figure 6.1)

The small area of seagrass loss (approximately 0.08ha in total) predicted to occur is minor in relation to the much larger seagrass areas that surround the Project Area. Whilst it currently provides habitat for marine fauna such as fish species, it is not considered critical habitat that is necessary for the survival of local species.

Impacts to seagrass are considered a low impact, however a permit to remove native vegetation will still be required.

LEGEND

- Seagrass Disturbance Area
- Seagrass
- Potential Wave Extent
- Existing footprint
- Construction Footprint

Title:

Potential Indirect Seagrass Disturbance

Figure: 6-1

Rev: A

N

0 30 60m

Approx. Scale

BMT

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6.2 Reef Communities

Rocky reef habitats were observed throughout the Project Area and were composed of high relief reef, low relief reef and rubble. High and low relief reef were comprised of fixed rocky structures of varying height and complexity, while rubble communities were predominantly composed of gravel/cobble sized stones and shell pieces in a loose aggregation.

Reef communities within the Project Area were generally low in their structural and ecological complexity and were typically associated with macroalgae (mainly *Sargassum sp.*) and filamentous algae species. Intertidal and subtidal fouling communities were composed of barnacles, oysters (Pacific oysters *Crassostrea gigas* and the Native flat oyster *Ostrea angasi*), sponges and ascidians.

The substrate beneath the jetty structure was typically comprised of bare, unconsolidated sediments, with some razorfish, cockles and sponges observed. The pylons of the jetty provided a hard substrate that supported ecological communities dominated by sponges and ascidians.

The deployed baited remote underwater video stations (BRUVS) identified a total of 12 species, which included nine fish species and three crustacean species. Fish assemblages were dominated by the silver trevally (*Pseudocaranx georgianus*), Australian herring (*Arripis georgianus*) and little weed whiting (*Neoodax balteatus*). The crustacean species were comprised of the seagrass swimmer crab (*Nectocarcinus integrifrons*), which was the only species that was recorded at all three BRUVS locations, in addition to the surf crab (*Ovalipes australiensis*) and blue swimmer crab (*Portunun pelagicus*). All recorded fish and crustacean species are considered common within the Project Area and are not listed as a threatened species under either the NPW Act or EPBC Act.

There should not be any direct impacts to reef habitat within the Project Area; material currently below the water surface will remain in situ and will not be removed. Rather, the placement of new infrastructure will expand the surfaces available for colonisation and increase available habitat.

Direct impacts to reef communities are assessed as being of low impact.

6.3 Terrestrial Vegetation

The site has been extensively cleared of terrestrial vegetation and filled for industrial development. Native vegetation is restricted to narrow roadside copses of eucalypt plantings and natural regeneration and disturbed patches of low open coastal shrubland with minor chenopod shrubland patches on the sand plains.

No native vegetation communities have been mapped in the Project Area. However, Chenopod shrubland within and directly adjacent to intertidal foreshores are considered part of the Subtropical and Temperate Coastal Saltmarsh community listed as Vulnerable under the EPBC Act. No threatened terrestrial flora species listed under the NPW Act or EPBC Act have been recorded in the Project Area. Provided this vegetation is not removed however, impacts would be negligible.

6.4 Noise Impacts

Upgrades to the existing jetty will involve demolition and piling works, which generate underwater noise. Marine fauna (whales, dolphins, seals or turtles) can be reliant on sound for communication and underwater noise levels generated by construction activity can alter their behaviour (avoidance

of a noisy location), or in some instances cause injury or death. Cetaceans and pinnipeds that are listed under the EPBC Act are known to frequent the Ceduna area, and would be vulnerable to disturbance from underwater noise. A local population of common bottlenose dolphin (*Tursiops truncatus*) and a solitary resident Australian Sea Lion (*Neophoca cinerea*) were observed during the survey. The Australian Sea Lion is listed as Vulnerable under both the EPBC Act and NPW Act. There are no key breeding colonies for this species in the Project Area.

Mitigation measures (such as setting exclusion zones and having trained marine fauna monitors in place) to protect marine fauna from underwater noise during construction would be required. Shorebirds can also be vulnerable to noise disturbance; the surrounding foreshore habitat is not considered likely to support large numbers of birds.

Operationally, noise generated would not be higher than that already experienced from use of the jetty conveyor and vessel movements.

Provided mitigation measures are in place to protect marine fauna from underwater noise during construction, the impacts are considered low.

6.5 Artificial Lights

Artificial lighting for an extended period of time can attract fish and other species, altering their behaviour. It is intended that after-hours construction for the jetty upgrade does not occur except under unusual circumstances; the jetty is already lit at night-time and vessel loading is a 24 hr operation; it is unlikely that this project would generate further light nuisance than that already experienced.

6.6 Water Quality

Demolition and piling activity may generate small, localised sediment plumes during seabed disturbance. The nature of the material to be disturbed is sandy, therefore any plumes generated would be minor and temporary only; they would be expected to settle rapidly. Nevertheless, mobile fauna such as fish species may be temporarily displaced.

Seagrass beds are vulnerable to a loss of light availability, which can be experienced when turbid plumes are created. The minor nature of disturbance would not be expected to generate plumes of sufficient duration or volume that seagrass loss would be experienced.

Accidental spills from construction equipment can also occur if it is not maintained or operated effectively; standard control measures such as regular maintenance, training of staff in correct use and having spill kits available should be sufficient in minimising any impacts to water quality.

There should be no changes to operational water quality once the jetty replacement has been completed.

There is a low risk of construction or operations reducing water quality to an extent that it would cause a permanent impact to habitat or marine fauna that utilise the Project Area.

6.7 Introduction of Pest Species

Marine pests can be spread through bringing in vessels that have pest species already attached to their hulls. Any equipment brought to site would be required to be cleaned prior to use in accordance with Australian regulations for biosecurity.

6.8 Vessel Strike

Marine vessels would largely be confined to the immediate jetty area during construction and would not be fast-moving; nevertheless, speed limits shall be placed on vessels to further reduce the risk of marine fauna strikes.

7 Environmental Management Measures

In order to minimise disturbance to the marine and terrestrial environment, management measures will be put in place which will include, but not be limited to:

- Preparing a Construction Environmental Management Plan which outlines the following:
  - Roles and responsibilities for environmental management;
  - Any legislative obligations;
  - Measures to minimise environmental impacts;
  - Emergency procedures in the event of incidents;
- Exclusion zone and marine fauna monitoring to be put in place in accordance with the South Australian Underwater Piling Noise Guidelines (2012) during demolition and piling activity;
- Chenopod shrubland within and directly adjacent to intertidal foreshores are not to be removed during stockpiling and will be protected from damage through barrier fencing/taping;
- Vessel and machinery to be maintained to the manufacturers specifications to reduce noise emissions and the likelihood of a spill to the marine environment;
- Vessels are to be operated at minimum speeds to reduce the likelihood of boat strike; interaction with cetaceans and pinnipeds should be compliant with the Australian Guidelines for Whales and Dolphin Watching (Commonwealth of Australia, 2017) which implements controls for interactions e.g. sets no approach zones, not encouraging bow riding etc;
- Should night-time works occur, light spill from vessels or the jetty will be minimised by using directional lighting and light shields, unless there is a safety hazard; and
- A Significant Environmental Benefit agreement is reached under the NVA, to compensate for any loss of seagrass meadows.

8 Conclusion

A number of EPBC-listed species including whales, seals, sharks and shorebirds are known to occur in the environment surrounding the jetty. Based on fauna records and a site survey, the Project Area does not provide any significant breeding, aggregation or feeding habitat for any of these species, and they are not known to occur in large numbers. More extensive and suitable habitat is available within the broader Ceduna environment.

The Project Area contains seagrass meadows and reef habitat that would provide occasional foraging opportunities for these listed marine species as well as other common marine fauna. There is expected to be some minor disturbance to these communities and species they support during construction from the generation of underwater noise and localised turbidity from demolition and piling. With appropriate construction controls such as marine fauna monitoring and operating under exclusion zones, there is not expected to be a significant impact to any protected habitat or fauna species. The construction of additional marine infrastructure will increase the available habitat for biofouling species that populate hard surfaces, but may also have an indirect impact on seagrass communities around the rock groyne, which would be subject to increased wave refraction.

Once operational, the upgraded jetty does not change the volume of material exported from the facility or the number of vessel movements; there is therefore no additional environmental impacts anticipated that would be additional to those existing currently.

Although it is concluded that there is no significant impact for a MNES and no further assessment against the EPBC Act necessary, it is recommended that Flinders Ports confirm that no referral is required Act with the Department of Environment and Energy. If no referral is required, a self-assessment under the Act should be prepared and remain on file.

Under the NV Act, approval to remove seagrass will be required, and a Significant Environmental Benefit agreement reached.

9 References

Carter AC, Jarvis JC, Bryant CV and Rasheed MA (2015). Development of seagrass indicators for the Gladstone Healthy Harbour Partnership report card.

Goldsworthy SD, Mackay AI, Shaughnessy PD, Bailleul F and Holman D (2015). Maintaining the monitoring of pup production at key Australian sea lion colonies in South Australia (2014/15).

Hutchinson M (2018) 'The Marine Reptiles of South Australia.' South Australian Museum, Adelaide.

McKenzie LJ (2003). Guidelines for the rapid assessment and mapping of tropical seagrass habitats (QFS, NFC, Cairns) 26 pp.

Appendix A PMST Report

Australian Government
Department of the Environment and Energy

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.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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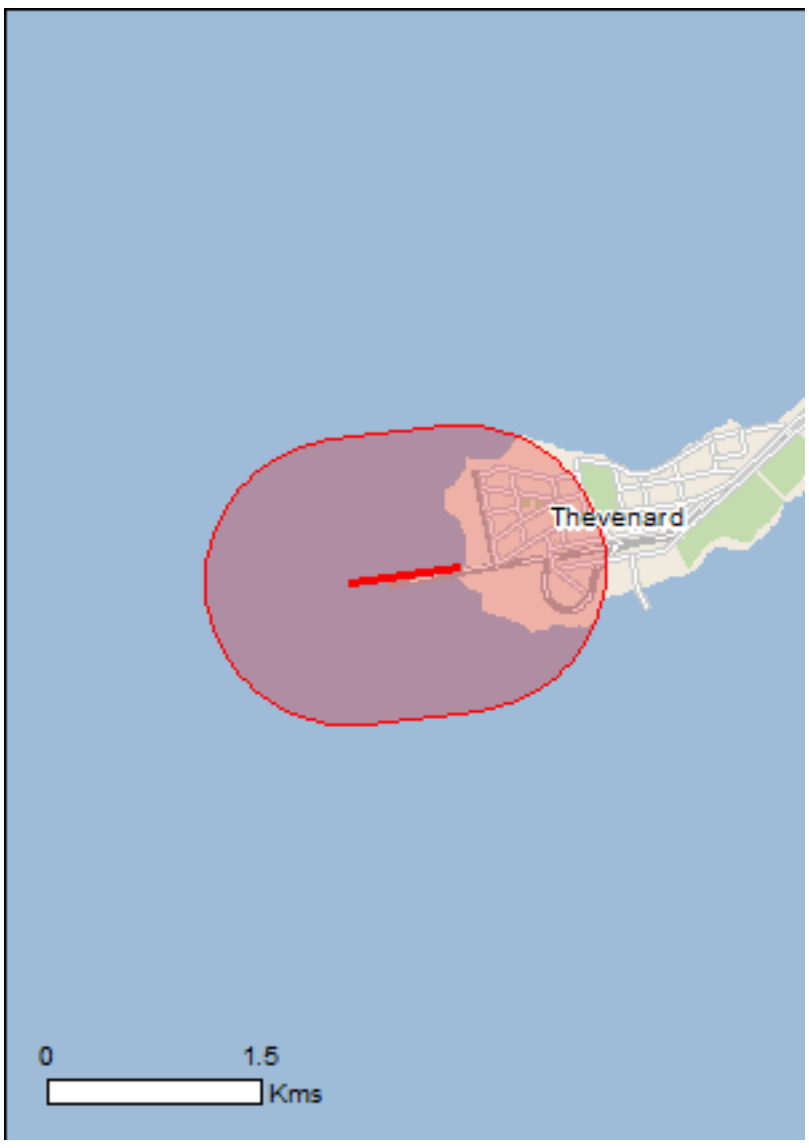

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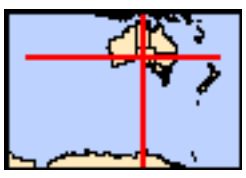

Summary

Matters of National Environmental 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.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	33
Listed Migratory Species:	43

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 environment anywhere.

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.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	66
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	14
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

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.

Name	Status	Type of Presence
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat may occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Extinct within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat known to occur within area
Plants		
Caladenia tensa Greencomb Spider-orchid, Rigid Spider-orchid [24390]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Sharks		
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or

Name	Threatened	Type of Presence
		related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Breeding known to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species

Name	Threatened	Type of Presence
		habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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.

Name
Commonwealth Land - Aboriginal & Torres Strait Islander Commission

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat known to occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Foraging, feeding or related behaviour likely to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat likely to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Fish		
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Hypselognathus horridus Shaggy Pipefish, Prickly Pipefish [66244]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area

Name	Status	Type of Presence
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

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.

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

Where very little information is available for 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 reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

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

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

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

Coordinates

-32.148402 133.643802,-32.149128 133.636592

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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Appendix B Benthic Communities Observed from the Field Surveys

Figure B-1 Sea pen on rubble substrate

Figure B-2 Sea star on rubble substrate

Figure B-3 Rubble substrate with macro algae (including *Sargassum sp.*) and attached algae

Figure B-4 Mixed community of sponges and ascidians on low relief reef

Figure B-5 Pipeline structure with seagrass wrack on rubble substrate

Figure B-6 Mixed community of *Halophila australis* and *Zostera muelleri*

Figure B-7 Mixed community of macro algae (*Sargassum sp.*) and seagrass (*Posidonia sp.*) with attached algae

Figure B-8 Dense *Posidonia sp.* meadow with attached algae

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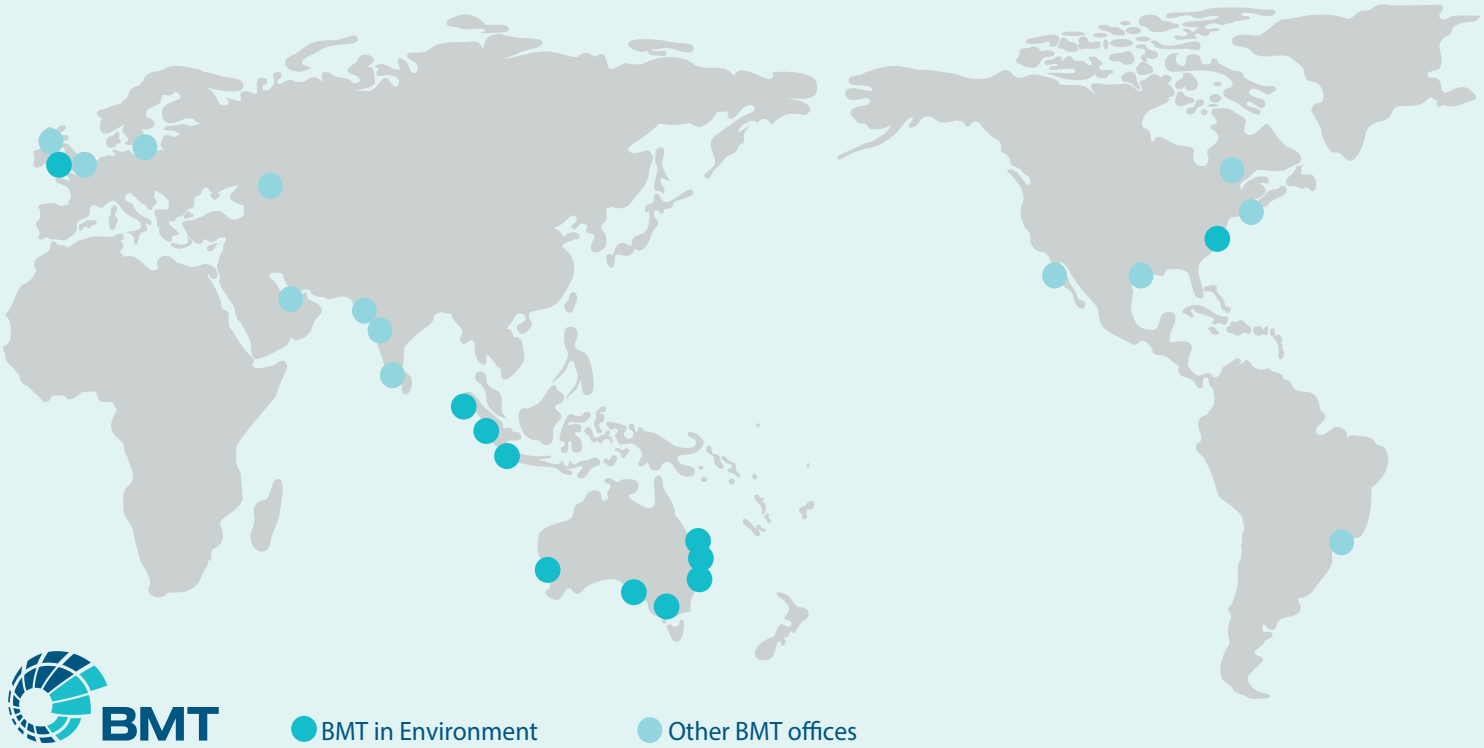

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Appendix C Coastal Processes Assessment

Port Thevenard Upgrade Coastal Process Assessment

Reference: R.B23384.002.00.Coastal_Process.docx
Date: October 2018
Confidential

Document Control Sheet

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Document:	R.B23384.002.00.Coastal_Process.docx
Title:	Port Thevenard Upgrade Coastal Process Assessment
Project Manager:	Lisa McKinnon
Author:	Ian Teakle
Client:	Arup
Client Contact:	John Haese
Client Reference:	

Synopsis: A desktop review of the impacts of the new infrastructure on coastal processes.

REVISION/CHECKING HISTORY

Revision Number	Date	Checked by		Issued by	
0	3rd October 2018	LCM		IAT	

DISTRIBUTION

Destination	Revision										
	0	1	2	3	4	5	6	7	8	9	10
Arup	PDF										
BMT File	PDF										
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1 Introduction

Thevenard is located on the Eyre Peninsula, 793 km west of Adelaide, South Australia, and 3 km south-west from the centre of Ceduna. Port Thevenard (the port), is located at the headland of the Thevenard peninsula and is operated by Flinders Ports.

The port is situated within the relatively sheltered waters of Denial Bay (Figure 1-1). Vessels access the tidal port from the Yatala Channel. The port has a prescribed depth of 8.2 m LAT and consists of 360 m jetty.

The proposed Project Area is shown on Figure 1-2. This area includes the jetty structure itself and the adjacent landside parcel which provides access from Thevenard Road and West Terrace.

The proposed Project is a “like for like” replacement of the 235 m section of deteriorating concrete jetty, between the shoreline and jetty head. The jetty is at risk of being condemned if these works are not carried out, thus are considered essential maintenance.

The existing Port Thevenard jetty cannot be rehabilitated and therefore requires demolition in order to minimise the risk of future uncontrolled collapse, which has potential to cause harm to port users, the jetty itself and the environment.

BMT has conducted an impact assessment to determine potential impacts from the project on coastal processes.

Figure 1-1 Study Location

Figure 1-2 Indicative proposed Project Area

2 Coastal Process Baseline

2.1 Bathymetry

The Denial Bay bathymetry (Figure 2-1) is typically in the range 5 to 10 m below CD, with areas of shallower shoals. The shipping approach to Port Thevenard is via the marked Yatala Channel, which is a curved (s-shaped) route negotiating between adjacent shoals.

Cape Thevenard is a promontory extending around 3 km westward and connected to the eastern bay coastline and township of Ceduna by an isthmus. Murat Bay lies to the north of the cape and Bosanquet Bay to the south. St Peters Island lies around 10 km south across Denial Bay.

The wave growth fetch at Port Thevenard is around 7 km to the North-North-East, 6 km to the West and 10 km to the South. Denial Bay is exposed to the Great Australian Bight to the South-West, however the constrained entrance between Point James and St Peter Island and the shallow bathymetry within Denial would attenuate Southern Ocean swell penetration. The 20 m depth contour lies around 25 km to the South-West and an extensive shallow shoal extending above 0 mLAT lies between Port Thevenard and open water.

2.2 Tidal Planes

The tidal regime at Port Thevenard is classified as diurnal but will be predominantly semi-diurnal during most spring tide phases. Tidal planes are provided in Table 2-1. The spring tidal range is typically 1 – 1.5 m.

Table 2-1 Thevenard Tidal Planes (Austide, 2018)

Tidal Plane	Level (m LAT)
HAT	2.3
MHHW	1.7
MLHW	1.1
MSL	1.0
MHLW	1.0
MLLW	0.4
LAT (Chart Datum)	0.0

2.3 Wind

Wind roses for the Bureau of Meteorology site at Ceduna Airport are shown in Figure 2-2.

The synoptic wind patterns are strongly seasonal and also exhibit diurnal variation as a result of sea breeze effects. During summer the prevailing morning wind is a moderate (10 – 30 km/h) South-Easterly. The prevailing summer afternoon sea breeze is from the South-South-East at 20 – 40 km/h. Afternoon sea breezes are also common during autumn and spring.

Winter wind speeds and directions are more variable, with a greater prevalence of Northerly sector winds and more frequent wind speeds in excess of 40 km/h. The highest frequency of strong winds occur in spring, most typically from the westerly or northerly sectors.

2.4 Waves

Due to the short fetches and shallow bathymetry within Denial Bay, the wave climate at Port Thevenard is locally-generated by the prevailing winds. During summer the dominant wave direction will be from the South, while in winter the dominant waves will be generated across the fetch to the North-North-West. Due to the limited fetch distances the significant wave heights will typically be less than 1 m and associated wave periods less than 3 s.

2.5 Seabed Character

Port Thevenard sediments are predominantly sandy, with varying quantities of shell rubble and fine silts depending on location. In order to provide vessel berth access to the jetty the seabed has been dredged for a distance of approximately 150 m on both the northern and southern sides of the jetty head. Rocky reef and rubble patches occur within the dredged berth area. As described in the marine ecology assessment (BMT, 2018) the seabed inshore of the jetty head and associated berths is covered with dense seagrass, while the coverage is sparser on the flanks of the dredged berth area.

Photographs of sediment samples collected just outside the dredged area footprint to the north and south of the jetty are shown in Figure 2-3.

2.6 Beach Character

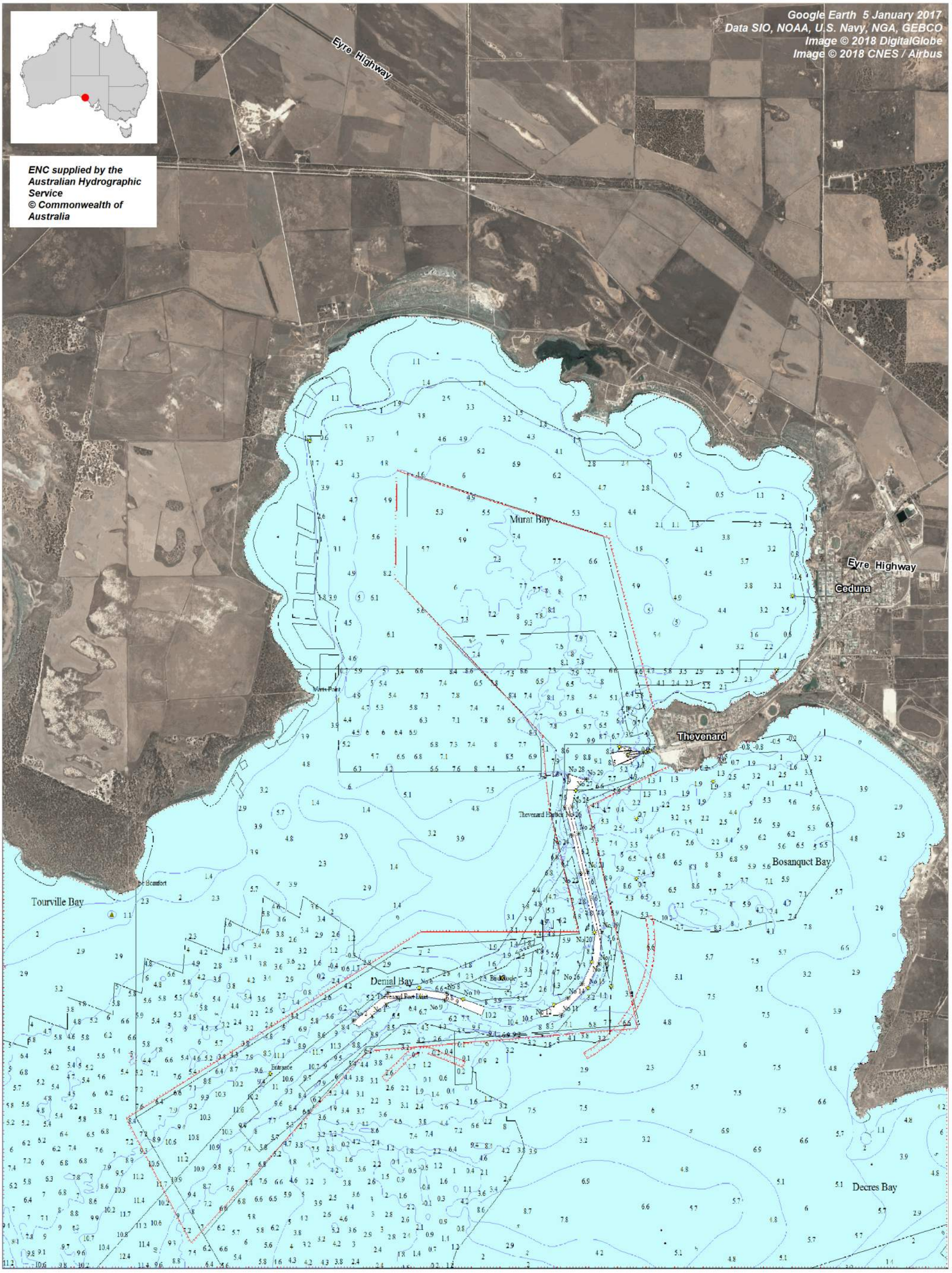
The beaches flanking Cape Thevenard are characterised by intermittent fine sand patches between calcareous rocky outcrops (Figure 2-4). At the time of the field survey (September 2018) the beach to the south of the jetty had a higher proportion of sand coverage than the beach compartment to the north.

The Cape Thevenard beaches are backed by moderate relief rocky dune/cliff structures. Rocky outcrops act as control points for the intervening sandy beaches. The Port Thevenard jetty protrudes from land at a location where rock and concrete protection has been used to stabilise the upper shoreface (Figure 2-5). This is likely to have been built upon a naturally rocky outcrop and serves as a beach compartment control point. The upper shoreface rock/concrete protection has been extended some way north of the jetty structure, presumably to mitigate shoreline erosion.

2.7 Existing Jetty Structure

The jetty is approximately 360 m long. Originally constructed in 1919, it has periodically been added to. It consists of a 235 m long concrete section extending from shore out to a 125 m long jetty head. An adjacent piled timber jetty was constructed on the south side of the original concrete jetty, approximately 20 years later to widen the facility from the shore to jetty head.

The jetty head was modified in 1972. Sheet piles were driven into the ground around the western half of the jetty head (from bents 1 to 11). The original structure, from concrete span 11 and the last 4 timber spans extending to the western end of the jetty head, were then infilled. Inshore of span 11 the jetty is supported on timber piles and would allow for the transmission of waves, currents and sediment transport.



Title:

Electronic Navigational Chart (ENC)

Figure: **2-1**

Rev: **A**

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

N

0 1.5 3km

Approx. Scale

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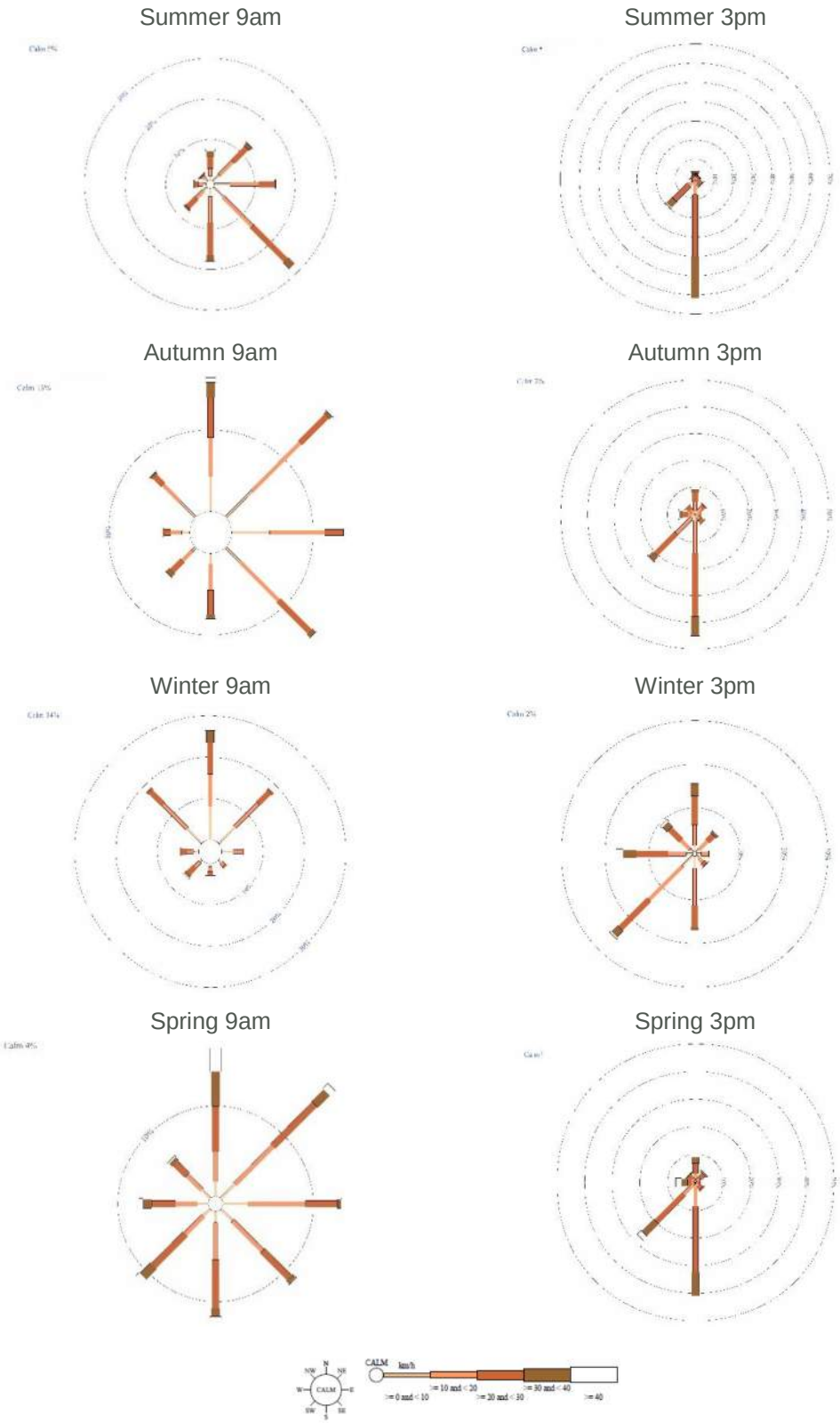

Figure 2-2 Ceduna Airport Seasonal Windroses. Prepared by the Bureau of Meteorology, 5 April 2016.

Figure 2-3 Sediment samples collected outside dredged berth footprint. LHS – South of jetty; RHS – North of jetty.

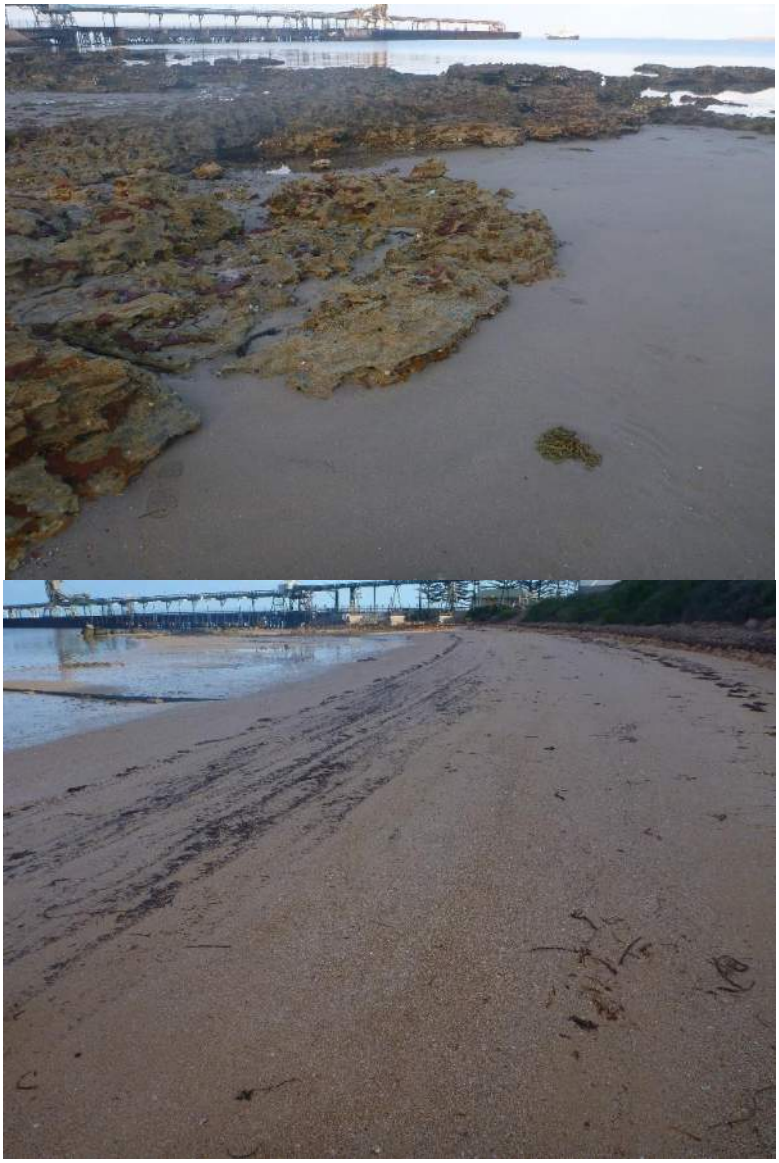

Figure 2-4 Cape Thevenard intertidal beach. Top – North of jetty, looking south; Bottom – South of jetty, looking north.

Figure 2-5 Thevenard Jetty – existing rock groyne

3 Project Description and Impacts

3.1 Project Description

The proposed Project is a “like for like” replacement of the 235 m section of deteriorating concrete jetty, between the shoreline and jetty head. The jetty is at risk of being condemned if these works are not carried out. Therefore these project works are considered essential maintenance.

The existing concrete jetty cannot be rehabilitated and therefore requires demolition in order to minimise the risk of future uncontrolled collapse, which has potential to cause harm to port users, the jetty itself and the environment.

Because the existing jetty provides support to an additional structure (the conveyer), the existing jetty cannot be demolished until a supporting structure for the conveyer has been constructed. As such the proposed Project involves the following high-level activities in sequence:

- Civil Works – construct new groyne and associated civil works including reconfigure road access to the land-side
- Piling – Marine based piling rig to ensure independence of ongoing operations
- Demolition – Marine based, upon completion of the piling works
- Transverse Beams – Marine based construction of main supporting structures
- Conveyor Support Structures – Jetty based works to construct lighter weight supports and general construction activity
- Construct Jetty – Jetty based works placing pre-cast deck & completing construction activity.

Works will not include any dredging, but some piling activity will occur. There is potential for minor turbid plumes to be caused by piling activity and installation of a launch platform on the northern shoreline of the jetty.

The jetty upgrade site layout plan is shown in Figure 3-1, and shows the rock groyne extension where the jetty connects to shore.

3.2 Coastal Process Impacts

The Project related change of most significance to coastal processes is the rock groyne extension, which will extend approximately 25 m further west than the current rock protection (Figure 3-1). The footprint of the upgraded rock groyne would also extend a further 10-15 m further north and south of the existing groyne.

The extended rock groyne will continue to act as a beach control point, however the westward extension would not be expected to result in a significant change to sand volumes on the adjacent beach compartments. As shown in Figure 2-5 there is not much sand build-up on the southern and northern side of the existing rock groyne.

It is probable that the extended groyne structure will cause an increase in reflected wave energy in its immediate vicinity, which has the potential to result in the indirect disturbance of inshore seagrass. As can be seen in Figure 3-1 the existing inshore seagrass limit is located further offshore to the

immediate North-West of the existing rock groyne than other locations. This may be due to the combined action of incident and reflected waves generated under strong northerly wind conditions. The extended groyne may therefore result in some inshore seagrass loss in addition to any direct construction impacts.

Aside from the potential impacts associated with the rock groyne extension, the transmission of waves and currents by the remediated jetty structure should be essentially identical to the baseline case and therefore no further impacts to coastal processes would be expected.

Historical erosion of the shoreline to the North-East of the existing rock groyne may have required stabilisation of the upper shoreface, as seen in Figure 2-5. The upgraded rock groyne is likely to be of a higher engineering standard than the existing structural protection. While the upgraded groyne structure shouldn't increase the erosion pressure on this section of coastline, it is probable that maintenance and upgrade of the existing protection will also be required at some point in the future.

Figure 3-1 Jetty Upgrade Site Layout Plan, showing rock groyne extension and proposed new jetty

4 References

USACE (2015). Coastal Engineering Manual, USACE, EM 1110-2-1100 (Part II), 30 Sep 2015.

Flinders Ports (2015). Marine Operations Thevenard Port Rules, PRTHED07, Issue 15, 27/8/2015.

Wiltshire and Tanner (2009). Baseline marine benthic environmental assessment of Thevenard Wharf region. SARDI Publication F2009/000208-1, Prepared for ABB Grain Ltd, April 2009.

WGA (2018). Thevenard Jetty Detailed Design, Prepared for Flinders Ports, PER171662, 6/7/2018.

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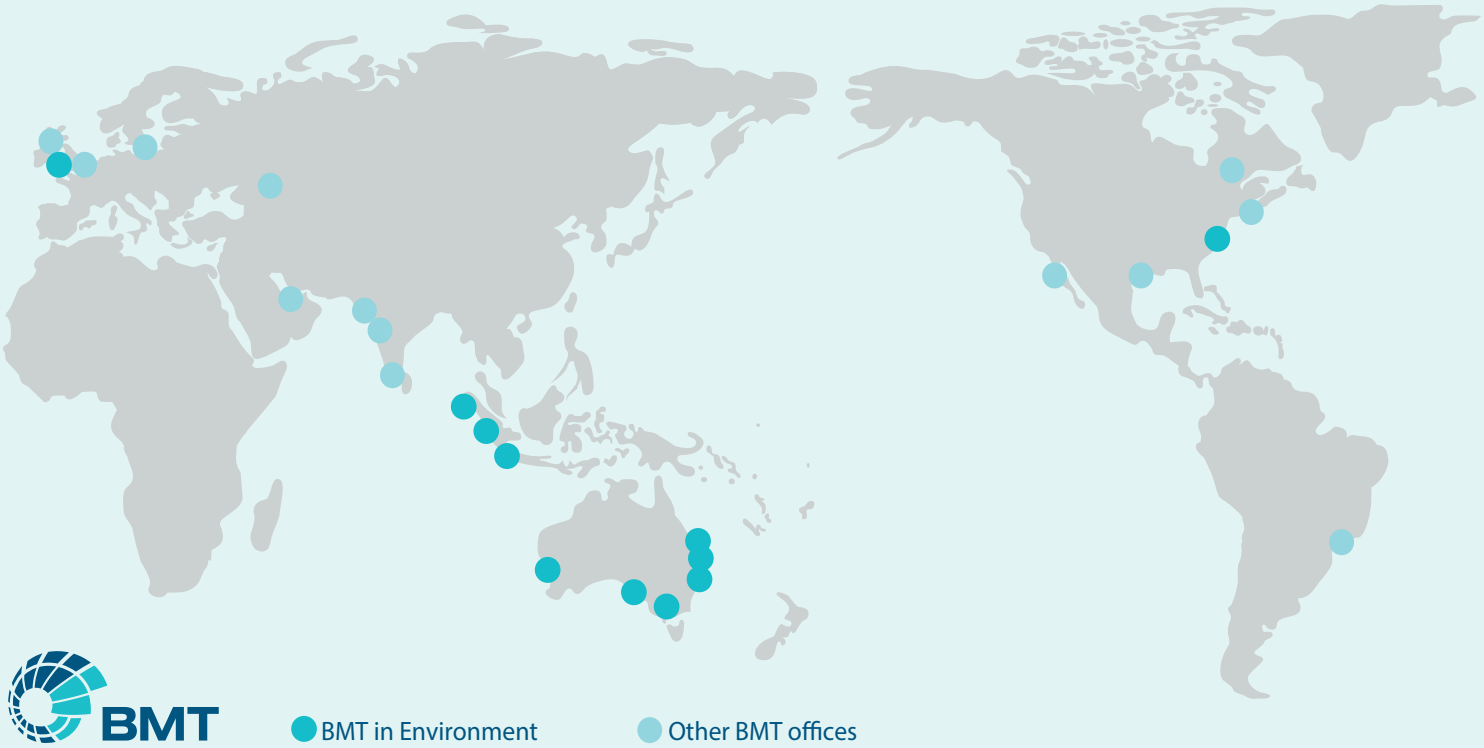

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Appendix D Cultural Heritage Register Search

ABORIGINAL HERITAGE SITES

Government of South Australia
Department of the Premier and Cabinet

Jordan Green
Arup
Level 17, 1 Nicholson Street
East Melbourne 3008 Victoria

Dear Jordan

Thank you for the search request dated 23 Aug 2018. The search was based on the parcel details - Plan: 57833, Parcel: 8. The address for this parcel is: JETTY RD THEVENARD SA 5690. Your reference is 30.

I advise that the central archive, which includes the Register of Aboriginal Sites and Objects (the Register), administered by Aboriginal Affairs and Reconciliation (AAR), has no entries for Aboriginal sites within 100m of this location.

The applicant is advised that sites or objects may exist in the proposed development area, even though the Register does not identify them. All Aboriginal sites and objects are protected under the *Aboriginal Heritage Act 1988* (the Act), whether they are listed in the central archive or not. Land within 200 metres of a watercourse (for example the River Murray and its overflow areas) in particular, may contain Aboriginal sites and objects.

Pursuant to the Act, it is an offence to damage, disturb or interfere with any Aboriginal site, object or remains (registered or not) without the authority of the Premier. If the planned activity is likely to damage, disturb or interfere with a site, object or remains, authorisation of the activity must be first obtained from the Premier under Section 23 of the Act. Section 20 of the Act requires that any Aboriginal sites, objects or remains, discovered on the land, need to be reported to the Premier. Penalties apply for failure to comply with the Act. It should be noted that this Aboriginal heritage advice has not addressed any relevant obligations pursuant to the *Native Title Act 1993*.

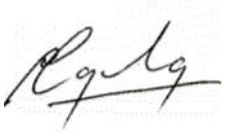
Please be aware in this area there are Aboriginal groups/organisations/traditional owners that may have an interest. These may include:

Name: Far West Coast
FCNO: SAD6008/1998

Name: Far West Coast Sea Claim
FCNO: SAD71/2016

If you require further information, please contact the Aboriginal Heritage Team on telephone (08) 8226 8900 or send to our generic email address dsdaarheritagesites1@sa.gov.au

Yours sincerely,



Perry Langeberg
SENIOR INFORMATION OFFICER (HERITAGE)
ABORIGINAL AFFAIRS & RECONCILIATION

29 August 2018

Memorandum

ARUP

To	Laura Kerber (DPTI)	Date	2 November 2018
Copies	John Haese (Arup) Virginia James (Arup)	Reference number	262887-00
From	Jordan Green, Arup	File reference	PTJR
Subject	DA 010/U060/18: Port Thevenard Jetty REQUEST FOR FURTHER INFO		

This memorandum has been prepared in response to a Request for Further Information from the Department of Planning, Transport and Infrastructure (DPTI), regarding the proposed Port Thevenard Jetty Restoration.

1. *Confirmation regarding the capacity of the existing (and ongoing) Bulk Shipping Facility at Port Thevenard. In particular, is the facility capable of handling materials into or from vessels at a rate exceeding 100 tonnes per day.*

Arup response: While the Bulk Handling Facility has an existing and ongoing capacity of over 100 tonnes per day, the subject of the Development Application is the essential maintenance of the jetty structure. As such the proposed works are not related to and do not influence the capacity of the existing Bulk Shipping Facility. The Bulk Shipping Facility infrastructure is owned by a third party (Viterra, as discussed in the Development Application) whom have no involvement, financial or otherwise, in this Development Application.

2. *A plan indicating the location and extent of proposed stockpiling and construction activities (laydown, storage, car parking, site office etc) including details of allotment parcels (Certificate of Title, Allotment, Plan Number).*

Arup response: The attached plan (Q2. PTJR_Proposed Construction Laydown.pdf) shows areas that are being considered for construction laydown. Once tenders from Contractors have been received, and the extent of laydown areas required is confirmed, the most appropriate laydown area, from those listed in the Development Application will be confirmed. Contractors are required to provide a Construction Environmental Management Plan (CEMP) that will expand upon the outline CEMP provided in the Development Application that clearly demonstrates how the Contractor will manage and comply with its obligations under Contract, including the protection of native vegetation, management of stormwater, traffic, noise etc in accordance with existing policies and requirements.

3. *Further detail regarding the operation of the proposed stockpile / storage area located adjacent West Terrace (north of the jetty) as indicated in Figure 1-2 of the Marine Ecology Assessment Report. This area is in close proximity to dwellings along West Terrace, Kent Street and Poyntz Street and also in close proximity to intact Coastal Shrubland as indicated in Figure 5-*

Memorandum

14. Potential impacts from operations on this site include noise, dust, run-off and traffic movements. Please provide further detail of how this storage area will operate (including how heavy vehicles will access the site) and environmental management / mitigation measures.

Arup response: Once a preferred construction Contractor has been selected, Flinders Ports will work with them to identify the area deemed most appropriate for the storage of construction materials (the attached plan indicates the areas that are potentially available). All these areas have previously been extensively cleared and filled for industrial development. The Contractor is required to avoid interaction with any areas where Coastal Shrubland or Foredune Vegetation have been identified as discussed in Section 3.7 and 8 of the Development Application (and as indicated in Figure 5-14 of the Marine Ecology report).

The area will be fenced off and steps will be taken to ensure disruption to neighbours is minimised. Materials and equipment will be stored on site so as to prevent damage to each site and minimise hazards to persons, materials and equipment and keep storage areas neat and tidy. The area will have loading and unloading areas indicated and no goods or materials will be stored on adjacent roads, driveways, paths or pavements. The area will be cleaned after completion.

It is proposed that all delivery vehicles will turn off the entrance road completely to deliver materials and exit the site safely. The piece of land on H660300S166 is accessible in and out of the site without turning around and is located away from dwellings and any vegetation communities, therefore is the preferred site at this time subject to confirmation of the area required by the preferred contractor.

Under existing transfer operations, grain is delivered to Port Thevenard via the road network using multi combination heavy vehicles. As discussed in Section 7.1, the road network leading to and from the port is gazetted for vehicles up to a 36.5 m higher mass limit road train and all the proposed areas are accessible by these roads. It is not anticipated that any construction activity relating to this project will require a vehicle exceeding these dimensions.

It is anticipated that at the peak of construction activity, the project will generate no more than 10 heavy vehicle movements per hour. This forecast peak is anticipated to be short in duration (i.e. a worst-case scenario that would only occur during civil works deliveries over several weeks) as the bulk of materials are anticipated to be delivered by barge to site (such as piles and major steelwork). Relative to the available capacity in the surrounding road network, this is a small volume of traffic and is not expected to generate any significant capacity related impacts. This forecast peak and the frequency of delivery is also considered to be of a short duration, as the bulk of materials are anticipated to be delivered to site via barge.

Noise, dust and runoff will be managed carefully by the Contractor to minimise impacts on neighbouring areas via mitigation measures detailed in the Construction Environmental Management (CEMP), an outline of which was included in Section 8 of the Development Approval application that will be further developed, refined and adopted by the preferred construction Contractor. The CEMP is based on recommendations from the technical investigations undertaken in the development of the project.

EPA Guidelines will be adopted for all site-based works in proximity to local residences.

4. *Will the demolition works involve any removal of hazardous materials such as asbestos? If yes, please provide detail on the proposed environmental management / mitigation measures for handling and disposing of this material.*

Arup response: It is not anticipated that any hazardous materials are present or involved in the works (including asbestos). The existing records (registers) have been reviewed and identify no asbestos present on the jetty. The demolition works involves the removal of concrete and steel structures and the Contractor will be required to notify Flinders Ports immediately should any unforeseen potential hazardous material is discovered to enable appropriate management actions and notification (if required) is undertaken, including compliance with all relevant policy and legislation to safely confirm, remove and dispose of any hazardous material.

5. *Will the demolition works involve the removal of the artificial reef structure formed from sections of the collapsed original jetty?*

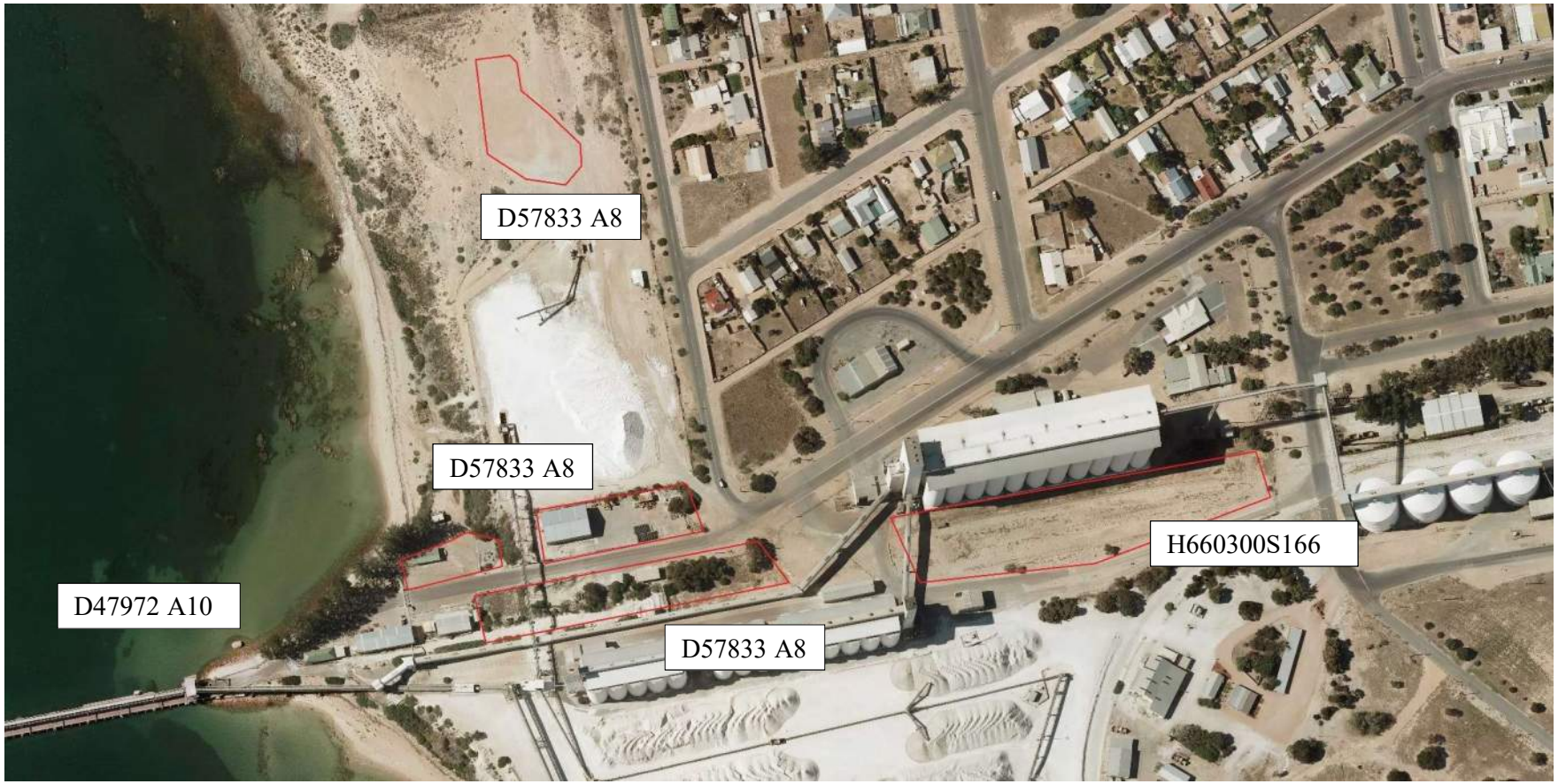
Arup response: The current scope of work does not include the removal of the artificial reef formed from sections of the collapsed original jetty. As stated in the Development Application, there should not be any direct impacts to reef habitat within the Project Area; material currently below the water surface will remain in situ and will not be removed. Rather, the placement of new infrastructure will expand the surfaces available for colonisation and increase available habitat.

6. *Confirmation regarding the scale of the site layout plan (Appendix A) when printed at A3. The EPA has requested either an electronic version of the site plan with the scale when printed at A3 is received or an A1 hard copy.*

Arup response: Please see attached plan Q6. PER171662-S001-E.PDF.

If this is not suitable for EPA, please let us know and we will send an A1 hard copy.

Port Thevenard Jetty Restoration – potential construction laydown areas with allotment parcels labelled.



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When sheet printed full size, the scale bar is 1:1 (100mm).

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SITE LAYOUT PLAN

SCALE 1 : 1000

(SCALE 1:4000 WHEN PRINTED AT A3)

TENDER ISSUE
NOT FOR CONSTRUCTION

REV.	DATE	DESCRIPTION	DRAFT.	ENG.	CHKD.
A	06.04.18	ISSUED FOR 40% REVIEW	RS	ST	
B	23.05.18	ISSUED FOR 70% REVIEW	RS	ST	
C	06.07.18	ISSUED FOR 95% REVIEW	RS	ST	
D	23.07.18	ISSUED FOR 100% REVIEW	RS	EP/ST	DM
E	06.09.18	ISSUED FOR TENDER	RS	DM	DM

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FLINDERS PORTS
THEVENARD JETTY UPGRADE

SITE LAYOUT PLAN

A1

DRAWING NUMBER
Job Number Sheet No. Rev.

Design ST Drawn RS PER171662 S001 E