

# Executive Summary

<b>1. Introduction</b>	<b>1</b>	<b>12. Climate Change and Greenhouse Gases</b>	<b>26</b>
<b>2. Project Description</b>	<b>7</b>	<b>13. Coastal Processes and Water Quality</b>	<b>28</b>
<b>3. Legislation and Planning</b>	<b>9</b>	<b>14. Marine Ecology</b>	<b>30</b>
<b>4. Water Resources</b>	<b>11</b>	<b>15. Underwater Noise</b>	<b>34</b>
<b>5. Noise and Vibration</b>	<b>13</b>	<b>16. Sustainability</b>	<b>36</b>
<b>6. Air Quality</b>	<b>15</b>	<b>17. Hazard and Risk</b>	<b>37</b>
<b>7. Terrestrial Ecology</b>	<b>16</b>	<b>18. Cumulative Impacts</b>	<b>38</b>
<b>8. Transport</b>	<b>18</b>	<b>19. Draft Environmental Management Plan</b>	<b>40</b>
<b>9. Landscape and Visual Amenity</b>	<b>20</b>	<b>20. Summary of Benefits, Impacts and Commitments</b>	<b>41</b>
<b>10. Socio-economic Impact</b>	<b>22</b>		
<b>11. Cultural Heritage</b>	<b>25</b>		

# 1. INTRODUCTION

This Environmental Impact Statement assesses the environmental, social and economic impacts associated with the construction and operation of the proposed Bulk Commodities Export Facility (henceforth known as ‘the Project’) at Port Bonython by Spencer Gulf Port Link. The facility will export up to 50 million tonnes of iron ore per annum with an estimated capital value \$663 million. **Figure 1** shows the location of the proposed Project.

This Executive Summary has been prepared as an overview of the key environmental, social and economic findings contained in the Environmental Impact Statement. For a full description of its findings, it is important to view the complete document; each section in this summary reflects the structure of Chapters.

The Project is located at Stony Point at Port Bonython on the Eyre Peninsula, South Australia. The land is currently undeveloped, but has been impacted by past uses including grazing and unauthorised off-road vehicle use. The land the Project will occupy is owned by the State. Some development of the Port Bonython Peninsula has already occurred, with the construction of the Santos Hydrocarbon Fractionation Plant and jetty, the establishment of the Cultana Army Training Area and the development of small pockets of coastal homes at Point Lowly, Fitzgerald Bay and False Bay. Much of the Project area is zoned for industrial purposes.

The Project consists of:

- » A new 17.5 kilometre railway spur from the existing Whyalla to Port Augusta rail line
- » A 6.1 kilometre railway loop at the terminal of the railway spur
- » The train receiving and bottom dump facility
- » Iron ore storage areas
- » Ancillary amenities and infrastructure required to support the proposed iron ore receipt, storage and export operations
- » A nominal three kilometre jetty to 20 metres of water depth constructed with a purpose built cantilever traveller off the water
- » Two 250 metre ship loading wharves; constructed in two work fronts, one from a self-elevating platform in the water and the second from a crane mounted platform on the ship loader rail
- » Two 4000 tonne/hour luffing ship loaders.

**Figure 2** shows the location of this proposed infrastructure. Initially, sufficient infrastructure will be provided to support a 25 mega tonnes per annum export capacity, with only one ship loading wharf constructed. When market conditions are optimal, infrastructure to enable a 50 mega tonnes per annum export capacity will be constructed; this Environmental Impact Statement addresses the full 50 mega tonnes per annum scenario.

## Project Proponent

The proponent for the Project is the Spencer Gulf Port Link, which is made up of the following organisations, with input provided as required from independent advisors:

- » Flinders Ports Holding
- » Leighton Contractors
- » Macquarie Capital
- » Australian Rail Track Corporation.

Flinders Ports are managing the Project’s planning and approvals phase on behalf of Spencer Gulf Port Link.

## Project Timing

Construction for the first stage of the Project (export capacity of 25 mega tonnes per annum) is expected to take three years and, once environmental approvals are in place, may commence in 2015 with export operations possibly commencing in 2018, subject to financial close. The timing of the second phase (export capacity of 50 mega tonnes per annum) will be subject to market conditions.

## Need for the Project

Identified iron ore resources have the potential to provide significant benefit to the South Australian and national economy, but the State currently lacks the infrastructure to take this resource to the global market. Construction of transport, handling and shipping infrastructure will unlock South Australia’s potential as a key player in the global iron ore market.

The Project will assist in addressing regional unemployment issues in Whyalla, through the creation of an estimated 270 construction and 40 operational jobs (full time equivalent). In addition to this, the economic stimulus provided by the capital expenditure, operating expenditure and export revenue associated with the Project could deliver up to 600 jobs (Full Time Equivalent) for the local economies in the region.

The Project is estimated to add \$9.7 billion to the South Australian Gross Regional Product over a 30 year period as a result of increased exports, investment and household consumption.

## Project Alternatives

The South Australian Government has selected Port Bonython as the most suitable location for a new shipping terminal based on its location within an existing deep water harbour, land availability, access to existing rail infrastructure and services and proximity to iron ore mining projects in the region. After a competitive tendering process by the State Government, Spencer Gulf Port Link secured development rights for the site to plan, build and operate the new common user Port Bonython facility.

Figure 1: Project Description

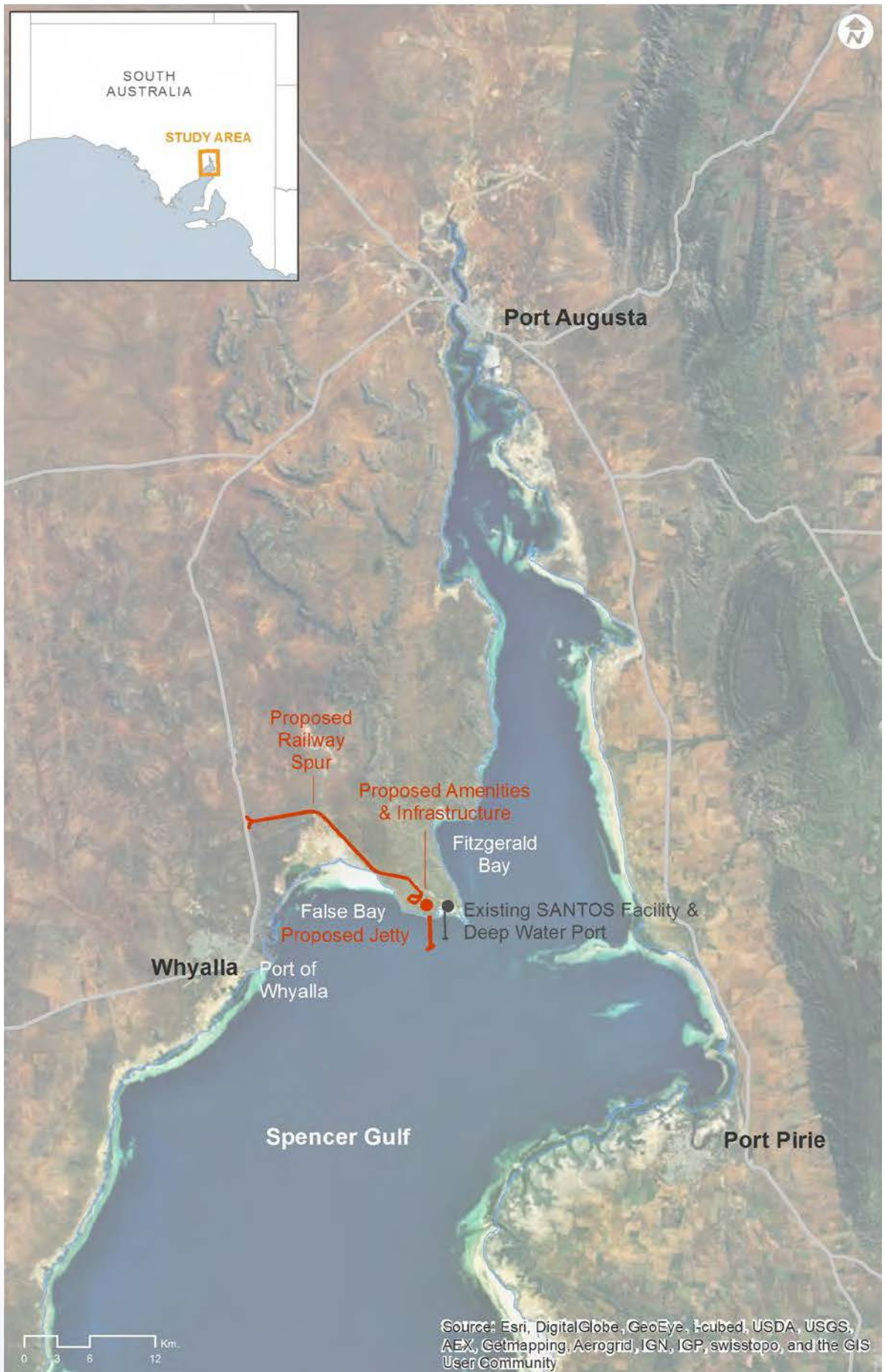


Figure 2: Location of the proposed Project



Alternatives to construction of a new iron ore export facility at Port Bonython include 'Doing Nothing', utilising existing ports in the short term or construction of a new facility at an alternative location.

The Do Nothing option will result in foregoing the potential economic and employment benefits for South Australia. It may be a short term option to utilise existing ports (including Port Pirie, Whyalla or Port Adelaide), however these options are constrained in the long term for a number of reasons including insufficient capacity, private ownership, higher operating costs, and lack of landside infrastructure. Alternative locations for a new iron ore facility at other Spencer Gulf locations have also been considered. These are not considered suitable due to a number of factors which include lack of deep water and lack of proximity to rail, iron ore deposits or an available workforce.

## Environmental Impact Statement Process

On 1 March 2012, the South Australian Minister for Planning made a declaration for the proposal to be assessed as a Major Development under the provisions of Section 46 of the *Development Act 1993*.

The assessment of the proposal and consideration of the potential implications of the Project resulted in a determination that it will be subject to the processes and procedures of an Environmental Impact Statement. The Environmental Impact Statement Development Assessment Guidelines was issued by the Development Assessment Commission in August 2012, and is available for public viewing on DAC's website ([www.dpti.sa.gov.au](http://www.dpti.sa.gov.au)). This Environmental Impact Statement responds to the requirements of the Guidelines.

The major development assessment process provides an opportunity for formal public consultation to occur prior to a decision being made by the Governor. The proponent is required to respond to any comments received through the provision of a Supplementary Environmental Impact Statement, which will be taken into consideration in decision making.

The proposal may be approved, approved with conditions attached, approved in part or rejected. Some matters of detail may be reserved for a later decision (a secondary consent).

Along with the EIS, the Project was referred to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* on 4 April 2012.

In May 2012, the Commonwealth Department of Sustainability, Environment, Water, Population and Communities determined that the Project was a 'controlled action' under Section 75 and Section 87 of the *Environment Protection and Biodiversity Conservation Act 1999* and that the Project will be assessed by preliminary documentation. The relevant controlling actions are:

- » Listed threatened species and communities
- » Listed migratory species
- » Commonwealth marine areas.

Specifically, further information was requested on the following matters:

- » Impacts to Southern Right Whales (*Eubaleana Australis*)
- » Impacts to Slender-billed Thornbill (*Acanthiza iredalei iredalei*).

A Preliminary Documentation Report was prepared and submitted to Commonwealth Department of Sustainability, Environment, Water, Population and Communities and was made available for comment on Monday the 1st July, 2013. The document is available on the Spencer Gulf Port Link website at [www.spencergulfportlink.com.au](http://www.spencergulfportlink.com.au).

An overview of the Environmental Impact Statement process is provided in **Figure 3**.

**Figure 3: EIS approval process**



## Environmental Impact Statement Preparation

This Environmental Impact Statement was prepared by Spencer Gulf Port Link with assistance from their consultant, Arup. Suitably qualified experts were engaged to carry out the extensive investigations required for the Environmental Impact Statement.

Spencer Gulf Port Link can be contacted through the following means:

- » Phone: 1800 657 248
- » Post: Port Bonython Project Team, c/o Arup, Level 7, 182 Victoria Square, Adelaide SA 5000.
- » Web: [www.spencergulfportlink.com.au](http://www.spencergulfportlink.com.au)
- » Email: [eis@spencergulfportlink.com.au](mailto:eis@spencergulfportlink.com.au)

## Environmental Impact Statement Approach

Each Chapter of the Environmental Impact Statement includes:

- » A description of the baseline environmental conditions
- » An identification of the impacts of the Project
- » An assessment of the significance of the identified impacts
- » Recommended mitigation measures.

The Chapters of the Environmental Impact Statement detail the existing conditions in the study area with reference to a wide range of information including:

- » Historical and contemporary records
- » Data from recent field surveys and sampling in the study area
- » Maps and aerial photography
- » Data obtained from statutory bodies such as the state government departments
- » Previous environmental studies undertaken in the study area.

The approach to assessing impacts has involved a description of the impacts using significance criteria, followed by a description of existing or proposed mitigation measures. Criteria specific to each Chapter have then been used to assess the significance of the residual impact once mitigation has been applied. Where residual impacts have been identified, the cumulative impact of the Project and other existing and proposed projects in the study area is considered. Identified impacts are assessed as either beneficial or adverse. **Table 1** outlines the broad significance criteria used to assess the impacts for the Environmental Impact Statement. This set of criteria has been modified as required within each Chapter for assessment purposes.

In order of preference, identified impacts have been:

- a) Avoided if possible through appropriate location of the Project and related infrastructure
- b) 'designed out' thereby minimising significant impacts
- c) Mitigated through the implementation of environmental management plans to monitor and minimise impacts.

## Public Comment Period and Written Submissions

The Environmental Impact Statement will be on public display for a six week period, during which time written comments and submissions are invited from any interested person or party. Submissions need to include the name, address and signature of the party making the submission and their reasons for making the submission.

A Public Meeting will be held by the Development Assessment Commission in Whyalla to explain the contents of the Environmental Impact Statement and the submission process.

The Environmental Impact Statement can be viewed at the following locations during the submission period:

- » Online at [spencergulfportlink.com.au](http://spencergulfportlink.com.au) and [www.sa.gov.au](http://www.sa.gov.au)
- » On CD – available for \$10 (ex GST) by contacting DPTI
- » In hard copy at the following locations:
  - Department of Planning, Transport and Infrastructure (DPTI) – Level 5, 136 North Terrace, Adelaide
  - South Australian State Library – Kintore Avenue, Adelaide
  - Whyalla City Council – Civic Building, Darling Terrace, Whyalla
  - Whyalla Library – Elkhorn Street, Whyalla.

Hard copies of the printed EIS are also available for purchase for \$300 (ex GST) by contacting DPTI.

### Written submissions should be sent to:

Mr Robert Kleeman  
 General Manager Assessment Branch  
 Department of Planning, Transport and Infrastructure  
 Level 5, 136 North Tce  
 ADELAIDE SA 5000

**Table 1: Project Significance Criteria**

Impact Significance/ Consequence	Description of significance
Very High	<p>The impact is considered critical to the decision-making process.</p> <p>Impacts tend to be permanent or irreversible or otherwise long term and can occur over large scale areas.</p> <p>Very high sensitivity of environmental receptors to impact (e.g. national significance – i.e. loss or removal of a population of a Federally listed status).</p>
High	<p>The impact is considered likely to be important to decision-making.</p> <p>Impacts tend to be permanent or irreversible or otherwise long to medium term.</p> <p>Impacts can occur over large or medium scale areas.</p> <p>High to moderate sensitivity of environmental receptors to impact (e.g. fragmentation or partial loss of populations of a Federally listed threatened flora)</p>
Moderate	<p>The effects of the impact are relevant to decision-making including the development of environmental mitigation measures.</p> <p>Impacts can range from long term to short term in duration.</p> <p>Impacts can occur over medium scale areas or otherwise represents a significant impact at the local scale.</p> <p>Moderate sensitivity of environmental receptors to impact (e.g. removal or significant reduction in the extent of suitable habitat assessed as 'high suitability' for a Federally listed threatened flora across the site).</p>
Minor	<p>Impacts are recognisable/detectable but acceptable.</p> <p>These impacts are unlikely to be of importance in the decision making process. Nevertheless, they are relevant in the consideration of standard mitigation measures.</p> <p>Impacts tend to be short term or temporary and/or occur at local scale. (e.g. a reduction in the extent of suitable habitat assessed as 'high suitability' for a Federally listed threatened flora across the site, however replacement habitat will be provided.</p>
Negligible	<p>Minimal change to the existing situation. This could include for example impacts which are beneath levels of detection, impacts that are within the normal bounds of variation or impacts that are within the margin of forecasting error.</p>
Positive	<p>Impacts have a positive outcome on the existing situation. This could include for example, an improvement in vegetation management or an improvement in air quality as a result of the Project.</p>

## 2. PROJECT DESCRIPTION

Works will occur on land currently owned or controlled by the South Australian Government. Whilst the Project site has never been developed, there have been impacts from past and current activities such as uncontrolled vehicle access and grazing. The primary land uses in the area include:

- » Recreation including aesthetic enjoyment, diving, boating, fishing, swimming and camping
- » An extensive network of unsealed roads and tracks allowing for both recreation and emergency access
- » Industrial development, namely the Santos Hydrocarbon Fractionation Plant Facility (the BHP Billiton Olympic Dam Expansion Desalination Plant has also been approved, but is not yet constructed)
- » Pastoral leases
- » Coastal homes around Point Lowly, with other smaller settlements at False Bay and Fitzgerald Bay
- » The Cultana Army training Expansion Area to the north
- » Aquaculture farms in Fitzgerald Bay. It is understood that these farms are no longer considered viable and have recently closed.

The marine environment has importance in terms of its ecological value, as well as recreational and commercial value (i.e. commercial fishing, tourism). Stony Point, the location of the proposed Project, is approximately 294 kilometres from the entrance to the Gulf and 18 kilometres east of Whyalla (adjacent to Port Bonython) in the northern Spencer Gulf bioregion. This area supports a rich scale fish and invertebrate species fishery, including a number of species of commercial value. The sub-tidal reefs found in the area are an important breeding ground for the Giant Australian Cuttlefish, which is not a threatened species, but is of particular conservation significance in the Gulf and has become an iconic species for the region. The species spawning aggregation attracts tourists and recreational divers.

### Rail

A new rail spur will branch from the existing Port Augusta to Whyalla Railway line, just north of Whyalla and Port Bonython Road. The railway alignment will meet and then run in parallel with Port Bonython Road. It will then cross over Port Bonython Road and run parallel to the southern side of the road, before veering off to the proposed storage facility in the form of a loop.

An elevated crossing has been provided for at the intersection of the rail spur with Port Bonython Road, nominally located between Fitzgerald Bay Road and Cuttlefish Drive (pending final detailed design) to enable clear separation between the road and rail interface for these intersections.

### Bulk Storage Facility

A Bulk Storage Facility will include ore unloading facilities, ore storage sheds, a maintenance facility, a staff administration and amenity building and conveyors and material handling equipment.

### Jetty and Wharf

A 3.0 kilometre jetty will provide access to berthing wharves (nominally 200 metres long); an enclosed conveyor belt(s) will pass the iron ore from the storage sheds to the end of the jetty. The proposed jetty will be erected parallel to the 2.4 kilometre Santos jetty, at a separation distance of approximately 1.4 kilometres. This is outside the safety buffer zone of the Santos jetty of approximately one kilometre. There will also be a tug berth at the jetty, to enable a permanent tug boat presence at the facility.

### Road Access and Transport

The main access corridor will be Port Bonython Road, a sealed road which joins the Lincoln Highway. A sealed access road will be constructed from Port Bonython Road to the storage facility and associated buildings. Access to the coastal road leading to Stony Point will remain open to the public once the Project becomes operational. The conveyor belt to the jetty will cross above the road, allowing for vehicle access below.

The majority of materials delivered to site during construction will be transported via roads, however some materials will be pre-fabricated offsite and transported to site via barge from other nearby port facilities such as Adelaide, Port Pirie or Whyalla. The main road delivery route will be along the Lincoln Highway approaching from the north or south of Port Bonython.

A number of transport barges will be utilised on site to ferry equipment, materials and staff to and from maritime construction works.



## Project Timing

It is expected that the Project will open immediately following the construction phase, currently targeted from 2015 to 2017 (actual start date is subject to project financial close) with the operational phase likely to commence in 2018. Initially, the Project will operate at a capacity of 25 mega tonnes per annum (Stage One). Once sufficient demand is generated, the infrastructure to reach a total capacity of 50 mega tonnes per annum (Stage Two) will be constructed. The timing of this second phase is unknown but may take place some years after Stage One is constructed.

Generally, the expansion from 25 mega tonnes per annum (Stage One) to 50 mega tonnes per annum (Stage Two) will include construction of the following elements:

- » Second shipping wharf and ship loader
- » Additional storage sheds
- » Second jetty conveyor.

Construction for the expansion to 50 mega tonnes per annum will occur while the Project is in operation.

## Construction Workforce and Working Hours

The construction workforce for Stage One is anticipated to peak at approximately 200 persons. Additional indirect jobs will be generated for design activities, off-site fabrication, supply items and other construction support services.

Estimates for ancillary personnel to support the workshop, office support, cleaning, food services are between 30-50 persons. Additionally there will be approximately 20-40 persons in the pre-assembly facilities (e.g. precast yard, fabrication workshops etc.) depending on the final construction methodology adopted.

It is anticipated that the workforce will be accommodated in Whyalla; there is no requirement for an on-site construction camp for workers. The workforce for Stage Two will be less than Stage One, with an estimated peak construction workforce of 120 people, with an ancillary workforce of 20-30 people.

Construction will occur six days of the week, Monday to Saturday, with shifts expected to be from 6am to 6pm. The EPA currently sets standard construction work hours of 7am to 7pm. SGPL will make an application to amend these standard work hours. Occasionally, work may need to be undertaken outside of 'standard hours'; permission will be obtained from the EPA, and affected residents will be notified prior to out of hours work occurring.

## Operational Workforce, Working Hours and Activities

The Project has been designed to be capable of operating continuously 24 hours a day, seven days a week. Operations will have a peak workforce of approximately 48 shift personnel for Stage One. Personnel will work in four shifts of eight persons, with an additional six persons working permanent days. During Stage Two, staff levels will increase by approximately an additional 24 personnel.

Approximately six trains will deliver iron ore to the site each day (Stage One) increasing to twelve trains per day for the 50 mega tonnes per annum facility (Stage Two). Bulk Carriers will deliver the iron ore to market. All vessels will reach the site via designated approach and departure channels under pilot. Laden vessels will depart the berth two hours prior to high tide to allow for safe manoeuvring through the Yarraville Shoals, an area of reduced depth in the Gulf.

The operation of the Project will increase the number of large vessel movements in the Spencer Gulf. The exact number of vessels movement generated by the Project will be determined by market conditions, but the Project is expected to contribute approximately 277 ships on an annual basis (based on a 50 mega tonnes per annum capacity). The number of ships will also be dependent on export levels i.e. if the full 50 mega tonnes per annum capacity of iron ore is not delivered the corresponding number of ships will be lower and actual annual movements will fluctuate according to export volumes.

### 3. LEGISLATION AND PLANNING

**Chapter 3** of the Environmental Impact Statement outlines the relevant Federal, State and local legislative requirements and identifies the likely planning and environmental approval requirements for the Project. It provides an overview of relevant legislation, codes of practice, guidelines, management plans/policies to which the Project will be required to adhere to, or have close regard to, during detailed design, construction, operation and decommissioning. A review of the Project against local and regional strategic and statutory planning instruments is also provided.

Approvals and permits required will be largely dependent on the final agreed construction and operational methodology and agreements with relevant Federal and State agencies. **Table 2** provides an overall summary of approvals that may be required for the construction and operation of the Project (following approval under the *Development Act 1993 and the EPBC Act 1999*) and highlights the relevant administering/regulatory agency for each.

**Table 2: Summary of possible approvals and legislative requirements**

Relevant Legislation	Approvals and Legislative Requirements	Administering/Regulatory Agency
<b>Primary Project Approval</b>		
<i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984</i>	<p>Permission will be required to access, search or excavate land of aboriginal significance including damaging, disturbing or interfering with an aboriginal object or remains. The Project will also require the approval of a heritage management plan, established through negotiations and agreement with all relevant aboriginal parties and regulatory agencies.</p> <p>The construction and operational phase of the Project will need to comply with the general duty of care provision outlined in the Act.</p>	Department of Sustainability, Environment, Water, Population and Communities
<i>Native Title Act 1993</i>	<p>The Project area lies within the Barngarla native title claim application area (NNTT No SC96/4, Federal Court No SG6011/98) however a detailed assessment of the Projects impact on Native Title Claimants is yet to occur. The Project will use the mechanisms in the Native Title Act to address the extent, if any to which native title rights are affected by the Project.</p> <p>Developing a dialogue and consultation with Barngarla is a priority for SGPL, but until such consultation occurs, assessment of any impact on Native Title will be incomplete</p>	Commonwealth Attorney-General National Native Title Tribunal
<i>Navigation Act 1912</i>	Authority approval will be required for transporting bulk materials through Australian waters by shipping vessels.	Department of Infrastructure and Transport
<b>Other South Australian Approvals and Legislative Requirements</b>		
<i>Aboriginal Heritage Act 1988</i>	<p>Permission will be required to access, search or excavate land of aboriginal significance including damaging, disturbing or interfering with an aboriginal object or remains. The Project will also require the preparation and approval of a heritage management plan, established through negotiations and agreement with all relevant aboriginal parties and regulatory agencies.</p> <p>An application will need to be made to the Minister under Section 12 and Section 23 of the Aboriginal Heritage Act 1988.</p> <p>The construction and operational phase of the Project will also be required to comply with the general duty of care provision outlined in the Act.</p>	Aboriginal Affairs and Reconciliation Division of the South Australian Department of Premier and Cabinet

Relevant Legislation	Approvals and Legislative Requirements	Administering/Regulatory Agency
<b>Other South Australian Approvals and Legislative Requirements</b>		
<i>Climate Change and Greenhouse Emissions Reduction Act 2007</i>	The proponent may enter into an agreement with the State or be conditioned to meet specified thresholds/targets relating to greenhouse emissions.	Department of Environment and Natural Resources
<i>Coastal Protection Act 1972</i>	The Project requires referral to the Coastal Protection Board for assessment for undertaking works on the coastline	Department of Environment and Natural Resources
<i>Environment Protection Act 1993</i>	The Project will require an environmental authorisation in the form of a licence under the EP Act. The licence will likely be granted subject to particular construction and operational conditions aimed at minimising environmental impacts. Authorisation for and ongoing licensing of these activities will be required from the EPA.	Environmental Protection Authority (South Australia)
<i>Highways Act 1926</i>	Approval will be required to undertake works to a State Road i.e. Port Bonython Road.	Department for Planning, Transport and Infrastructure
<i>National Parks and Wildlife Act 1972</i>	A permit may be required to remove or damage native plants or interfere with protected animals.	Department of Environment, Water and Natural Resources
<i>Native Title (South Australia) Act 1994</i>	<p>The Project area lies within the Barngarla native title claim application area (NNTT No SC96/4, Federal Court No SG6011/98) however a detailed assessment of the Projects impact on Native Title Claimants is yet to occur. BCEF will use the mechanisms in the Native Title Act to address the extent, if any to which native title rights are affected by the Project.</p> <p>Developing a dialogue and consultation with Barngarla is a priority for SGPL, but until such consultation occurs, assessment of any impact on Native Title will be incomplete</p>	Attorney-General, linked through National Native Title Tribunal
<i>Native Vegetation Act 1991</i>	Approval from the Native Vegetation Council is not required for the clearance of native vegetation, as the clearance is proposed under Regulation 5(1)(c) - Development subject to Section 48 – <i>Development Act 1993</i> (as the proposed Project has been declared to be of such social, economic or environmental importance requiring an EIS) Instead, the Council is provided the opportunity to make comment on the proposed development, which is then taken into account by the Minister administering the Development Act.	Department of Environment, Water and Natural Resources
<i>Natural Resources Management Act 2004</i>	A licence or permit may be required if the Project interferes with natural resources including surface water, ground water, terrestrial ecology or marine environment. For example, if the Project interferes with particular plant or animal species.	Department of Environment, Water and Natural Resources
<i>Railways (Operations and Access) Act 1997</i>	Written consent is required to construct and operate the railway spur associated with the Project.	Department for Planning, Transport and Infrastructure

## 4. WATER RESOURCES

The following presents a summary of the key findings. For more detail, see the Environmental Impact Statement, **Chapter 4, Water Resources**.

### Existing Conditions

The Whyalla region is a dry area with an annual average rainfall of 278 millimetres (1906 – 2001) and an estimated annual potential evaporation of about 2500 millimetres. There is very low recharge to groundwater at Port Bonython, which is brackish to saline. For this reason, there is very limited use of groundwater.

The surface waterways in the study area comprise a network of drainage lines which flow only during major rain events, but are dry most of the year; there are no permanent streams or rivers. To the south of the corridor for the proposed rail spur is the low lying Long Sleep Plain which is characterised by salt flats and lagoons. The lagoons are intertidal and are intermittently inundated.

The proposed rail corridor and other land-based infrastructure will cross a number of minor drainage channels and waterways. All streams in the Project corridor were observed as being dry during site visits undertaken during March 2013.

**Figure 4** shows a dry culvert located at the turn off to Port Bonython Road from the Lincoln Highway. This is typical of the engineering treatment of the interface between drainage lines and transport infrastructure throughout the region.

The study area does not contain any surface water monitoring stations and no recorded water quality data has been identified for this region. It is important to note that water quality in these mostly dry streams is subject to variation due to the episodic nature of flows. Such streams are typically characterised by low salinity and high turbidity during flow events that follow significant rainfall.

**Figure 4: Culvert at turnoff to Port Bonython Road**



## Impact Assessment

### Groundwater

The potential impacts to groundwater arising from the Project are related to the risk of groundwater contamination as well as some possible minor, localised reduction in recharge and slight salinity increase. The proposed development does not include below ground structures or extensive deep excavations and there should be no requirement to carry out works below the water table except for the exploration and potential use of groundwater for construction.

Potential impacts to groundwater resources include:

- » Release of harmful substances that are stored or used on site e.g. concrete, fuel, lubricants, herbicides, paints
- » Use of groundwater for construction purposes i.e. watering down of dry surfaces, lowering the groundwater table
- » Reducing recharge to the groundwater through an increase in hard surfaces, which may result in increased salinity.

Because of the poor groundwater quality, it is unlikely that it will be utilised for construction purposes; however this will be confirmed during the detailed design phase. Water supply for construction purposes is most likely to be sourced from a dam constructed on site which will either be filled with rainwater or supplemented with town water if rainfall is insufficient.

### Surface Water

The potential impacts on surface waters associated with this Project include alterations to the existing drainage patterns and flows, altered flow regimes and altered water quality resulting from increases in impervious areas, vegetation clearance, erosion and use of surface water for site reuse, and potential water contamination through release of Project specific polluting substances (fuels, oil, litter, herbicides, etc.) resulting from spillages and leaks from either the rail corridor or storage areas.

## Mitigation Measures

A number of mitigation measures will be implemented to minimise impacts on water resources within the Project area. These include:

- » Establishing appropriate procedures for handling, transporting and using potentially contaminating substances, including the storage of substances in sealed and bunded enclosures
- » Establishing procedures for the recovery of spills and leaks e.g. spill kits, wash down procedures
- » Runoff from hardstand areas and roofs will be captured and treated prior to reuse or discharge
- » Minimising disturbance to the bed, banks or existing flow regime of existing drainage lines or waterways
- » Treatment of wastewater to a suitable standard prior to discharge via irrigation
- » Preparing and implementing an Erosion and Sediment Control Plan during the construction phase to control and manage sediment releases on site
- » Installation of permanent water sensitive design features to contain and treat runoff from site prior to release to the environment
- » Regular water quality monitoring, particularly during construction.

## Summary

Potential impacts associated with the Project are mostly related to construction impacts, the risk of ground and surface water contamination and the potential (unlikely) use of groundwater resources. These impacts can be readily mitigated through good site practice and adherence to the Project's Environmental Management Plan. Any impacts will be localised and considered minor in nature. The overall impact of the Project on water resources is of Low adverse significance.

## 5. NOISE AND VIBRATION

The following presents a summary of the key findings. For more detail, see the Environmental Impact Statement, **Chapter 5, Noise and Vibration**. Underwater noise that may impact on the marine environment is dealt with separately in Section 15 of this Executive Summary. Noise and vibration from the operation and construction of the Project has the potential to adversely affect the following noise sensitive receptors:

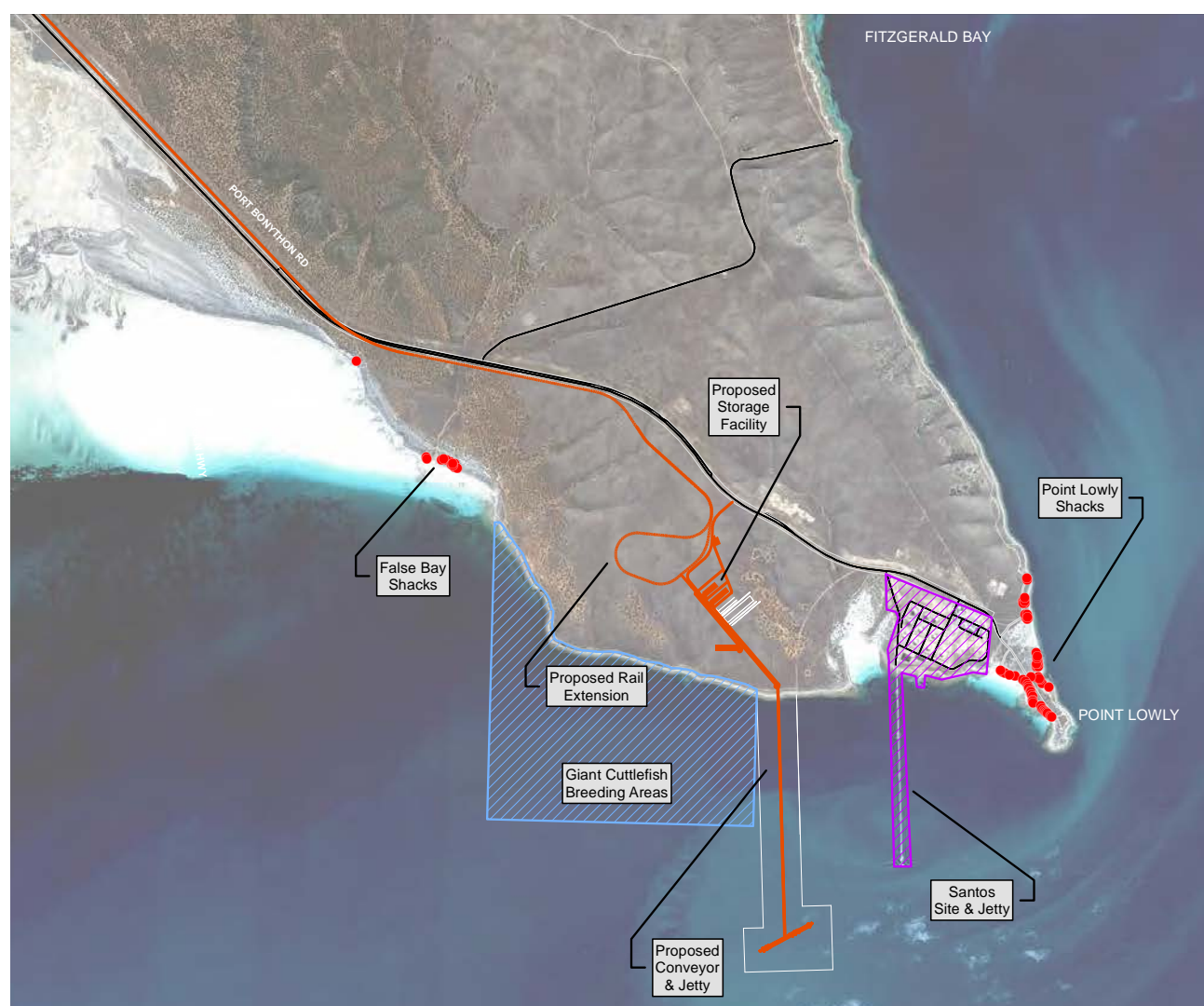
- » Residential properties at False Bay
- » Residential properties at Point Lowly
- » Terrestrial fauna and flora.

### Existing Environment

The subject site is in a rural coastal location with some existing industrial activities at the Santos facility, Point Lowly. Existing noise sources include industrial noise from the Santos site, wave and wind noise due to the coastal location of the site, occasional road traffic noise and bird noise. A noise survey of the study area was conducted in April and May of 2013. It was found that False Bay has a relatively constant, low noise environment, dominated by natural sources. Point Lowly has a higher level of background noise as there is significantly more traffic. Noise from Santos was generally inaudible during the day time period, but more audible at night.

The nearest potentially affected noise sensitive receivers are the coastal settlements at False Bay and Point Lowly, as shown in **Figure 5**.

**Figure 5: Noise sensitive receptors**



## Impact Assessment

Terrestrial noise and vibration impacts from the Project are anticipated to occur from the following major sources:

- » Construction of the storage area and jetty infrastructure main site (including marine construction works)
- » Construction of the connecting rail line
- » Operational noise, including noise from unloading of rail vehicles, operation of conveyers and loading of bulk carrier vessels
- » Operational noise from the connecting rail line
- » Increased traffic noise levels on roads serving the Project.

Noise modelling was undertaken to predict the impact of the Project on future noise levels and sensitive receptors. These levels were then compared to legislative noise limits, or criteria. The modelling concluded:

- » During jetty piling activities, noise will cause a marginal exceedance of noise criteria at Point Lowly, but only in adverse weather conditions
- » Construction of the rail line as it passes coastal shacks at False Bay will cause exceedances of noise criteria; this will be short term impact that will only occur during construction of the section of railway closest to False Bay
- » Site activities are not expected to generate vibration levels high enough to exceed vibration criteria
- » All other construction and operational activities are not expected to result in an exceedance of noise criteria due to the distance from sensitive receivers.

## Mitigation Measures

- » Night-time railway construction activities will be avoided wherever possible where it may impact False Bay. Should this be required, consultation with residents will occur and potential mitigation options will be discussed e.g. rescheduling of works, respite periods
- » Piling activities will be limited to daytime hours during adverse weather conditions wherever possible. Should night-time work be necessary (unlikely), consultation with residents will occur and potential mitigation options will be discussed e.g. rescheduling of works, respite periods
- » Construction noise will be managed through a construction Environmental Management Plan which will include measures such as:
  - Regular inspection of machinery
  - Worker education
  - Use of dampers etc. on machinery
  - Establishing a communications register for recording complaints
  - Limiting construction activities to 6am to 6pm Monday to Saturday, except for specific activities for which EPA approval is obtained
- » Enclosure of the conveyor belt will limit operational noise.

## Summary

Much of the Project area is generally a low-level noise environment, with existing major noise sources limited. Whilst the Project will create additional noise during both construction and operation, the noise source is of a sufficient distance from sensitive receivers that noise exceeding acceptable levels will mostly not be experienced. Some exceedance of acceptable levels is likely to be experienced at False Bay for a short period during construction of the rail line. In consultation with the affected community, mitigation measures will be provided that may include daytime respite times and re-scheduling works if possible.

## 6. AIR QUALITY

The following presents a summary of the key findings. For more detail, see the Environmental Impact Statement, **Chapter 6, Air Quality**.

### Existing Environment

The South Australian Environmental Protection Agency measures air quality at Whyalla (the closest monitoring station to the Project). The monitoring indicates that air quality generally complies with legislative requirements, although some limited exceedances do occur.

Emission sources within the Whyalla region including the Arrium Whyalla steelworks, a quarry operation, two wastewater treatment plants and the Santos hydrocarbon distribution facility at Port Bonython. None of these sources are considered to have a significant impact on local air quality, which is considered very good.

### Impact Assessment

The Project has the potential to result in the emission of particulate matter (dust) which can have, in sufficient concentrations, impacts to health (e.g. decrease in lung function) and amenity (e.g. reduction in visibility) for residents in proximity to the proposed operation. There are no other potential air pollution sources expected to be generated by the Project. Potential sensitive receivers are residential communities at Point Lowly and False Bay.

As a result of construction and operation of the Project, there exists the potential for the emission of particulates from activities, including land clearing and wind erosion during the construction stage and materials movements including the loading, unloading and transfer of ore during the operations stage.

A number of pre-emptive management measures have been embedded into the Project design, including full enclosure of the rail unloading and storage facility and iron ore conveyor systems which will minimise or eliminate fugitive dust emissions from operations. Water (fogging/mist) sprays will be fitted, where required.

In order to confirm the effectiveness of such measures, they were benchmarked against a number of other existing bulk commodities export facilities operating within Australia. The review of other major bulk export port operations indicates that the use of fully-enclosed rail unloading, storage and conveyor systems fitted with dust extraction and suppression systems for the Project represents current best practice and will effectively mitigate fugitive particulate emissions.

Provided the installed management measures are maintained and operated appropriately, the proposed air quality management system will be sufficient to effectively mitigate fugitive emissions, preserving the existing air quality.

### Mitigation Measures

In addition to those measures already incorporated into the Project design, additional mitigation will be applied including:

- » Best practice construction management e.g. staging vegetation clearance, covering access tracks to minimise dust, use of water carts for dust suppression etc
- » The use of additional particulate controls during emergency, unplanned or abnormal operations including the use of back-up dust extraction systems, manual application of water or the cessation of works until equipment is functional
- » The application of misting sprays or water to maintain moisture levels during ship-loading operations; no loading will occur during adverse wind conditions
- » Use of audible alarms to alert people to a potential failure of dust controls
- » Real-time dust monitoring to monitor the management system while it is being established.

It is likely that any unplanned, abnormal or emergency equipment failure-related dust event will be short-term in nature, representing a minor risk to nearby sensitive receivers. With the application of the appropriate contingency measures, the duration of any exceedance will be minimised.

### Summary

The proposed Project air quality management infrastructure has been reviewed and benchmarked against other, similar, facilities and has been determined to represent current best practice in terms of air emission mitigation. Sensitive receptors will be unlikely to notice a change in local air quality or amenity under normal operations.

There are sufficient contingency measures available to effectively manage a failure or underperformance of the installed dust management system, however such an event may result in a local, short-term and minor exceedance of the nominated air quality criteria whilst the contingency is being implemented.

Without prompt mitigation, some local residents may notice a short-term minor decrease in air quality/amenity, although no impact to health is predicted.



## 7. TERRESTRIAL ECOLOGY

The following presents a summary of the key findings. For more detail, see the Environmental Impact Statement, **Chapter 7, Terrestrial Ecology**. The assessment is based on a number of existing surveys and assessments that have been undertaken in the study area as well as site specific vegetation and fauna surveys undertaken for this Environmental Impact Statement.

### Existing Environment

Past and present activities in the study area have affected the condition of the existing environment, including grazing by sheep and cattle, off-road vehicle use, feral animals and the installation of services e.g. water mains, power transmission line and gas pipelines.

The semi-arid site is characterised by vegetation that consists of shrubland of Saltbush and Plover Daisy, low woodland of Blackoak and False Sandalwood, low open woodland of Myall with Blackoak or Bluebush, open scrub of Beaked Red Mallee, grassland of rolling Spinifex and low woodland of Mangroves. The vegetation within the study area is regionally common and extensive as shown in **Figure 6**. The distribution of

vegetation cover across the region is relatively consistent, with no significant disturbances that fragments habitats or creates barriers for movement of fauna.

No plant species listed as endangered, vulnerable or rare under either Federal or State legislation have been noted in surveys conducted in the Project area. Weed species such as the Onion Weed are common across the study area.

A total of 168 birds species are recorded as occurring in the general Point Lowly region. This includes the Slender-billed Thornbill - western subspecies (*Acanthiza iredalei iredalei*) which is listed as Vulnerable under Federal legislation. This bird species favours Bluebush and Saltbush shrubland, which is found within the study area. Its presence has been recorded in past fauna surveys in the study area, and was confirmed during 2012 surveys conducted for this Environmental Impact Statement. The presence of one Scarlet-chested Parrot (*Neophema splendida*) listed as rare under State legislation was recorded also, however given that the study area is on the extreme edge of its range, it is likely to be only an occasional visitor to the site. A number of shorebirds that are protected

**Figure 6: Typical vegetation of the Point Lowly region**



under Federal legislation and international agreements occur at False Bay and Fitzgerald Bay but are not present within proximity to the Project footprint.

A number of common mammal species are found within the study area including the Strip-faced Dunnart (*Sminthopsis macrooura*), Western Grey Kangaroos (*Macropus fuliginosus*) Red Kangaroos (*Macropus rufus*), Euros (*Macropus robustus*) and four bat species. Reptiles and amphibians include two species of frog (Spotted Grass Frog and the Trilling Frog), seven species of lizards, Geckoes, legless lizards, goannas, skinks and several snakes. None of the mammal, reptile or amphibian species that are known to occupy the study area are considered to be Endangered, Rare or Vulnerable under Federal or State legislation. There is an abundance of feral animal species in the study area including feral cats, goats, rabbits and foxes.

## Impact Assessment

Approximately 228 hectares of vegetation will be cleared during the construction phase of the Project, particularly Bluebush and Saltbush shrubland and some Mallee woodland. This is an upper limit, and it is likely that vegetation clearance will be far less. It is not expected that this clearance will result in habitat fragmentation or a barrier to fauna movement. Any native vegetation clearance will be offset to compensate for its loss, in accordance with the requirements of State legislation.

As described above, there is limited presence of any listed (not common) plant or animal species within the vicinity of proposed works. The primary species of concern is the Slender-billed Thornbill which is known to occur in low numbers in Chenopod shrubland areas. This habitat is common in the region and the removal of this vegetation is not expected to pose any risk to the viability of the Slender-billed Thornbill. Any birds displaced are expected to move to adjacent, good quality habitat. Overall, the impact to listed species as a result of vegetation clearance is considered minor.

Other potential indirect impacts of the Project on plants and animals of the study area include:

- » Noise from construction or operation of the rail spur, storage facilities, conveyors and jetty which may disturb fauna species utilising the area may cause some animals to avoid areas immediately adjacent to noisy activities
- » Light spill from construction activities or site operations which can affect feeding, reproductive behaviour and social behaviour
- » The introduction and spread of additional weed or feral pest sources

- » Increased bushfire risk through human causes
- » The release of dust from either construction or operations.

## Mitigation Measures

Mitigation measures to be applied include:

- » Surveys of vegetation for the presence of fauna and nests prior to the commencement of clearing activities; should wildlife be found works will not commence until they have moved on or been relocated
- » Minimising the clearance of vegetation wherever possible
- » Minimising night time lighting and providing shields to reduce light spill to the surrounding environment
- » Minimising the spread or introduction of weeds e.g. cleaning of plant and machinery, limiting works areas to designated tracks and rehabilitation of disturbed areas as soon as possible, regular surveys and treatment of declared and environmental weeds
- » Monitoring and control of feral animals
- » Restricting high risk activities during high fire danger periods and regular monitoring of potential fire-starting activities.

## Summary

There are no plants or animal species of significance that commonly occur within close proximity of the Project area, with the exception of the Slender-billed Thornbill, which is listed as Vulnerable under Federal legislation. Whilst the Slender-billed Thornbill does occur within the Project area, the clearance of habitat and other indirect impacts (i.e. noise, dust) are not expected to have a significant impact on the viability of this species.

With the control measures outlined above applied, the potential impact to terrestrial plants and animals within the study area is considered to be low.

## 8. TRANSPORT

The following presents a summary of the key findings. For more detail, see the Environmental Impact Statement, **Chapter 8, Transport**.

The traffic study focuses on the Lincoln Highway, Port Bonython Road and Norrie Avenue Extension, which are most likely to be affected.

Traffic modelling was undertaken to quantify the likely extent of impact. The level of background traffic at a given design year was calculated as the sum of existing surveyed traffic volumes and an allowance for traffic growth to account for gradual development in the area.

### Existing Environment

Port Bonython Road, Norrie Avenue Extension and the Lincoln Highway have free flowing conditions and operate within their design capacity. Site observations indicate that visibility from Port Bonython Road to oncoming traffic from both directions on Lincoln Highway is acceptable. However it was noted that the existing right hand turn from the Lincoln Highway south approach does not fully meet design requirements. The Lincoln Highway/Norrie Avenue Extension intersection also has sufficient capacity to accommodate the existing traffic volumes.

An assessment of the crash history for the route between Whyalla and the proposed development site at Port Bonython was undertaken. The crash data indicates that relatively few crashes have occurred within the study area. The assessment suggests that there are no accident black spot locations, as each crash recorded was unrelated to all others in crash type and / or location. In addition, there is little evidence to suggest that any of the crashes were caused by road design or poor maintenance of the road.

There is currently a single standard gauge railway track running from Port Augusta to Whyalla, with an alignment roughly parallel to the Lincoln Highway. The southern end of this line is located at the Arrium facility in Whyalla. The northern end of this line connects to the main east-west rail corridor from New South Wales and Victoria to Western Australia. The main east-west rail corridor is owned by the Australian Rail Track Corporation.

There is currently one active rail level crossing within the study area of relevance to the Project, located on Port Bonython Road near the intersection with the Lincoln Highway. The current crossing is actively controlled by flashing lights and bells only. Signage and road marking is also provided. This is consistent with the minimum requirements from the Australian Rail Track Corporation standard for Level Crossing Design for a single line railway intersected by a public road.

### Impact Assessment

- » There will be new rail movements associated with the proposed Project that will use existing and new rail lines. These movements may result in increased risk of road / rail accidents at existing and new road / rail crossings.

The traffic generated by the proposed construction and operation of the Project could also lead to impacts, including:

- » Increased risk of road accidents due to a higher level of traffic on the roads
- » Increased delay caused by insufficient capacity at intersections and along road links.

The volume of traffic generated by the Project in the construction and operations phases of both stages of development (Stage 1– 25 mega tonnes per annum and Stage 2 – 50 mega tonnes per annum) was calculated. These are presented in **Table 3**.

**Table 3: Traffic generated by the BCEF**

Phase	Traffic Generation (vehicles per day)
Construction (Stage One)	200
Operations (Stage One)	60
Construction (Stage Two)	120
Operations (Stage Two)	90

A summary of the intersection traffic increases as a result of the construction and operational phases of the development is provided in **Table 4** and **Table 5**.

**Table 4: Summary of intersection traffic increases due to construction**

Intersection	Percentage increase in traffic caused by construction	
	Morning peak hour	Evening peak hour
Lincoln Highway / Eyre Highway	4%	4%
Lincoln Highway / Port Bonython Road	31%	24%
Lincoln Highway / Norrie Avenue Extension	5%	6%
Norrie Avenue Extension / Iron Knob Whyalla Road	3%	3%
Lincoln Highway / McBryde Terrace	3%	3%

**Table 5: Summary of intersection traffic increases due to operation**

Intersection	Percentage increase in traffic caused by operations	
	Morning peak hour	Evening peak hour
Lincoln Highway / Eyre Highway	0%	0%
Lincoln Highway / Port Bonython Road	12%	9%
Lincoln Highway / Norrie Avenue Extension	2%	2%
Norrie Avenue Extension / Iron Knob Whyalla Road	3%	3%
Lincoln Highway / McBryde Terrace	3%	3%

The results show that the Port Bonython Road/Lincoln Highway intersection will operate with an acceptable level of service during the peak construction and operation periods. It is noted that the queue on Port Bonython Road (less than three metres in both peak periods for construction, and one metre during operations) is unlikely to obstruct the operation of the level crossing, which is located approximately 70 metres away. The results indicate that the intersection has sufficient capacity to accommodate the traffic volumes in the peak construction year. The Lincoln Highway/Norrie Avenue Extension intersection also has sufficient capacity to accommodate the expected traffic volumes during both the construction and operational phases.

Port Bonython Road, the Lincoln Highway and the Norrie Avenue Extension all have sufficient capacity to accommodate the expected future traffic volumes, and maintain a good level of service.

Advice from the Australian Rail Track Corporation indicates that there will be sufficient capacity on the railway network to support the expected rail traffic generated by the Project.

In addition to the impact on traffic capacity caused by additional traffic volumes, there are expected to be additional temporary impacts during construction. These include:

- » Impact on the Whyalla rail spur during the construction of the connection with the line to Port Bonython
- » Obstruction to property accesses along Port Bonython Road during the construction of the line to Port Bonython
- » Disruption to general traffic during the movement of oversized loads along the delivery path.

It is anticipated that the construction of the rail connection to Port Bonython can be completed during a brief closure of the Whyalla line. The exact methodology will be required to be agreed with Australian Rail Track Corporation during the detailed design phase of the Project.

It is recognised that the construction of the Port Bonython rail line is likely to affect the operation of property accesses along Port Bonython Road, including access to properties at Fitzgerald Bay. These will be required to be managed through the development of a Traffic Management Plan during the detailed design phase, in consultation with local property owners. The permanent impact of the rail line crossing these accesses will be minimised by tailoring the location of the rail line / Port Bonython Road grade separated crossing to avoid an at-grade crossing of the property accesses (Fitzgerald Bay and Cuttlefish Drive only; other property accesses will be an at grade crossing).

There may also be some temporary disruption to normal traffic flow due to over-sized vehicles travelling along the delivery route. As is usual with vehicles of this type, the contractor will be required to prepare a Traffic Management Plan for these vehicles, in consultation with Department of Planning, Transport and Infrastructure.

Sufficient off-road car parking spaces shall be provided for staff and construction vehicles to minimise the occurrence of on-road or uncontrolled off-road parking, which will tend to affect road safety.

## Mitigation Measures

Several mitigation measures are proposed as part of the Project works:

- » Improvement of the right turn treatment at the Lincoln Highway / Port Bonython Road intersection
- » Grade separation of the new rail level crossing of Port Bonython Road (located between Cuttlefish Drive and Fitzgerald Bay road pending detailed design)
- » Development of a construction traffic management plan for the control of site deliveries and over-sized vehicles
- » Provision of sufficient off-road car parking spaces.

## Summary

The additional traffic generated by the construction is not expected to cause a significant impact on the surrounding road network. The only impact that will require further mitigation is the safety impact on the right turn from Lincoln Highway south approach to Port Bonython Road.

## 9. LANDSCAPE AND VISUAL AMENITY

The following presents a summary of the key findings. For more detail, see the Environmental Impact Statement, **Chapter 9, Visual Amenity**. In order to undertake this study, a series of representative viewpoints were selected to comprehensively illustrate the visual influence of the Project.

### Existing Environment

Whyalla is located approximately 400 kilometres northwest of Adelaide, on the western side of the Upper Spencer Gulf. A town with an industrial history, founded in 1901, Whyalla was established as a port to ship iron ore from the nearby Middleback Ranges, and has a dominating industrial character on its foreshore, and outlying areas. Surrounding Whyalla, the landscape comprises of a broad semi-arid plain and low undulating hills. The vegetation is predominantly low, with isolated geological features, such as Wild Dog Hill, rising abruptly from the surrounding plains.

The Lincoln Highway travels north from Whyalla paralleled in part by an existing railway line and transmission lines, which traverse the open landscape. Port Bonython Road connects the Lincoln Highway, around False Bay, to Port Bonython and Point Lowly, located on a small peninsular protruding into the Gulf.

Landform in the vicinity of Port Bonython rises from the coastline with a series of low cliffs, rocky headlands and small bays. At the end of Port Bonython Road, Point Lowly comprises a cluster of historic buildings, including a whitewashed stone lighthouse. The Freycinet trail loops around the peninsula, and includes a series of interpretive signs that describe the surrounding landscape and history of the local area. A cluster of houses (a mix of coastal homes, holiday homes and some permanent dwellings) located adjacent to the beach on the western side of the peninsula are located adjacent to an existing industrial development.

The Santos Refinery, a hydrocarbon processing plant was established in 1984, and includes both land based industrial development and a jetty structure extending some two kilometres into the Gulf. The peninsula is roughly divided from east to west by a localised ridgeline. To the east of the peninsula the dramatic coastline is spotted with residences, however, these areas are beyond the visual catchment of the Project due to this landform.

Beyond this and on the eastern side of the Gulf are distant views of the Flinders Ranges, including Mt Remarkable, which can be seen as a background to some easterly views.

False Bay comprises a broad saltmarsh and dune landscape with a small cluster of coastal homes located directly on the shoreline. From this location there are uninterrupted views across the Gulf to the industrial coastline of Whyalla.

At night the study area is predominantly dark with lit areas being restricted primarily to the clusters of coastal homes on the coastline and the Santos Refinery at Point Lowly. The Highway, roads and railway in the region are not generally lit and carry low levels of traffic. The township of Whyalla is the brightest area of the landscape, emitting the greatest amount of light and sky glow.

Generally, there were six landscape character areas observed in the study area, namely:

- » Whyalla / Industrial & Urban
- » Lincoln Highway / Scattered Open Woodland
- » False Bay / Salt marsh & Dunes
- » Port Bonython Road / Low Open Woodland
- » Point Lowly / Low Shrubland
- » Spencer Gulf / Open Water.

The sensitivity of the study area is highly variable. Some parts of the study area are influenced by a number of historic properties and designated viewing points, resulting in a higher visual sensitivity. Others, including the highly industrialised landscapes of the Whyalla coast and Santos Facility at Port Bonython change the user type and reduce the sensitivity.

In this landscape there is an argument, particularly in Whyalla, that the industrial landscapes are a visual feature, which is of interest to some viewers. These include views from designated viewpoints, such as Hummock Hill, where the industrial buildings are visual landmarks, and the history and function of these activities are interpreted in signage and tourist brochures. This tourist interest adds to its visual sensitivity.

### Impact Assessment

A number of viewpoints were selected as representative of the range of views to the site and the proposed development to assess the impact of the Project on the visual amenity of the study area. The majority of views are considered to be of local sensitivity only, and will experience either negligible or minor adverse changes. Views that may experience a moderate adverse change during the daytime include:

- » Stony Point Cuttlefish divers' platform (**Figure 7**)
- » Port Bonython Road.

At night-time, there will also be some limited change to lighting which will be viewed mostly from the Port Bonython Road.

## Mitigation Measures

Due to the nature of the site and surrounding landscape, and potential impacts identified, there are few mitigation options available that will be sympathetic with the surrounding low vegetation, and natural character. In summary, the following mitigation measures are to be implemented.

- » Existing vegetation around the perimeter of the site will be retained to act as a visual screen
- » Where feasible the elements within the construction site will be located to minimise visual impact, e.g. setting equipment back from site boundaries
- » The colour of the sheds will be neutral and reflect the colours of the surrounding landscape to make them recede visually
- » Jetty colour selected to allow it to visually recede
- » Treatment of rail grade separated crossing bridge designed so that they blend with the surrounding landscape; this will include the selection of appropriate colours and design treatments
- » Car parking will be designed so that it follows the natural topography of the site, and is broken up with areas of retained vegetation to reduce the visual scale and mass
- » Storage areas and site offices required for construction will be set back from the road and site hoarding considered where visually obtrusive elements are located
- » The footprint of temporary construction works on the foreshore will be minimised as much as possible and the duration of this work minimised
- » Cut-off and directed lighting will be used to ensure glare and light trespass are minimised
- » Preparation of a Light Management Plan for operational activities.

## Summary

The Project is positioned such that views from existing vantage points and residential areas to the proposed infrastructure will be limited. The most significant change in landscape and visual character will be to views along the Port Bonython Road and along the Coastal Road from the existing diving platform. There is negligible impact predicted to views from Point Lowly, False Bay and Whyalla.

Figure 7: Viewpoint 3, Stony Point Cuttlefish divers' platform



## 10. SOCIO-ECONOMIC IMPACT

The following presents a summary of the key findings. For more detail, see the Environmental Impact Statement, **Chapter 10, Socio-Economic Impact**. The assessment was informed by 2011 census data, existing reports, a site visit and consultation with stakeholders.

Stakeholder and Community Engagement is an important aspect of the EIS process. The stakeholder engagement and social impact assessment have been undertaken as a combined activity with engagement with people and groups informing the social impact assessment. Activities to date have included:

- » Establishing a Project 1800 number and email address to allow stakeholders and the community to contact the EIS team
- » Stakeholder letters and email providing an update of EIS progress
- » Establishing a Project website which is regularly updated with Project information
- » Face-to-face briefings with key stakeholders
- » Media releases and Project fact sheets.

### Existing Environment

The key elements of the study area of relevance to this Project include:

- » Stony Point (the location of the majority of the Project) is a key access point for divers accessing the Australian Giant Cuttlefish breeding area. Weerona Bay, near Stony Point is no longer publically accessible due to closure for development of the Santos facility in the 1980s (**Figure 8**)
- » 75 coastal homes at Point Lowly and 32 coastal homes at False Bay, some of which are used as a primary residence with a larger percentage being used as short term accommodation for owners and their visitors
- » The Santos hydrocarbon processing plant, which commenced operations in 1984, intrinsically changed the character of the area by adding an industrial influence
- » Camping facilities provided at Point Lowly is used by caravans and campers

**Figure 8: Stony Point with the Santos jetty in the background.**



**Figure 9: Boating facilities at Point Lowly**

- » Boating facilities at Point Lowly including a breakwater and all weather boat ramp servicing both the aquaculture industry, previously located at Fitzgerald Bay, and recreational users (Figure 9)
- » The Australian Department of Defence Cultana Training Area, which occupies 50,000 hectares that is used for training and vehicle manoeuvres
- » The Upper Spencer Gulf and associated Marine Park, which provides a significant commercial fishery and tourism opportunities of economic value e.g. diving, fishing, aquaculture.

While a number of people call Point Lowly their permanent home, most users are transient with owners using their coastal homes as weekend or holiday accommodation. Other visitors rent the lighthouse cottages or coastal homes, stay in motorhomes or are day visitors to the area. The False Bay coastal homes are fewer in number and appear to have a higher percentage of permanent residents than Point Lowly.

The primary study area has limited social infrastructure with the settlements predominantly serviced by nearby Whyalla. The infrastructure that is in place at Point Lowly mainly services visitors to the area and is related to camping and boating activities. The primary study area is located within the Whyalla Local Government Area. Whyalla is the closest regional centre to the primary study area. The Whyalla central business district is located approximately 40 kilometres by road from Point Lowly.

Whyalla currently has a population of around 22,000 people, with this population remaining fairly stable for the past ten years. The area experienced a significant employment boom during the late 1960s and 1970s in line with the development of the Whyalla steelworks. A decline in population can be attributed to changes in employment opportunities at the steelworks, which was the area's primary employer for many years. The area's population has stabilised in the past five to ten years after a significant decline.

Whyalla provides a number of regional services that are accessed from Port Bonython including schools, medical care, retail and commercial facilities and a range of accommodation options.

The socio-economic profile of the Whyalla Region, within which Port Bonython sits can be characterised by the following information:

- » The average age of Whyalla residents is 38 years, a year younger than the South Australian median average and a year older than the Australian average age. 65 percent of the Whyalla population is of working age
- » There is a low rate of tertiary employment in comparison to other South Australians which is attributable to the majority of residents being employed in the manufacturing and trade industries
- » Nearly three quarters of Whyalla residents are Australian born and from Australian descent, with almost 60 percent of residents having both parents born in Australia. English is the most common language spoken at home
- » The Whyalla household structure is primarily dominated by couples and small families who live primarily in detached housing
- » In 2011, more than half of Whyalla residents were in full time employment, although there was an above average level of unemployment, likely due to a recent decline in industry in the area
- » Residents of Whyalla have a lower average weekly income than the State and National average.

## Impact Assessment

Potential impacts of the Project on the existing socio-economic conditions of Port Bonython and the wider Whyalla region include:

- » Limited impact to people's way of life as:
  - road access to points of interest will be maintained i.e. coastal road will remain open during port operations
  - recreational boating, camping, diving and fishing activities will not be significantly restricted (only a 50 metre buffer zone either side of the jetty will be restricted)
  - there will be no loss of public open space on land
- » Only minor impacts on noise, air quality, visual amenity and traffic will be experienced by users of Port Bonython
- » There is no direct loss of housing or land owned or occupied by residents or visitors to Point Lowly or False Bay as a result of the Project



- » At a regional scale, significant additional employment and business opportunities will be created for the Whyalla region
- » There will be significant value added to the regional and South Australian economy from the capital expenditure of the Project
- » Spencer Gulf Port Link are committed to sourcing local workers for the Project, and the members have significant track record in this pursuit. Flinders Ports is a significant regional employer, and Leighton Contractors has a permanent workforce located in the Upper Spencer Gulf with a commitment to ensure local workers and firms are able to participate in the opportunities presented by this Project. Leighton Contractors will take the lead for Spencer Gulf Port Link in the development of an Industry Participation Plan and implementing positive opportunities for engagement with the construction stage of the Project for Upper Spencer Gulf and South Australians.
- » Employment contracts and tenders will include clauses that require disciplinary action/dismissal if staff/contractors are found to be engaging in anti-social or disruptive behaviour whilst staying in short term accommodation while working on the Project.

## Summary

Construction will result in some temporary disruption to access and amenity within the primary study area, but this will be managed through appropriate communication with stakeholders and traffic management activities. Post construction the Project is not expected to have any significant impact on local settlements, access routes or adjacent land uses. The Project will add to the industrial character of the area, but this is in line with land use zoning for the area. The Project will not impact on any community facilities except for the Australian Giant Cuttlefish viewing area at Stony Point, which will be relocated to an appropriate local location.

Construction and operation of the new jetty will remove the area of the marine environment around the new structure from use. The exclusion zone around the jetty will only be 50 metres, which is significantly less than around the existing Santos jetty. Mariners will be notified of any changes to marine mapping and navigational aids. The impact on commercial fishing is expected to be negligible as limited commercial fishing occurs in the area where the jetty will be constructed. Recreational fishers will still have access to the Upper Spencer Gulf and will be able to manoeuvre in close proximity to the new jetty so impacts are also expected to be negligible.

From an economic perspective, construction and operation of the Project is expected to have a beneficial impact on the local economy in terms of jobs and economic contribution. This economic benefit extends to the State (forecast to add around \$10.2 billion to Gross State Product in the next 30 years, or around \$340 million annually) and National (forecast to add around \$9 billion to Gross Domestic Product in the next 30 years, or around \$300 million annually). The Project is expected to directly generate a maximum 270 Full Time Equivalent jobs during construction and approximately 40 Full Time Equivalent jobs during operation. Jobs will also be generated through flow on economic benefits in the South Australian (630 jobs during construction and 790 during operation). It is likely that the majority of these jobs will be located in the local Eyre and Northern Statistical Divisions of South Australia.

Without the Project, during the next 30 years this could potentially result in the loss of up to \$14.6 billion in direct export revenue as existing ports become capacity constrained in the future and/or the distances to alternative open access ports makes export commercially unviable.

## Mitigation Measures

A number of measures which will mitigate socio-economic impacts have already been proposed for incorporation into the Project design. These include:

- » Grade separation (of rail crossing) of Port Bonython Road to allow continued access for visitors, general road users and to the residential communities and properties accessing Port Bonython Road from Fitzgerald Bay Road and Cuttlefish Drive
- » The Coast Road will remain accessible at Stony Point
- » On-going communication and engagement will occur with local residents, workers, Whyalla City Council, Santos, the Australian Defence Force and other adjacent Project proponents/property owners during the design, construction and operation of the Project
- » Liaison with False Bay residents to discuss the railway construction program to minimise noise impacts (especially related to any night works that may be required) when the rail construction site is in close proximity to the False Bay settlement
- » Major changes to traffic management (in accordance with approved traffic management plans) are to be communicated with Port Bonython Road users in advance of changes being implemented
- » Relocation of the Stony Point Cuttlefish interpretive signage and viewing platform westwards to an adjacent area closer to the Marine Park. The form of this infrastructure is to be discussed with relevant stakeholders and the local community
- » A South Australian Industry Participation Plan will be prepared for the Project and included in all tender documentation to ensure appropriate levels of local contractor involvement are maintained. This plan will also outline plans for Indigenous training and employment

## 11. CULTURAL HERITAGE

The following presents a summary of the key findings. For more detail, see the Environmental Impact Statement, **Chapter 11, Cultural Heritage**.

### Existing Environment

The first known European contact with the Whyalla region was Matthew Flinders' exploration of Spencer Gulf in 1802, which included naming Point Lowly. The region to the north of Point Lowly to Port Augusta and the Flinders Ranges was further explored in the early 1800's and eventually developed for pastoral use. Increased shipping activity to service the pastoral industry led to the construction of the Point Lowly Lighthouse in 1883; the lighthouse is now protected under South Australian legislation (**Figure 10**). However the key driver for settlement and development in the Point Lowly region, since the late 1800's was the discovery of iron ore and the establishment of a mining and manufacturing industry. Operations at the Santos hydrocarbon processing facility at Port Bonython began in 1985.

There are three protected shipwreck sites off Point Lowly listed on the Historic Shipwrecks Register: Sarah (1876), Parara (1882) and Angler (1913). No physical evidence of these shipwrecks has been located.

**Figure 10: Point Lowly Lighthouse**



There is substantial historical evidence for the widespread movement of Aboriginal people around the Eyre Peninsula in the Twentieth Century. Many of the people lived semi-independent lives in camps on the edges of settlements and towns, locations in which aspects of Aboriginal language and ceremonial life

was maintained. 'Barngarla', 'Kokatha' and 'Wirangu' 'tribal' identities were sustained, but also reformulated in these settings. Contemporary individuals are descended from ancestors identified variously with these groups.

Historical records confirm the presence of known and remembered Aboriginal people living and working in the wider Whyalla/Port Bonython area. Throughout the Twentieth Century this usually meant station work and domestic work in the pastoral industry. Many women, children and the elderly were resident in fringe camps that grew up near towns or ration depots such as Iron Knob.

The Barngarla have clearly documented heritage interests in the Port Bonython area, including the Project site, based on their association with the area prior to non-Indigenous occupation. The Project area also lies within the Barngarla native title claim application area which is currently in hearings before the Federal Court. The Kokatha, Adnyamathanha and Nukunu people also have an interest in the area.

A search of the public records indicates that there are several recorded sites and/or objects of Aboriginal heritage significance within and/or adjacent to the site. There are significant archaeological sites (both registered and recorded) in the area of Black Point, and are likely to occur further in the red deflated dune that runs north from here almost to the Port Bonython Road. The area of the proposed rail spur and line is less well covered in the documentary record, however previous surveys findings suggest that dunes and rock outcrops are the most likely location of archaeological sites and that these are unlikely to occur in the rail corridor. The Port Bonython road itself will have disturbed any possible archaeology, as has the gas pipeline which runs beside it.

### Impact Assessment

The Point Lowly Lighthouse and the likely location of the shipwrecks will not be directly or indirectly impacted by the Project.

Consultation with all aboriginal groups with an interest in the area will be undertaken to confirm these interests, to assess the cultural heritage impact of the proposed development and to mitigate any impact of the proposal. Any mitigation measures may be included in Heritage Agreements with traditional owners within the requirement of legislation. The development plans avoid the archaeological sites in vegetated deflated dunes, but cultural heritage management process will be needed to avoid damage from construction, vehicle and human access.

The Project area lies within the Barngarla native title claim application area however a detailed assessment of the Projects impact on Native Title Claimants is yet to occur. Developing a dialogue and consultation with Barngarla is a priority for Spencer Gulf Port Link, but until such consultation occurs, assessment of any impact on Native Title will be incomplete.

## 12. CLIMATE CHANGE AND GREENHOUSE GASES

The following presents a summary of the key findings. For more detail, see the Environmental Impact Statement, **Chapter 12, Climate Change and Greenhouse Gas**. **Table 6** presents climate change projects that have used for this assessment.

**Table 6: Summary of predictions for key climate variables in the Eyre Peninsula, SA**

Description	Impact under High Emissions Scenario
Annual temperature increase best estimate	+0.8°C by 2030 +2.25°C by 2070
Annual rainfall reduction best estimate	-3.5% by 2030 -15% by 2070
Evapotranspiration	An increase in potential evapotranspiration varying from +4% to +8%, adds to increasing aridity.
Sea surface temperature increase best estimate	+0.45°C by 2030 +0.6°C by 2070
Sea level rise recommendation adopted by the South Australian Coast Protection Board	+ 0.30 m to 2050 + 0.70 m to 2100
Wind speed change	Wind speeds may change by 3.5-7.5%
Extreme hot days (number of days over 35°) (Regional projections from Adelaide)	+21-26 days by 2030 +24-47 days by 2070
Extreme cold events and frost	Decrease in number of events
Bushfires, increase in the number of "very high" and "extreme" fire days	15-70% by 2050
Extreme rainfall events	Increase between 0-10% by 2050
Increase in months experiencing drought	Increase of 300 months in frequency by 2050

### Potential Impacts

#### Climate Change

Potential impacts of climate change that might be experienced by the Project include:

- » Changes in rates of deterioration of rail, road and other pavements due to extreme heat (railway buckling, material delamination, hard stand deterioration)
- » An increase in the frequency of interruption of road, rail and ship traffic from extreme weather events

- » Exceedance of site drainage capacity during extreme events
- » Increased risk of damage to infrastructure from bushfire, lightning strike
- » Higher rates of building deterioration and associated maintenance costs from higher average temperatures and more extreme heat days
- » Damage to marine infrastructure from storm surge events and a rising sea level
- » Insufficient water supply due to reduced overall runoff
- » An increase in the proliferation of some species of weed and pests
- » An increase in drought tolerant species and more stress to less resilient native species
- » Potential change in breeding seasons and migration patterns of marine fauna
- » Health and safety risks for staff associated with potential heat stress and increased exposure to UV
- » Changes in marine water conditions including salinity, pH and algal blooms due to increased water temperatures.

#### Greenhouse Gases

Construction emissions will result from the use of an estimated 3,000 Kilolitres of diesel fuel used in plant, equipment, vehicles and vessels throughout the 30 month construction period (Phase One, 25 mega tonnes per annum). The use of diesel fuel during Phase 1 of construction is estimated to account for 8100 tonnes of carbon dioxide equivalent. Fuel use will be the largest contributor to a greenhouse gases footprint during the construction phase and is estimated to represent 80 percent of overall emissions. The purchase of 3.05 Mega Watt Hours grid power during construction is estimated to generate 2000 tonnes of carbon dioxide equivalent representing approximately 20 percent of Greenhouse Gas emissions during the construction stage.

This equates to a total construction greenhouse gas production (during phase one) of 10,100 tonnes of carbon dioxide equivalent.

Energy use during the Project operational activities will include fuel usage in port related infrastructure, equipment, plant, vessels and vehicles. Emissions will also be generated through the consumption of purchased electricity during the operation of port related infrastructure and buildings.

An estimated 1700 kilolitres of diesel per annum is expected to be utilised during the operation of the proposed Project (at the full 50 mega tonnes per annum capacity). Fuel usage during the operational stage will primarily involve tugs, road vehicles, and loaders operating within the storage sheds.

Fuel usage during the operational stage is estimated to generate approximately 5100 tonnes of carbon dioxide equivalent annually, contributing approximately seven percent to the operational carbon footprint.

An overall usage of 106.18 Giga Watt Hours of electricity is projected for the annual operation of the Project. Electricity consumption during operation will generally involve conveyors, ship loaders, sewage treatment plant operation, lighting and general port management.

Emissions associated with purchased electricity will be the largest contributor of Greenhouse Gas emissions during the operational phase. The overall annual greenhouse gas emissions likely to be generated by the operation of the Project is 74,100 tonnes of carbon dioxide equivalent.

## Mitigation Measures

### Climate Change

Many of these potential impacts can be mitigated through early design intervention and operational procedures.

Generally there are four possible approaches in responding to climate change:

- » Avoid – e.g. avoid locating assets in vulnerable areas
- » Adapt – e.g. design and/or design standards to operate in predicted climate conditions
- » Defend – e.g. install defences at or around critical infrastructure
- » Retreat – e.g. develop and implement plans to relocate from the vulnerable area.

The measures discussed in this assessment respond directly to the 'Adapt' approach and seek to present a range of recommendations to support continued operation in the face of predicted climate change conditions.

Mitigation measures will be further investigated in subsequent design phases to determine whether they are feasible, but may include:

- » Use of materials that reduce degradation of road and rail infrastructure from heat
- » Management plans for consideration of operating procedures in major storm events to minimise potential health and safety risks and damage to infrastructure
- » Optimal layout of drainage and the application of water sensitive urban design measures to maximise reuse of existing available water supply
- » Installation of energy efficiency measures for buildings to reduce energy demand on hot days
- » Preparation of a bushfire management plan, which will consider the additional risk posed by climate change

- » Buildings will be designed to consider projected wind and storm extreme events
- » Marine infrastructure will be designed with a safety factor to allow for sea level risk and storm surge
- » Provision of back-up power for critical port infrastructure in the event of extreme events
- » Landscaping will make use of drought tolerant species
- » Disturbance of existing marine and terrestrial habitats will be minimised so that they retain a level of resilience to climate change
- » Policies regarding heatwaves, sun and Ultra Violet exposures will form a part of the operation management plan.

### Greenhouse Gas Emissions

A number of mitigation measures may potentially reduce greenhouse gases produced by the Project. Opportunities to further reduce Greenhouse Gas emissions will be evaluated based on the following emissions hierarchy:

- » Avoid: identify how the design, construction and operation stages can avoid activities that produce Greenhouse Gas emissions
- » Reduce: identify how activities can be modified to reduce Greenhouse Gas production
- » Switch: identify opportunities to switch to renewable energy and lower-emission fuel sources
- » Offset: offset residual emissions in line with regulatory requirements.

The feasibility of these potential measures will be explored further during the next design phase and will include consideration of:

- » Energy efficient building design
- » Efficient site layout that minimises travel distances between facilities
- » Use of renewable energy e.g. solar/wind power
- » Sourcing materials locally to reduce travel times and fuel use
- » Use of energy efficient plant and equipment
- » Purchase of carbon offsets for residual greenhouse gas emissions.

## 13. COASTAL PROCESSES AND WATER QUALITY

The following presents a summary of the key findings. For more detail, see the Environmental Impact Statement, **Chapter 13, Coastal Processes and Water Quality**. As there will be no dredging as part of the Project, desk top studies have been utilised, supplemented by some sediment sampling.

### Existing Environment

#### *Tides and Currents*

The Project is largely sheltered from significant wave action (or heights), experiencing waves of generally less than 0.25 metres. Port Bonython experiences a tidal range of up to 2.7 metres. Tides at Point Lowly circulate in a clockwise pattern, producing an easterly alongshore flow, with velocities of between 0.7-1.0 metres per second.

#### *Sediment Characteristics*

Surface sediment samples were collected to better understand the seabed sediments. The results show that there is a high percentage of sand and gravel size material at most locations, limiting turbidity impacts.

#### *Coastal Protection and Sediment Transport*

The foreshore from which the jetty will be launched is rocky, and as such, no man-made coastal protection exists. There is no evidence of recent or ongoing major change in either the shoreline or the seabed along the proposed jetty alignment. Inshore, sand transport will travel from east to west. Further offshore, near the end of the jetty, sediment may travel in a westerly direction.

#### *Marine Water Quality*

Potential existing sources of water pollution in the region include a number of Wastewater Treatment Plants, aquaculture, a power station at Port Augusta, urban and agricultural stormwater runoff. The existing water quality at Port Bonython can be described by the following parameters:

- » Nutrients – all nutrient concentrations are within recommended levels, and meet the requirements for the protection of marine ecosystems
- » Metals – there is no evidence of metals above recommended levels
- » Turbidity – turbidity varies between seasons (generally higher in summer months), with peaks during periods of strong southerly winds. On average, turbidity is within acceptable ranges, but at times does exceed recommended levels. This indicates that some sediment is mobilised and transported by tidal currents

- » Faecal microorganisms – indicators of faecal contamination are very low, which is to be expected with the limited effluent discharges in the area
- » Hydrocarbons – hydrocarbons are below the limit of detection.

#### *Shipping Activities and Operations*

Flinders Ports undertakes the management of shipping operations in Spencer Gulf including Upper Spencer Gulf, which includes Port of Whyalla, a Cape Transshipment Point, Port Pirie and Port Bonython (Santos Jetty).

Currently Cape-size vessels up to 180,000 Dead Weight Tonnage travel through Spencer Gulf to the boundary of the Port of Whyalla limit and at the Cape Transshipment Point. In addition, Liquefied Natural Gas carriers up to 110,000 Dead Weight Tonnage travel through Spencer Gulf to Port Bonython (Santos Jetty). Vessels calling at Port Pirie and Whyalla range in size considerably but are all significantly smaller than those calling at Port Bonython (Santos jetty).

The existing shipping channel is along a route with water depth of 20 metres at Lowest Astronomical Tide with the exception of the Yarraville Shoals where the water depth is slightly less than 20 metres (19.6 metres) at Lowest Astronomical Tide.

Although it varies from year to year, on average, the number of large vessels that utilise the Upper Spencer Gulf is 171.

### Impact Assessment

#### *Marine Water Quality*

Potential impacts on water quality include:

- » Turbidity from the installation of steel piles – this is not expected to have a significant impact on the amount of suspended sediment in the water as the impact is temporary and localised
- » Generation of construction and operational waste
- » Oil spills either from construction equipment, ship collision or refuelling of tugs and construction vessels
- » Turbidity from propeller wash of tugs and Cape-size vessels, which may stir up bed sediments during vessel manoeuvring. Whilst some sediment will be disturbed, this is considered to have only a moderate impact on water quality and it is unlikely to affect any sensitive habitats.
- » Coastal Protection and Sediment Transport

There will be negligible change in beach and nearshore profiles due to the proposed jetty abutment. Protection to the jetty abutment will be designed against potential scouring due to wave and current flow.

The diameter and spacing of the piles is such that the impact to tidal flow will be negligible. The magnitude of the flow velocity indicates that there may be local scour around the piles however this will not influence broader sediment transport processes.

It is therefore considered that there will be negligible change in the hydrodynamic regime and seabed profiles as a result of the Project.

### **Shipping Activities and Operations**

The proposed development is expected to receive approximately 277 vessel calls per annum. This will be less if the full 50 mega tonnes per annum capacity of iron ore handling is not delivered. The ships calling at the proposed BCEF will be largely using the existing shipping route, apart from at the approach and departure routes in the vicinity of the Project.

The maximum proposed design vessel is the Cape-size bulk carrier with the smaller Panamax bulk carrier also able to utilise the Port. Photos of unloaded and loaded Cape-size vessels are shown in **Figure 11** and **Figure 12**.

The clearance for vessels manoeuvring in the Spencer Gulf is 0.9 metres or ten percent of the vessel draft (whichever is greater), as required by Flinders Ports. For the fully laden Cape-size vessel this corresponds to a required clearance of 1.8 metres and hence the Cape-size vessel requires a water depth of 20.1 metres when manoeuvring or underway. At Yarraville Shoals where the water depth is slightly less than 20 metres (19.6 metres) at Lowest Astronomical Tide, a fully laden Cape-size vessel will be required to take the advantage of tidal levels. This will mean that fully laden vessels will be required to depart the berth within two hours prior to high tides for safe navigation through Yarraville Shoals.

## **Mitigation Measures**

The following mitigation measures are proposed:

- » Design of the footprint of the abutment to be within the tidal zone to avoid any potential coastal erosion
- » Ensure hollow piles are used during piling activities to minimise sediment produce
- » Construction Management Plan to ensure best practice management of waste, hazardous substances
- » No fuelling facilities are to be provided for the iron-ore carrying vessels
- » Operate under Port Bonython's Spill Contingency Plan
- » Further assessments of sediment re-suspension and transport during detailed design to confirm that any turbidity propeller wash is unlikely to affect sensitive habitats
- » Fully-laden vessels will follow Port Rules to manage sailing with tides whilst navigating through Yarraville Shoals

- » Vessels will be piloted by experienced Flinders Ports pilots whilst in Port waters to minimise the risk of ship grounding or collision.

**Figure 11: Capesize vessel laden**



**Figure 12: Capesize vessel unloaded**



## 14. MARINE ECOLOGY

Spencer Gulf is recognised as an important resource for the recreational and commercial fisheries it supports and its unique biological characteristics. This Chapter of the Environmental Impact Statement provides an overview of the ecological values of the marine environment of the Gulf, with a focus on the Upper Spencer Gulf and the Port Bonython region. It identifies the potential impacts the Project may have on the marine environment from an ecological perspective and provides appropriate measures to avoid or minimise these impacts. Monitoring requirements for both the construction and operational phases of the development are also outlined.

The following presents a summary of the key findings. For more detail, see the Environmental Impact Statement, **Chapter 14, Marine Ecology**. Information for this Chapter was drawn from existing reports and a marine habitat survey.

### Existing Environment

Spencer Gulf encompasses two marine bio-geographical regions: Spencer Gulf and Northern Spencer Gulf. This bioregion extends from Point Riley on Yorke Peninsula, to the head of the Gulf at Port Augusta and to Shoalwater Point on Eyre Peninsula, and covers an area of 4,136 km<sup>2</sup>. Key features of the bio region are:

- » A relatively sheltered eastern shore with beach ridges, wide inter-tidal flats, and tidal creeks that are frequently colonised by seagrass, mangrove and samphire communities
- » A shallow, subtidal zone, which is generally less than 10 metres in depth. This zone is colonised by extensive seagrass meadows
- » Narrow deep channels up to 30 metres of depth with fine silt, coarse sand and shell grit bottoms, dominated by benthic invertebrate communities
- » Rocky intertidal zone and shallow reef communities, which are up to 6 metres in depth along the west coast that fall away steeply into deep water.

#### Upper Spencer Gulf Marine Park

The area where the Project will be constructed is located within the Upper Spencer Gulf Marine Park. The marine park holds a number of environmental, economic and social values as described in the 2012 Upper Spencer Gulf Marine Park Management Plan. These include:

- » Unique characteristic as an inverse estuary with higher salinity at the top of the Gulf. Influenced by high temperatures and large tidal ranges
- » Recognised as a Wetland of National Importance containing a variety of coastal and marine habitats including saltmarsh, tidal flats and some of the largest stands of mangroves in South Australia

- » Important nesting and breeding site for local and migratory shorebirds
- » The most extensive seagrass meadows in South Australia
- » Aggregation of the Giant Australian Cuttlefish
- » Commercial fisheries including Spencer Gulf Prawn Fishery, the Blue Crab Fishery, the Charter Fishery and the Marine Scalefish Fishery
- » Fitzgerald Bay aquaculture zone
- » Tourism; including recreational and charter fishing, fishing competitions, sightseeing cruises and diving/snorkelling with Cuttlefish
- » Commercial shipping from the ports of Whyalla, Port Bonython and Port Pirie supporting a range of industry sectors, including mining development
- » Existing coastal infrastructure (e.g. power stations) and proposed infrastructure developments (e.g. desalination plants and port facilities) are of economic importance in the region
- » Water and gas submarine cables traversing Spencer Gulf supply valuable essential services to the Eyre Peninsula community.

#### Species of significance

The Northern Spencer Gulf supports numerous marine species of conservation value. Some of these species are protected by legislation. A database search of marine fauna species listed for protection under Federal and State legislation identified 40 species of conservation significance that could potentially occur in the Upper Spencer Gulf within two kilometres of the Project. This included eight threatened species and 32 non-threatened species. The eight threatened species are the Southern Right Whale (*Eubaleana australis*), Humpback Whale (*Megaptera novaeangliae*), Australian Sea-lion (*Neophoca cinera*), Australian Fur-seal (*Arctocephalus pusillus*), Loggerhead Turtle (*Caretta caretta*), Green Turtle (*Chelonia mydas*), Leatherback Turtle (*Dermochelys coriacea*) and the Great White Shark (*Carcharodon carcharias*).

Protected species that were considered likely to occur in the Project area include:

- » **Southern Right Whale** (*Eubaleana australis*) - Following the cessation of whaling activities, the Australian population of the Southern Right Whale is increasing at near the maximum biological rate. Despite this recovery, the total population is still estimated to be only at around ten percent of the population that existed prior to whaling. Southern Right Whales are migratory, moving from their summer feeding grounds in the Southern Ocean to warmer Australian coastal waters over the winter months to calve and breed. Southern Right Whales are seasonally present in South Australian

coastal waters generally between the months of May and November. The Spencer Gulf does not contain any recognised aggregation areas; the closest location where regular sightings occur is in Sleaford Bay near Port Lincoln. The Marine bioregional plan for the South-west Marine Region recognises that all of the South Australian coastline should be considered as potential habitat for the Southern Right Whale

- » Observations suggest that Southern Right Whales are occasional visitors to the Upper Spencer Gulf, particularly when compared to the frequency of sightings around known congregation areas such as Victor Harbor and Fowlers Bay. There is no obvious reason for their presence in the Gulf, since it is not recognised as a breeding, calving, or feeding area. There is a possibility that the semi-protected waters of the Gulf could provide some use as a resting area
- » **Humpback Whale** (*Megaptera novaeangliae*) - Humpback Whales have a large distribution, occurring in both the northern and southern hemispheres. Migration of Humpback Whales through Australian waters generally occurs through autumn as whales move up through the Southern Ocean then up the east and west coasts of Australia to aggregation areas on the northern coast where breeding and calving occurs through winter and spring before returning to southern waters for the summer period. Despite these general migration patterns, Humpback Whales don't tend to be as predictable as Southern Right Whales with numerous 'out of season' sightings reported. In South Australia, there have been sightings from every month, with the possibility that these are Whales from both the east and west coast populations. In the Upper Spencer Gulf, Humpback Whales are an occasional visitor
- » **Syngnathids** (*Pipefish, Seadragons*) - Syngnathids are a family of fishes that include Seadragons, Seahorses and Pipefish and are known from a variety of habitats in South Australia, but are particularly well known as inhabitants of shallow inshore waters, including seagrass areas. All Syngnathids gained protection under the EPBC Act 2000, giving the family of fish protection in all Australian waters. The family was also given protection in South Australian waters under the FM Act in 2006. Several pipefish species are known from the Upper Spencer Gulf, predominantly associated with seagrass beds. High numbers of some species have been reported from these habitats in False Bay.

A number of non-threatened species of local interest were also identified as potential visitors to the Upper Spencer Gulf. These include:

- » **Giant Australian Cuttlefish** (*Sepia apama*) - Although not listed as a threatened species under Federal or State legislation, the Giant Australian Cuttlefish is considered by many to be an iconic species in the region, particularly with regards to the aggregation phenomenon witnessed at Point Lowly. As such it is provided a level of protection under the Fisheries Management Act 2007 with a permanent Cephalopod closure area in False Bay extending from a line from Point Lowly lighthouse, south-west to the end of the Port Bonython jetty, then west to the Arrium Jetty

in Whyalla. This is a year round closure that prohibits the taking, and use of fishing tackle that targets all cephalopods including Cuttlefish, squid and octopus. In March 2013, the State Government announced a temporary closure to Cuttlefish fishing in the northern Spencer Gulf, north of a line from Wallaroo to Arno Bay. This closure applies only to the taking of Cuttlefish, so if taken inadvertently by persons targeting other Cephalopod species (i.e. Squid), they must be immediately and carefully returned to the water. This temporary closure applies until 27th March 2014 when it will be reviewed. There is also a declared sanctuary zone within the Upper Spencer Gulf Marine Park encompassing the area around Black Point. Although this sanctuary represents a 'no take' zone, the zone is situated in an area that is already part of the cephalopod closure area. However, the sanctuary zone does afford additional protection for Cuttlefish habitat and other species within the sanctuary

The population of Australian Giant Cuttlefish aggregating in the Point Lowly area was first studied in response to the rapid development of a commercial fishery for the species between 1994 and 1997 when the annual catch increased by over 700 percent to a peak of 262 tonnes in 1997. Seasonal closures of the main spawning area around Black Point began midway through the 1998 season with the taking of Cuttlefish now prohibited in all waters of the northern Spencer Gulf. Although not a complete data set, the surveys that have been conducted over the period from 1998 to 2013 show a consistent decline in seasonal aggregations of Australian Giant Cuttlefish

The decline of the population prompted a recent study into the possible causes. The results of this report were inconclusive, with the only correlation found being a negative correlation with rainfall (i.e. years of low rainfall had high Cuttlefish abundance; high rainfall years had low abundance). The report also suggested that there was not sufficient data to rule out that the high numbers present around the late 1990's and early 2000's was an unusual natural phenomenon, and that the population was now returning to a more 'normal' level. There is also the possibility that the population has become more dispersed, using other, smaller habitat areas for spawning in the Upper Spencer Gulf

- » **New Zealand Fur Seal** (*Arctocephalus forsteri*) - The New Zealand Fur Seal occurs around the southern Australian coastline and New Zealand and populations are still recovering following historical seal hunting. Known Australian breeding colonies occur on islands off South Australia and Western Australia and to a lesser extent off Victoria and Tasmania. The nearest breeding colonies to the study area are located on islands at the southern extreme of the Spencer Gulf (i.e. Neptune Islands offshore from Port Lincoln). Although Upper Spencer Gulf is not within the historic main foraging range of adult New Zealand Fur Seals, individuals, most likely adult males, may enter Upper Spencer Gulf foraging for prey items that are seasonally available (such as Cuttlefish). The current population recovery is likely to cause greater numbers of New Zealand Fur Seals to explore foraging opportunities in the Upper Spencer Gulf



- » **Indian Ocean Bottlenose Dolphin (*Tursiops aduncus*)**- Indian Ocean Bottlenose Dolphins have a global distribution and are found Australia-wide but are more commonly associated with tropical and sub-tropical waters. Whilst not a threatened species, they are commonly found in the study area. The preliminary findings of a dolphin survey commissioned by BHP Billiton at Point Lowly in January and May 2010 suggest that Point Lowly is a relatively high use area for Bottlenose Dolphins with all life stages sighted (i.e. adult, juveniles and calves) and a variety of behaviours observed including resting, feeding, socialising and transit. The presence of cow and calves pairs in the sheltered waters of the bay adjacent, and to the west of the lighthouse point, suggests that this may be a nursery area
- » **Short-Beaked Common Dolphin (*Delphinus delphinus*)** - Common Dolphins are generally found in both shallow and deep offshore waters in tropical, sub-tropical and temperate climates. They have been recorded in all Australian States and Territories but are regarded as uncommon in northern Australian waters. More prevalent in the southern Spencer Gulf, Short-beaked Common Dolphins are not a common occurrence in Upper Spencer Gulf, however, may move up the Gulf following seasonal abundances of prey items.

#### **Commercial and recreational fisheries**

The northern Spencer Gulf supports a rich scale fish and invertebrate species fishery, including the Western King Prawn (*Melicertus latisulcatus*) which has significant commercial value. Of particular importance is the Spencer Gulf Prawn Fishery, which is the largest of the three commercial prawn fisheries in South Australia, which includes the Gulf St. Vincent and the Western Coast Prawn fisheries (SARDI, 2005). The Spencer Gulf Prawn Fishery is a single species fishery, based on the Western King Prawn. The Spencer Gulf Prawn Fishery is managed by the Department of Primary Industries and Resources of South Australia under an existing plan. The plan includes monitoring of the marine environment and strongly promotes conservation of seagrass meadows and juvenile prawn habitats. Northern Spencer Gulf is also an important fishing area in South Australia in terms of commercial yield per annum.

Prior to the Cuttlefish spawning area closure which commenced in 1999, northern Spencer Gulf was also the major region in the State for commercial fishing of Giant Australian Cuttlefish, particularly during the mid to late 1990s. With the exception of minor increases in 1999/2000, 2006/07 and 2009/10, catch rates of Cuttlefish from the commercial sector have trended downwards over the last 14 years, declining from a peak of 253 kilograms per boat a day- in 1997/98 to 77 kilograms per boat a day in 2010/11.

## **Impact Assessment**

The potential impacts of the Project on the marine environment include:

- » A direct loss of the following marine habitat:
  - A small area, approximately 80 square metres, of the intertidal zone as a result of constructing the cantilever abutment
  - A small area, between 50-100 square metres of subtidal reef due to pile construction
  - A small area, less than one percent of the 59 hectare work zone, of the soft bottom community which will be affected by the jetty construction and changed light conditions
- » The creation of additional habitat through the installation of piles, which are expected to be colonised quickly to create an artificial reef
- » Construction activities can impact on adjacent marine communities as a result of sediment disturbance, which when excessive, can result in adverse impacts, including:
  - Increased turbidity in the water column affecting visibility for fauna and reducing light availability for flora
  - Increased suspended solids in the water column, which may be abrasive and cause clogging e.g. of gills
  - Sedimentation through silt deposition smothering fauna and flora
- » Piling and propeller wash from construction vessels are the main marine activities which could have impacts. Piling will have a minor impact on turbidity and sedimentation, but it is expected that the effects will be localised, transitory and within natural background variation. These activities are not expected to have a significant impact on the existing reef, soft benthic, pelagic or seagrass communities
- » There is a potential for diesel fuel oil to leak into the marine environment whilst refuelling tug boats
- » Artificial light from the jetty can change the behaviour of some marine fauna. As lighting on the jetty will be minimal, this is not expected to have a significant impact on marine fauna utilising the area

- » Marine pests can be introduced to the Project area through marine pests that have accumulated on vessel hulls and internal structures, through deliberate or accidental introduction by ship personnel, via vessel stowaways or ballast water discharge. It is important to prevent the establishment of marine pests in the Upper Spencer Gulf as they can have a variety of impacts including threatening and displacing native marine life, damaging the value of coastal area and threatening the local economy through impacts to fisheries, aquaculture and recreational activities. There are very strict management measures and an inspection regime enforced by the Australian Quarantine and Inspection Service, which minimises the risk of marine pest spread. Ballast water will not be able to be released in the waters around Port Bonython by ocean-going vessels. There are also strict guidelines in place for antifouling and hull cleaning and maintenance, which will be enforced by Flinders Ports
- » Marine fauna could be impacted through boat strike from activity during both construction and operation of the Project. Marine mammals are most vulnerable due to their need to surface to breathe. Of particular concern are the nationally protected and relatively slow moving Southern and Humpback Whales that occasionally visit the Upper Spencer Gulf. It is important to note that there are no known migration paths or breeding areas for whales in the Upper Spencer Gulf. The number of recorded whale strikes in Australian waters is very low, and with mitigation measures (see below), the risk of boat strike is considered minor
- » The iconic Australian Giant Cuttlefish could be impacted by increased turbidity, loss of habitat or underwater noise, particularly during Project construction. Only a small area of reef habitat will be lost, and any turbidity caused by the Project will be localised and within natural background levels. Piling activities that could potentially damage the species or cause behavioural changes will not occur within proximity of their habitat during the aggregation season, therefore avoiding this risk
- » Despite strict operational controls, the potential for an oil spill from a ship to structure, ship to ship or grounding incident can never be completely ruled out. There will be spill contingency plans and emergency response equipment in place at the Port Bonython Project so that a quick response can occur in the event of a spill. Although the risk of a spill is low, because of the potential severity of impacts, this is considered a high risk
- » Iron ore dust spilt from vessel loading is unlikely to lead to an increase in algal growth in the marine environment. The iron ore conveyor will be fully enclosed to prevent dust spill, iron ore dust will be controlled by sprayers/mists and loading will cease in adverse wind conditions. Any spillage will be of very small quantity and will be insufficient to cause algal growth.

## Mitigation Measures

Mitigation measures proposed to protect the marine environment include:

- » Placing speed restrictions on construction vessels to minimise the potential for boat strike
- » Scheduling of piling works to avoid the breeding season (aggregation) of the Australian Giant Cuttlefish. Surveys will be undertaken to confirm the timing of the breeding season and the presence of the species (as this can vary from year to year) to coordinate the scheduling of Project works accurately
- » Minimising jetty lighting and using low-spill lights
- » Compliance with national biofouling and ballast water management guidelines to minimise the introduction and spread of marine pests
- » Oil spill contingency plan and emergency response procedures to be put in place
- » Instigating a whale notification system in the Spencer Gulf so that vessel pilots are aware of whales being within the area, allowing them to take avoidance action to prevent boat strike
- » Spencer Gulf Port Link will maintain a record of ship strikes within the Spencer Gulf and report any incidents in order to establish a baseline. Should the number of strikes increase, a review of management procedures will be undertaken
- » Construction and operational monitoring of water quality
- » Pre and post-construction condition surveys of marine communities in proximity to the proposed jetty.

## Summary

With the mitigation measures proposed, impacts to the marine environment will mostly be localised and short term in nature, and are not expected to have a long term impact on marine habitats or fauna within the vicinity of the Project. Nevertheless, monitoring of water quality and the condition of marine habitats will be undertaken regularly and corrective actions taken if impacts are identified. Increasing vessel traffic in the Gulf does increase the risk of an oil spill occurring from vessel grounding or collision; however oil spill contingency planning that will occur should minimise the likely extent of harm.

## 15. UNDERWATER NOISE

The following presents a summary of the key findings. For more detail, see the Environmental Impact Statement, **Chapter 15, Underwater Noise**. Modelling has been used to predict the likely noise generated by both the construction and the operation of the Project, which has then been compared to data on the tolerance, or sensitivity, to noise of species known to occupy the area.

### Existing Environment

The Port Bonython area is a shallow water and high-energy coastal environment. The shallow water depth means that noise from the ocean boundaries (wind and wave noise) will be higher than in deep water. The presence of several ports and industrial facilities in the region of Port Bonython (i.e. Whyalla, and Port Pirie) combined with the narrow width of Spencer Gulf means that underwater ambient levels in the region are expected to be high at low frequencies.

### Impact Assessment

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

- » Auditory masking (the presence of noise causes important biological sounds to be obscured). This has generally short-term impacts, persisting only as long as the masking sound is in operation e.g.
    - 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, e.g.
    - 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.
- The significant noise sources associated with construction and operation of the proposed Project are piling noise during construction and vessel noise during both construction and operation of the Project.
- The following impacts are expected from piling should mitigation measures not be applied:
- » Fish mortality will likely occur within one to two metres of the piling rig
  - » Whale temporary hearing damage may occur within approximately ten metres of the piling rig
  - » seal temporary hearing damage may occur within approximately 20 metres of the piling rig
  - » Temporary hearing damage for human divers will occur within approximately 100 metres of the piling rig
  - » Auditory damage to cuttlefish will likely occur within ten metres of the piling source
  - » Auditory damage to cuttlefish may occur within approximately 100 metres of the piling source
  - » Avoidance behaviour is expected for fish and cuttlefish within 300-1200 metres of the piling source (depending on seafloor conditions)
  - » Avoidance behaviour is expected for marine mammals within 3000 metres of the piling source.

Impacts are predicted to be least in the very shallow water to the west, medium to the south (in the deepening water). Greatest impacts are predicted to the east, where the water is approximately constant depth at five metres - sound propagates more effectively in the slightly-deeper water than to the west, while the constant depth means that sound does not “escape” into deeper water like towards the south.

Avoidance behaviour from marine mammals may occur at distances of approximately 3000 metres from larger iron ore-carrying vessels. This avoidance behaviour may minimise the chance of injury to animals from collisions with ships. At distances greater than approximately 1200 metres, shipping noise will likely be imperceptible for Cuttlefish. Hence, operational impacts on the Cuttlefish breeding area (located over 2500 metres from the loading berth) are likely to be negligible.

## Mitigation Measures

The following mitigation measures are proposed to minimise impact on marine fauna from underwater noise:

- » A ‘soft start’ to piling activities, which involves gradual ‘ramping up’ of piling machinery which avoids animals being suddenly exposed to loud sound levels and allows them to flee the area without experiencing permanent damage
- » The adoption of safety zones around the sound source and to monitor for animals entering these zones, shutting down the sound source if necessary if the animal continues to approach the source. This approach typically relies on detection of animals by trained observers, and hence is most effective for marine mammals, which must periodically come to the surface to breathe. The requirement to visually detect animals means that piling activities must occur during daylight hours
- » Piling activities will not occur in the inshore area near the Cuttlefish aggregation area whilst Cuttlefish are present
- » Underwater noise monitoring will be conducted at the beginning of construction to calibrate the predicted impact zones based on the actual piling rig selected and the precise conditions at the piling site.

## Summary

Piling noise is predicted to have minor impacts on fish, with localised fish mortality within the immediate vicinity of the piling rig and behavioural changes (avoidance) expected within approximately 3000 metres of the piling rig. The commercial fish farms and commercial fishing areas lie further than 3000 metres from the Port Bonython site, and hence no significant impacts on commercial fishing are expected from construction of the proposed jetty and wharves.

Piling noise is expected to have negligible impacts on marine mammals, with hearing damage limited to the immediate vicinity of the piling rig (up to approximately 50 metres), at which point the management measures (safety zones etc.) require the piling operation to be shut down. Although behavioural changes (avoidance) are expected, these are not considered to have significant long term impacts since the Upper Spencer Gulf does not lie on a migration route.

Sufficient data is not available to determine what the safe exposure level to underwater noise is for the Giant Australian Cuttlefish and further research is required; however, based on the likely hearing sensitivity of Cuttlefish, there may be some impacts on some areas of Cuttlefish habitat if inshore piling occurs during winter months. Piling noise is expected to have negligible impacts on the Giant Australian Cuttlefish however, as inshore piling activities will be scheduled when the Cuttlefish are not aggregating in the Port Bonython vicinity.

Additional shipping noise impacts associated with operation of the new wharf at Port Bonython are predicted to have negligible impacts on the Giant Australian Cuttlefish. Shipping noise is predicted to be below the hearing threshold of cephalopods at 1200 metres from the vessel. The wharf is over 500 metres from the shallow-water Cuttlefish habitat and hence shipping noise is likely to be imperceptible for the Cuttlefish.

Shipping noise is predicted to have negligible impact on marine mammals. There is existing vessel traffic from Port Bonython and the upgrade will result in additional vessels of similar type to the existing vessels. Noise levels from shipping are predicted to cause avoidance behaviour in whales at a distance of approximately 3000 metres from the vessel.

## 16. SUSTAINABILITY

The following presents a summary of the key findings. For more detail, see the Environmental Impact Statement, **Chapter 16, Sustainability**. The Infrastructure Sustainability Council of Australia has released an Infrastructure Sustainability Framework which has been used to assess the sustainability performance of the current Project design and the commitments made in the Environmental Impact Statement. The tool has been used to assist in planning for the Project, and as a basis for this Environmental Impact Statement assessment only.

The Infrastructure Sustainability rating tool uses six broad themes to assess sustainability attributes of infrastructure projects:

- » Management and Governance
- » Using Resources
- » Emissions, Pollution and Waste
- » Ecology
- » People and Place
- » Innovation.

### Assessment Findings

Overall, the sustainability assessment shows that the Project rates at the 'good' or 'commended' Level using the Infrastructure Sustainability rating tool. This level indicates that the Project is performing above the minimum standard and goes beyond the 'business-as-usual' approach to achieve improved sustainability outcomes. The existing commitments to sustainability by the Project team have established the framework for implementing plans and processes addressing many of the key environmental, economic and social aspects of sustainable development.

The credit relating to 'discharges to air, land and water' has been identified as a strength for the Project. Construction methods and mitigation measures identified as part of the Environmental Impact Statement are predicted to minimise adverse impacts to the surrounding environment, with monitoring and measuring of actual impacts to be undertaken throughout the Project life to ensure continued compliance. Climate change adaption has also been effectively assessed as part of the current studies, resulting in a high rating for this aspect.

The use of sustainable materials has been identified as a category in which there is opportunity for improvement. For materials, the lower result is due to the Project not being sufficiently progressed to enable a meaningful material impact assessment to be undertaken.

Current sustainability measures and initiatives include:

- » Preparation of a sustainability policy
- » Regular sustainability reporting during both construction and operation
- » Preparation of a carbon footprint
- » Identification of waste reduction and reuse opportunities
- » Capture and reuse of stormwater and application of water sensitive design principles
- » Balancing cut and fill on site so that spoil material will be retained on site
- » Development of an Industry Participation Plan to encourage local employment and purchase of goods and services
- » Maintaining property access during construction
- » Regular stakeholder and community engagement.

During the next detailed design phase of the Project, the feasibility of implementing further sustainability initiatives will be explored.

## 17. HAZARD AND RISK

The following presents a summary of the key findings. For more detail, see the Environmental Impact Statement, **Chapter 17, Hazard and Risk**. The Chapter explores the key health and safety risks associated with the Project on the community, workforce and visitors to the site.

### Impact Assessment

Potential hazards to the health and safety of the community, workforce or visitors to the site include:

- » Generation and/or use of hazardous or flammable materials that e.g. sewage, oils, lubricants, construction waste, concrete particles from concrete batching plant
- » Moving vehicles or machinery
- » Unauthorised site access to the construction area or site operations
- » Mosquitos
- » Interface with the Santos Facility and the hydrocarbon processing plant/jetty
- » Bushfires
- » Unexploded ordnances remaining from when parts of Port Bonython were used by the Department of the Army (now the Department of Defence) as a training area in the 1960s and 70s
- » On-site irrigation from treated wastewater
- » Loading/offloading of iron ore
- » Construction work within proximity of existing services along Port Bonython Road.

### Mitigation Measures

The following mitigation measures are proposed to minimise the health and safety impacts for construction/operation workers and the general public:

- » Installation of a bunded hazardous goods store to Australian Standard requirements
- » Hazardous substance controls e.g. regular inspections, use of Material Data Safety Sheets, Hazardous Substances register, tracking of materials, work force training in spill management, incident and reporting procedures, provision of Personal Protection Equipment
- » Operational controls for on-site wastewater treatment irrigation including provision of a buffer zone, prominent signage and controlled application rates/times
- » Preparation of an Emergency Response Plan, which will be informed through consultation with emergency service providers
- » Preparation of a Traffic Management Plan for the construction period for site traffic movements both within the site and on public roads
- » Preparation of a Site Security Plan that will address requirements for fencing, access points and jetty exclusion controls (an area of not less than 50 metres around jetty will form an Exclusion Zone)
- » Design of water storage and treatment systems to avoid the creation of mosquito breeding areas
- » Fire prevention controls such as reducing fuel loads near buildings, using fire resistant species in landscaping and installing a fire break around buildings, spark control during construction, water supply for fire fighting and emergency response planning such as defining muster points and evacuation procedures
- » Undertaking a detailed Unexploded Ordnance Survey prior to construction and putting in place any necessary controls should any unexploded ordnances be located on site
- » Preparing Safe Work Method Statements for works near services
- » Enforcing harbor rules and controls for vessel movement to minimise any potential ship to ship or ship to infrastructure impact.

## 18. CUMULATIVE IMPACTS

**Chapter 18, Cumulative Impacts**, describes the cumulative impact of the Project in conjunction with the other projects that exist or are planned within the study area. Cumulative impacts can be described as the sum of the Project's impacts when added to those of other past, present or future Projects. Cumulative impacts may result from a number of activities with similar impacts interacting with the environment in a region.

The Environmental Impact Statement Guidelines require the following projects to be considered when assessing cumulative impacts of the Project:

- » The current Santos liquids fractionation plant at Port Bonython
- » The existing Port Bonython jetty and associated shipping facility
- » The approved Port Bonython diesel fuels storage facility
- » Expansion or addition to the Arrium Whyalla facility
- » The approved BHP Billiton desalination plant and return water discharge into the marine environment off Point Lowly.

An assessment should also be based on publically available planning documents that clearly identify impacts of the Project. Recent information for the Santos Facility and jetty, the Port Bonython Diesel Fuels Storage Facility and the Arrium Whyalla Facility were not publically available. For this reason, cumulative impacts assessed in this Environmental Impact Statement are limited as the impacts of other projects are not able to be identified.

### Impact Assessment

Based on the information available, the following cumulative impacts were identified:

- » Release of pollutants from multiple sources could result in a deterioration of water quality parameters, particularly during rain events
  - It is expected that each Project will install water protection measures and monitoring to limit pollutants released from site via surface water similar to those proposed for the Project, therefore a long-term impact on surface water discharged to the Upper Spencer Gulf is not anticipated
- » A reduction in fauna habitat availability as a result of clearing of vegetation for multiple projects
  - There is insufficient information on the amount of vegetation to be cleared for other projects; however it is not believed this will have a significant impact on the survival of any species that utilises the Port Bonython region
- » Indirect impacts on fauna habitat as a result of weed invasion, noise, artificial light from multiple projects
  - As all projects will be required to implement comprehensive controls via Environmental Management Plans, this should pose a low risk to the existing environment
- » Traffic growth along Port Bonython Road should multiple projects be constructed simultaneously, and when all projects are operational
  - Modelling indicates that such growth can be accommodated without any further infrastructure upgrades

- » A reduction in visual amenity
  - The combined effects of these projects may result in an overall reduction in the quality of views from Point Lowly, Port Bonython Road and the Lincoln Highway due to an increase in the industrialisation of the area
- » Disruption to the local community's way of life
  - Increased industry in the local area will result in more industrialised views when accessing the coastal settlements which will impact the amenity of the area for locals and visitors. That said this change in land use is consistent with zoning for the area. Potential disruption to access and people's way of life has been highlighted as a residual impact associated with the construction of the Project. Should another project's construction period overlap with the Project's construction period there is the likelihood that these impacts could be exacerbated. As timing for construction of the other projects is not known, this is an issue that needs to be monitored
- » Greenhouse gases will be generated from all projects, contributing to an increase in South Australia's total greenhouse gas emissions if no reduction measures are applied or offsets sought. Climate change will also be expected to potentially have an impact on each project, but the effects are not considered interactive
- » Cumulative impacts on water quality of the Port Bonython region are not expected, as water quality impacts identified for each project are minimal and unlikely to be interactive
- » An increase in ships utilising the Upper Spencer Gulf
  - The cumulative amount of ships will be approximately 309 a year, which is a significant increase on the current number of approximately 170 a year. This will increase the likelihood of ship strike for whales, however given the low numbers currently reported in Australian waters, it is still considered to be an unlikely and uncommon event that will not have a significant impact on whales. While marine fauna in the region will be familiar with existing ship noise which will not increase in volume, the additional cumulative vessel movements will mean that the background noise contribution from ships will be sustained for longer. Noise associated with ships can cause avoidance and behavioural changes in marine fauna. Given the limited number of whales that use the Upper Spencer Gulf however, this is not expected to have a significant impact on the viability of whale species. The increase in ships will also increase the risk of maritime incidents (i.e. ship to ship strikes, running aground), as described above
- » Increased risk of marine pest introduction
  - The management of ballast water and biofouling of international vessels is very closely monitored and controlled by the Australian Quarantine Inspection Service, therefore the cumulative risk is not considered significant.



## 19. DRAFT ENVIRONMENTAL MANAGEMENT PLAN

The Draft Environmental Management Plan for the construction and operation of the Project is contained in **Chapter 19, Environmental Management Plan**. The Plan will be updated prior to the commencement of work by the Project Contractor, and then periodically during construction and operations. It is a description of proposed measures to help achieve and maintain acceptable levels of the environmental impacts identified in the Environmental Impact Statement and a tool to meet the requirements of relevant legislation and best practice environmental management.

The purpose of the Environmental Management Plan is to identify all potential environmental impacts and mitigation measures, together with monitoring, reporting and corrective actions if an undesirable impact or unforeseen level of impact occurs.

The aims of the Environmental Management Plan are to:

- » Provide practical and achievable plans for complying with environmental requirements
- » Demonstrate compliance with relevant legislative obligations
- » Outline performance criteria to be met by the Project
- » Provide evidence to stakeholders and the community that the Project is being managed in an environmentally sensitive manner
- » Specify roles and responsibilities, monitoring regimes and corrective actions.

## 20. SUMMARY OF BENEFITS, IMPACTS AND COMMITMENTS

In addressing the Environmental Impact Assessment Guidelines issued by the South Australian Government, Spencer Gulf Port Link has undertaken detailed investigations and assessments to demonstrate that the Project can occur without posing an unacceptable impact on the surrounding environment or community as detailed in **Table 7**. Spencer Gulf Port Link have committed to the application of a mitigation program to address potential impacts that need ongoing monitoring and management. A comprehensive Environmental Management Plan has been prepared as part of the Environmental Impact

Statement to ensure the protection of the surrounding terrestrial and marine environments over both the short and long term.

Spencer Gulf Port Link will continue to engage with the government and community to help ensure that environmental values are protected and managed. Overall, the combination of management measures and ongoing monitoring that has been proposed demonstrates that the Port Bonython Bulk Commodities Export Facility can be developed without posing significant environmental impacts, whilst generating jobs and revenue for the local community.

**Table 7: Summary table**

Item	Key Mitigation and Monitoring Measures	Residual Impact Risk Level
Water Resources	<ul style="list-style-type: none"> <li>» Application of water sensitive design features to treat site runoff e.g. swales, detention basins</li> <li>» A comprehensive erosion and sediment control plan to be implemented during construction</li> <li>» Regular water quality monitoring at the discharge point to ensure compliance with legislative standards</li> <li>» Testing of groundwater suitability and availability prior to use to ensure no significant impact on existing aquifers</li> </ul>	<p><b>Low</b></p> <p>Groundwater contamination, surface water contamination</p>
Noise	<ul style="list-style-type: none"> <li>» Avoid night time construction around the False Bay area, unless absolutely necessary</li> <li>» Construction noise to be managed in accordance with best practice standards</li> <li>» Consultation with all potentially affected residents prior to construction works commencing about timing of works and mitigation measures</li> <li>» Full conveyor enclosure</li> <li>» A complaint reporting mechanisms for the community</li> </ul>	<p><b>Low</b></p> <p>Construction and operational vibration, industrial noise, road traffic</p> <p><b>Medium</b></p> <p>Rail construction near False Bay</p>
Air	<ul style="list-style-type: none"> <li>» Application of best practice dust management during construction</li> <li>» Fully enclosed loading, storage areas and conveyor systems for transportation of iron ore</li> <li>» The use of back-up dust extraction systems in the event of system failure</li> <li>» Application of misting sprays or water to iron ore during storage, conveyance and ship loading to minimise iron ore dust release</li> <li>» Real-time dust monitoring until such time as the system has been established to allow for reactive mitigation if required</li> <li>» A complaint reporting mechanism for the community</li> </ul>	<p><b>Low</b></p> <p>Construction activities, normal operations</p> <p><b>Medium</b></p> <p>Abnormal operations or unplanned emergency situations</p>

Item	Key Mitigation and Monitoring Measures	Residual Impact Risk Level
Terrestrial Ecology	<ul style="list-style-type: none"> <li>» Revegetation of cleared areas</li> <li>» Ongoing monitoring and control of environmental weeds</li> <li>» Spotting and catching of native animals prior to construction occurring</li> </ul>	<p><b>Low</b></p> <p>Vegetation clearance, habitat fragmentation, noise/air/light pollution, weed/feral animal proliferation</p>
Transport	<ul style="list-style-type: none"> <li>» Improvement to the Lincoln Highway/Port Bonython Road intersection</li> <li>» Grade separation of the new rail level crossings of Port Bonython Road at Fitzgerald Bay Road and Cuttlefish Drive location</li> <li>» Development of a Construction Traffic Management Plan</li> <li>» Provision of sufficient off-road car parking spaces</li> </ul>	<p><b>Low</b></p> <p>Operational failure, over-utilisation, disruption of traffic, disruption of property access, on-site parking</p> <p><b>Medium</b></p> <p>Reduced safety at rail level crossings, reduced safety at Lincoln Highway/Port Bonython Road</p>
Visual Amenity	<ul style="list-style-type: none"> <li>» Shed colour chosen to recede into the environment</li> <li>» Minimise vegetation clearance along the corridor</li> </ul>	<p><b>Low</b></p> <p>Views from Point Lowly, False Bay, Whyalla</p> <p><b>Medium</b></p> <p>Views from Stony and Black Points, Views from Port Bonython Road and Lincoln Highway</p>
Socio-economic	<ul style="list-style-type: none"> <li>» Ongoing communication and engagement with local residents and other stakeholders about Project progress, construction and operation</li> <li>» Relocation of the Stony Point Cuttlefish Viewing Platform</li> <li>» Development of an industry participation plan to encourage local employment and purchase of goods and services</li> <li>» Maintaining access to the existing Coastal Road once the site is operational</li> </ul>	<p><b>Low</b></p> <p>Disruption of way of life (during operations and construction), reduction in amenity, disruption to property access, community facilities, marine access</p> <p><b>High Beneficial</b></p> <p>Economic contribution</p>
Cultural Heritage	<ul style="list-style-type: none"> <li>» Further investigation of aboriginal cultural heritage impacts, including completion of an aboriginal cultural heritage survey</li> <li>» Undertaking consultation with aboriginal people with a heritage interest in the Port Bonython area</li> </ul>	<p>Further investigation and consultation to be undertaken</p>
Climate Change and Greenhouse Gases	<ul style="list-style-type: none"> <li>» Further assessment of the feasibility of greenhouse gas reduction measures</li> <li>» Further investigation of measures to reduce the impact of climate change on the Project during the detailed design phase e.g. building energy efficiency, waste management</li> </ul>	<p><b>Low</b></p> <p>Pavement/track/drainage and building/marine infrastructure damage</p> <p><b>Medium</b></p> <p>Increased inundation of coastal infrastructure, higher rates of building and infrastructure deterioration</p>

Item	Key Mitigation and Monitoring Measures	Residual Impact Risk Level
Coastal Processes and Water Quality	<ul style="list-style-type: none"> <li>» Jetty abutment to be within the tidal zone</li> <li>» No provision for vessel refuelling on site (with the exception of tug boats) or waste disposal</li> <li>» Best practice water quality management e.g. waste/hazardous substances management</li> </ul>	<p><b>Low</b></p> <p>Sediment transport, changes to hydrodynamics, release of sediment from piling or propeller wash, release of contaminants e.g. waste</p> <p><b>High</b></p> <p>Oil Spill</p>
Marine Ecology	<ul style="list-style-type: none"> <li>» Placing speed restrictions on construction vessels to minimise the potential for boat strike</li> <li>» Scheduling of in-shore piling works to avoid Australian Giant Cuttlefish aggregation times</li> <li>» Minimising jetty lighting and using low-spill lights</li> <li>» Compliance with national biofouling and ballast water management guidelines to minimise the introduction and spread of marine pests</li> <li>» Oil spill contingency plan and emergency response procedures to be put in place</li> <li>» Instigating a whale notification system in the Spencer Gulf so that vessel pilots are aware of whales being within the area, allowing them to take avoidance action to prevent boat strike</li> <li>» Spencer Gulf Port Link will maintain a record of ship strikes within the Spencer Gulf and report any incidents in order to establish a baseline. Should the number of strikes increase, a review of management procedures will be undertaken</li> <li>» Construction and operational monitoring of water quality</li> <li>» Pre and post-construction condition surveys of marine communities in proximity to the proposed jetty</li> </ul>	<p><b>Low</b></p> <p>Loss of habitat from jetty construction, habitat fragmentation, ship strike, noise &amp; light pollution, turbidity, spread of pest animals, algal growth, oil spill (during construction)</p> <p><b>High</b></p> <p>Oil Spill during operations</p>
Underwater Noise	<ul style="list-style-type: none"> <li>» A 'soft start' to piling activities, which involves gradual 'ramping up' of piling machinery which avoids animals being suddenly exposed to loud sound levels and allows them to flee the area without experiencing permanent damage.</li> <li>» The adoption of safety zones around the sound source and to monitor for animals entering these zones, shutting down the sound source if necessary if the animal continues to approach the source. Piling activities will not occur in the inshore area near the Cuttlefish aggregation area during aggregation events</li> <li>» Underwater noise monitoring will be conducted at the beginning of construction to calibrate the predicted impact zones based on the actual piling rig selected and the precise conditions at the piling site.</li> </ul>	<p><b>Low</b></p> <p>Piling impacts on fish, Cuttlefish &amp; marine mammals, shipping noise, other construction noise</p>

Item	Key Mitigation and Monitoring Measures	Residual Impact Risk Level
Sustainability	<ul style="list-style-type: none"> <li>» Preparation of a sustainability policy and management plan</li> <li>» Regular sustainability reporting during both construction and operation</li> <li>» Preparation of a carbon footprint</li> <li>» Identification of waste reduction and reuse opportunities</li> <li>» Capture and reuse of stormwater and application of water sensitive design principles</li> <li>» Balancing cut and fill on site so that spoil material will be retained on site</li> <li>» Development of an Industry Development Plan to encourage local employment and purchase of goods and services</li> <li>» Maintaining property access during construction</li> <li>» Regular stakeholder and community engagement</li> </ul>	<b>Beneficial Impact</b>
Hazard and Risk	<ul style="list-style-type: none"> <li>» Installation of a bunded hazardous goods store to Australian Standard requirements</li> <li>» Hazardous substance controls</li> <li>» Operational controls for on-site wastewater treatment irrigation including provision of a buffer zone, prominent signage and controlled application rates/times</li> <li>» Preparation of an Emergency Response Plan</li> <li>» Preparation of a Traffic Management Plan</li> <li>» Preparation of a Site Security Plan</li> <li>» Fire prevention controls</li> <li>» Undertaking a detailed Unexploded Ordnance Survey</li> <li>» Preparing Safe Work Method Statements for works near services</li> <li>» Enforcing harbor rules and controls for vessel movement to minimise any potential ship to ship or ship to infrastructure impact</li> </ul>	<p><b>Low</b> Hazardous substances, dust, waste, mosquitos</p> <p><b>Medium</b> Transport, marine traffic incidents, loading/offloading, fire, Unexploded Ordinances, Services</p>

