Project Description

2. PROJECT DESCRIPTION

2.1. Introduction

This Chapter of the EIS sets out the key technical parameters on which the EIS for the Bulk Commodities Export Facility (BCEF) has been developed. The Project description is based on a concept design prepared by engineering consultancy AECOM in 2009 and on a preliminary construction methodology provided by Leighton's Contractors in 2012/13. This Chapter addresses:

- The location of the Project including development plan zones
- A physical description of the Project
- Description of the existing environment
- Descriptions of the construction, operation and decommissioning phases of the Project including proposed staging and timeframes
- An overview of the land use, environmental, social, economic impacts and benefits
- Site layout
- Management arrangements.

2.2. Overview of the Project Area

2.2.1. Land Tenure

The Minister for Infrastructure has care and control of approximately 2500 Hectares (Ha) of land at Port Bonython. An approximate 800Ha portion has been identified as having potential for port development. In addition, the Minister for Transport has control over the seabed adjacent to the site. A portion of coastal land is owned by the State and is in trust to the City of Whyalla.

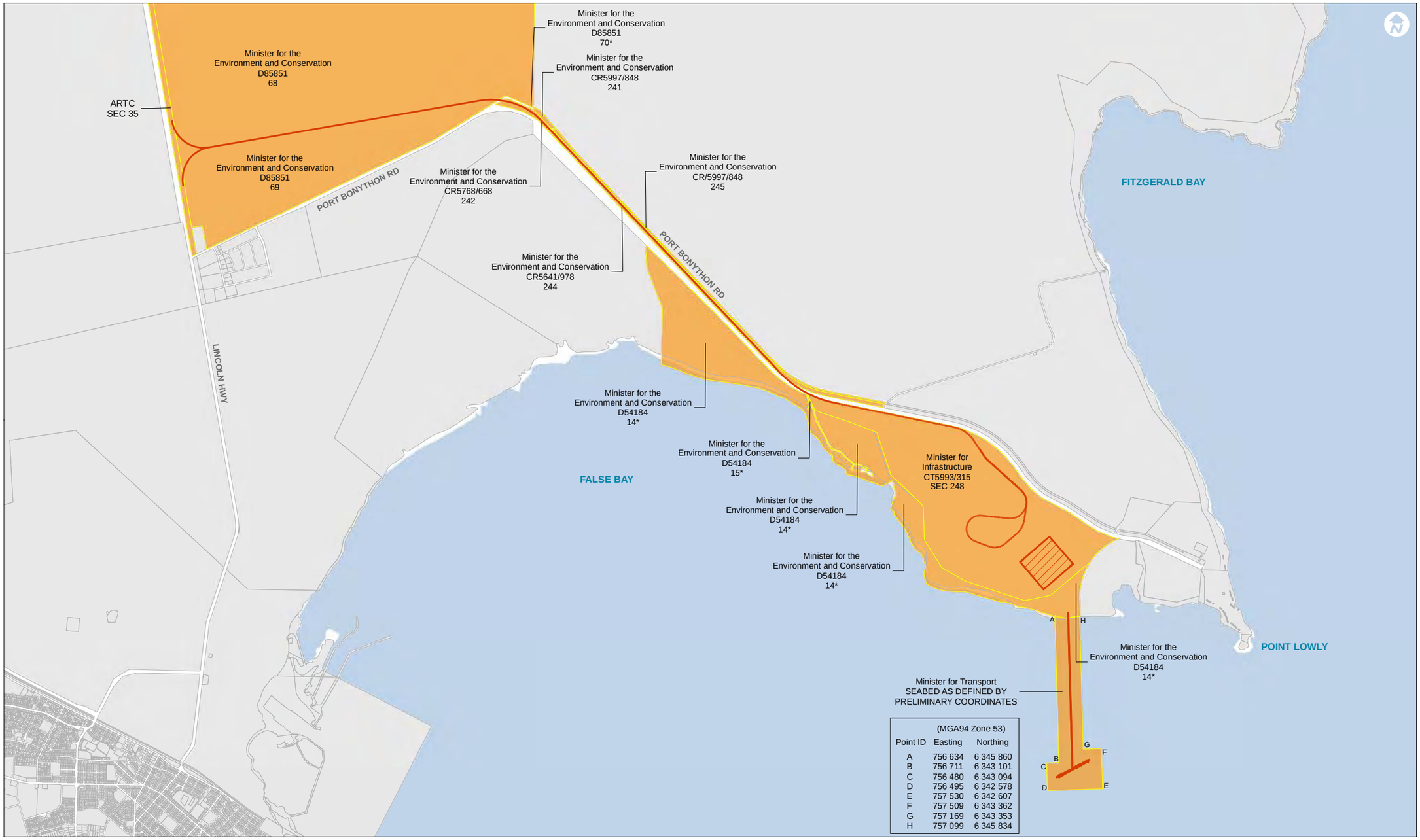
2.2.2. Lot Descriptions

The following land parcels will be impacted by this proposal, subject to detailed design, as shown in **Figure 2.2a**:

- Land held in the Name of Minister for the Environment and Conservation (Current title: Minister for Sustainability, Environment and Conservation):
  - Portion of Piece 4 in Deposited Plan 29397 – CL 1395/50 – New identifier Allotment 69 in Deposited Plan 85851 (not yet deposited)
  - Portion of Piece 6 in Deposited Plan 29397 – CL 1395/50 – New identifier Allotment 70 in Deposited Plan 85851 (not yet deposited)
  - Section 241 in the Hundred of Cultana – CR 5997/848 – (Note: this property may not be affected but it is included subject to the final design)
  - Section 242 in the Hundred of Cultana – CR 5768/668
  - Section 245 in the Hundred of Cultana – CR 5997/848 – (Note: this property may not be affected but it is included subject to the final design)
  - Section 244 in the Hundred of Cultana – CR 5641/978
  - Portion of Piece 14 in Deposited Plan 54184, Hundred of Cultana – CR 5966/391
  - Portion of Piece 15 in Deposited Plan 54184, Hundred of Cultana – CR 5966/391 – (Note: this property may not be affected but it is included subject to the final design)
- Land held in the Name of The Corporation of Whyalla (Council):
  - Public Road between Allotment 69 and Piece 70 in DP 85851
  - Public Road between Sections 242 and 244, Hundred of Cultana
  - Public Road Reserve – (formally Allotment 16 in DP 54184) – located adjacent
- Land held in the Name of the Commissioner of Highways (CoH):
  - Port Bonython Road – (Grade separation to occur under this road for railway line)
- Land held in the Name of the Minister for Infrastructure (Current title: Minister for Transport and Infrastructure)
  - Portion of Section 248, Hundred of Cultana – CT 5993/315
- Land held in the Name of the Minister for Transport (Current title: Minister for Transport and Infrastructure)
  - Subjacent land (that portion of the seabed as defined by the preliminary coordinates)
- Land held in the Name of the Australian Rail Track Corporation (ARTC)
  - Portion of Section 35, Hundred of Cultana – 5983/544.

Figure 2.2a: Lot numbers and land parcels impacted by the Project

Figure 2.2a: Lot numbers and land parcels impacted by the Project



(MGA94 Zone 53)

Point ID	Easting	Northing
A	756 634	6 345 860
B	756 711	6 343 101
C	756 480	6 343 094
D	756 495	6 342 578
E	757 530	6 342 607
F	757 509	6 343 362
G	757 169	6 343 353
H	757 099	6 345 834

Port Bonython EIS
Spencer Gulf Port Link

Figure 2.2a - Project Description

Legend

Affected Land Parcels

ARUP

Spencer Gulf Port Link

1:65,000 (at A3)

0 1 2 4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: Geographic Datum of Australia
Grid: Map Grid of Australia 1994, Zone 53

2.2.3. Site Description

The Port Bonython Peninsula is heavily vegetated, and it is considered to be in good condition but with varying levels of disturbance. The footprint of land-based vegetation is predominantly made up of low-lying shrubland and low woodland, comprised of drought-tolerant species including Saltbush, Blackoak and Mallee as well as grassland of Spinifex. The vegetation communities found in the area are not recognised as threatened under State or Federal legislation however some types of vegetation have significance as habitat for threatened fauna including the Slender-billed Thornbill (western) and Scarlet-Chested Parrot. Although not identified in site surveys, three threatened flora species have the potential to be present on site. A number of declared weed species were observed and recorded in the study area, along with those considered aggressive environmental weeds; feral animals are also present in the area. Detailed descriptions of the terrestrial environment are given in **Chapter 7, Terrestrial Ecology**.

The land gently undulates, with land sloping seaward from a central ridge that runs the length of the peninsula. Much of the coastline is rocky, with some sandy beaches at the southern end; a saltpan occurs towards the northern end, on the western side.

There are no permanent water courses within the study area due to the low rainfall experienced in the region, although it does contain a number of minor ephemeral drainage lines which run during rainfall events.

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
- The Cultana Army training Expansion Area (CEA) to the north
- Aquaculture farms in Fitzgerald Bay. There is an eastern finfish (Yellowtail Kingfish) zone of 1445Ha, a western Finfish (Yellowtail Kingfish) zone of 1704Ha and a Shellfish zone. It is understood that these farms are no longer considered viable and have recently closed.

East of the Project is a small settlement of coastal homes around Point Lowly, with other small settlements at False Bay and Fitzgerald Bay. The majority of these coastal homes are holiday houses and are not permanently occupied. The closest settlement to the site is Whyalla, approximately 18km to the east of the site location. Whyalla is a major regional centre with a population of approximately 22,000 people.

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 BCEF, is approximately 294km from the entrance to the Gulf and 18km 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.

2.2.4. Existing Infrastructure and Services

2.2.4.1. Roads

Port Bonython can be accessed via the sealed Port Bonython Road that branches off from the Lincoln Highway, approximately 8km north of Whyalla. Port Bonython Road is the only sealed access road to Point Lowly and to the Santos Facility located on the peninsula. Other sealed roads branch off from Port Bonython Road, to service houses around Point Lowly. There is an extensive network of unsealed roads and tracks in the area that allow for recreational uses, property access and emergency access.

2.2.4.2. Rail

There is an existing standard gauge rail line between Port Augusta and Whyalla that passes adjacent to the Lincoln Highway, terminating at the Arrium Steelworks. The track is managed and operated by ARTC.

2.2.4.3. Utilities

Water

Water to Whyalla is sourced from two pipelines that are fed from the Murray River; Morgan to Whyalla pipelines No. 1 and No. 2 built in 1942 and 1966 respectively. The No. 1 pipeline passes adjacent to Lincoln Highway and into Whyalla, while the No. 2 pipeline passes across Spencer Gulf and intersects with Port Bonython Road before feeding into Whyalla.

Potable water is supplied to Port Bonython via a 200mm asbestos cement (AC) pipeline, which runs approximately 15km from the 825mm No. 2 pipeline. There is a pressure break tank located 5km upstream from the Santos facility.

Electricity

Port Bonython is serviced by a single circuit, 132 kilovolts (kV) transmission line rated at approximately 140 Mega Volt Ampere (MVA). This line is fed from the Cultana Substation located west of the Lincoln Highway near the Port Bonython Road intersection. The transmission line feeds into the Stony Point Substation which subsequently feeds electricity to the Santos Facility as well as to the coastal homes and facilities at Port Lowly. Constructed in 1983 to service the Santos Petrochemical complex, it consists of two 15MVA transformers.

Community Services

While there is no township and only limited community facilities at Point Lowly (facilities include a community hall, boat ramp and some caravan facilities), the region is serviced by Whyalla which is approximately 34km away by road. Whyalla provides the following regional services:

- Police
- Hospital and other medical
- Fire and emergency
- Post Office
- Accommodation
- Restaurant and other retail
- Education
- Social services.

2.3. Project Description

2.3.1. Overview

The Project includes the design and construction of the material handling facilities to accept iron ore from the rail network, storage, reclamation of the ore and loading to ship. The Project is still subject to detailed design, but the disturbance footprint is approximately 200Ha.

Although the design may be altered during the detailed design process, no significant changes are envisaged. The current plant layout has been optimised to minimise construction cost and resources consistent with provision for future expansion. Attention has been paid to siting the plant efficiently in the natural topography so that land disturbance and construction costs can be minimised. The BCEF has been situated a distance from the jetty infrastructure to facilitate future expansion toward the shore.

Initially, the BCEF will be constructed to provide capacity for the export of up to 25 Mega Tonnes per Annum (Mtpa) of iron ore. Associated infrastructure to be constructed during this initial phase will include:

- A 17.5km railway spur from the Lincoln Highway railway to the iron ore storage area
- A 6.1km rail loop at the end of the railway spur
- The train receiving and bottom dump facility
- Iron ore storages (including three sheds)
- Ore unloading facilities
- A nominal three kilometre jetty
- Conveying and ship loader equipment suitable for exporting up to 25Mtpa of iron ore
- A Ship loading wharf (suitable for Cape-size vessels).

Material is conveyed to the various ore handling components by fully enclosed 1200mm conveyors running nominally at 4.4m/s.

A concept plan for the Project is shown in **Figure 1.6a in Chapter 1, Project Introduction**.

The ship loading facility has been designed to operate at 4000 tonnes per hour (TPH).

Should sufficient demand be generated, the BCEF will be upgraded to export up to 50Mtpa; the timing of this upgrade will be dependent on market conditions, but is expected to be some years after operations commence. Additional infrastructure to be built for this second phase will include additional site storage sheds, a second jetty conveyor and a second ship loader wharf.

The BCEF is designed for the purposes of iron ore export only.

2.3.2. Project Design Parameters

To date, the Project has progressed to concept design and detailed design is anticipated to occur closer to the time of construction, following the approvals process. The original concept design has been prepared by AECOM in 2009 and drawings are contained in **Appendix E.1.** The plan was prepared in response to the Project Functional Design Brief prepared by SGPL along with subsequent amendments and design developments.

The base for the concept design was prepared in 2009, and has been updated with amendments and design developments.

The following design parameters have been established for the Project:

- Designated use as a facility for the bulk exports of Haematite and Magnetite Iron Ore
- Facility to be constructed in stages first to meet a 25Mtpa export capacity, with an expansion to enable production of 50Mtpa
- Facility to suit Cape-size bulk vessels with the capacity to hold 180,000T
- Wharves are 250m in length to suit vessel hatch length
- A rail loop of 6100m sized to accommodate a minimum of three 1800m trains
- Rail spur to provide connection to existing Pt. Augusta-Whyalla rail in both directions
- Rail component to be designed and constructed to the satisfaction of ARTC
- The materials handling system must be sized to deliver the required quantity of material at the design rate with high consistency and with as low as practicable risk of system failure and minimising the factors responsible for deterioration of ore quality and for generation / emission of dust and noise to the environment
- Each of the two materials handling systems should operate assuming a design loading rate of 4000 tonnes per hour (TPH)
- The design should minimise environmental and social impacts on the surrounding area.

2.4. Detailed Description of Design Elements

2.4.1. Rail

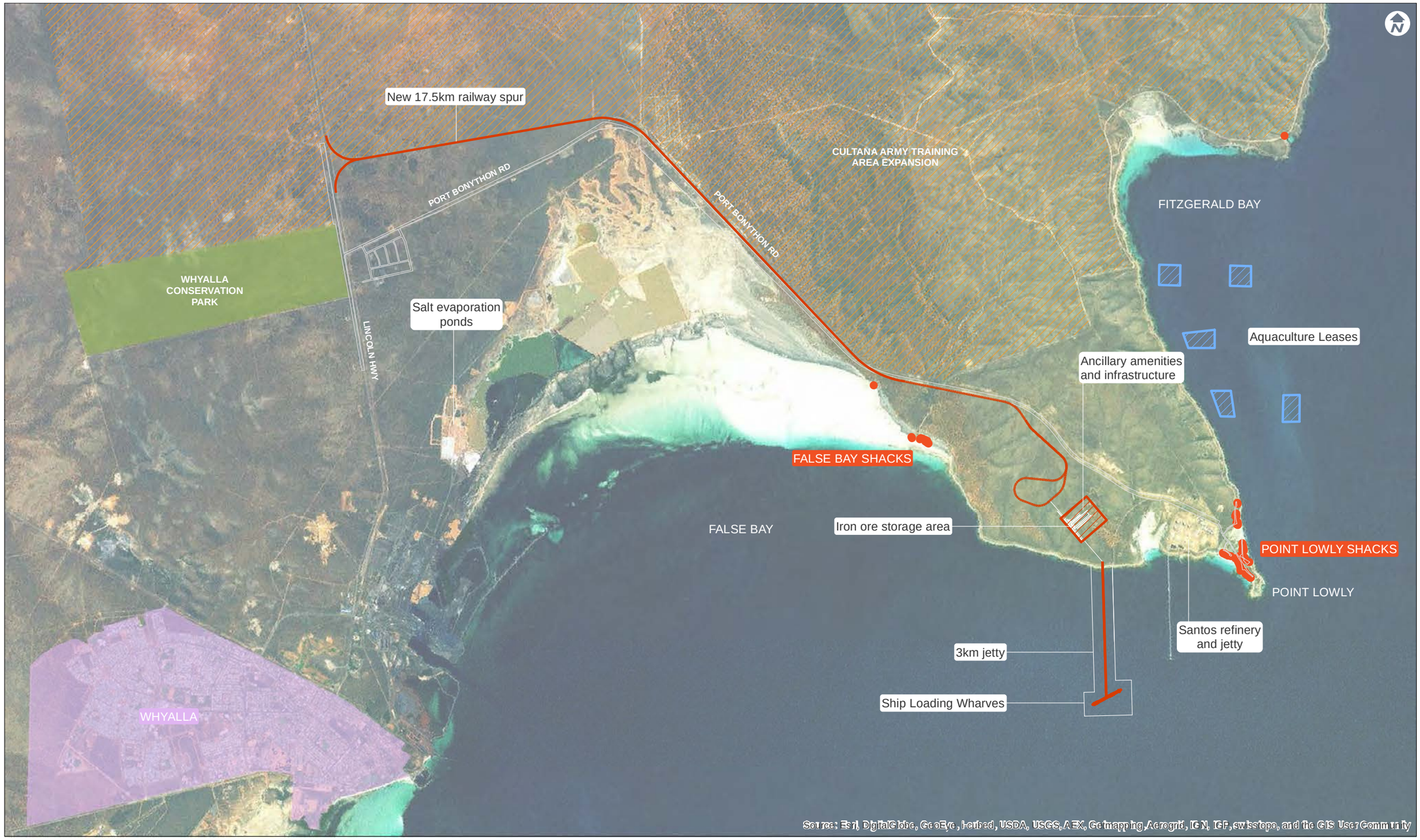
A new rail spur will branch from the existing Port Augusta to Whyalla Railway line, just north of Whyalla and Port Bonython Road. The railway alignment will meet and then run in parallel with Port Bonython Road as illustrated in **Figure 2.4a**. It will then cross over Port Bonython Road and run parallel to the southern side of the road, before veering off to the proposed storage facility in the form of a balloon loop.

The total track length is approximately 23.6 kilometres (2 kilometres of standard gauge track at the mainline turn outs and dual gauge track for a rail loop). A 6100m minimum rail loop is required (to accommodate three 1800m trains). The design speed for track alignment is to be 80km/h with a 23Tonne axle loading. There will also be a permanent maintenance access track for the railway that will run parallel to the railway.

A grade separated crossing has been provided for at the intersection of the mainline with Port Bonython Road. A nominal three passively protected level crossings (crossings protected with signs but no boom gates, flashing lights or warning tones) will be installed between the existing ARTC Network and the balloon loop to permit local access over the railway to adjacent properties.

Figure 2.4a: Concept site layout plan for the Project

Figure 2.4a: Concept site layout plan for the Project



Port Bonython EIS
Spencer Gulf Port Link

Figure 2.4a - Concept Plan

Legend

- Shacks
- Aquaculture Leases
- Cultana Army Training Area Expansion
- Whyalla
- Whyalla Conservation Park

ARUP

Spencer Gulf Port Link

1:75,000 (at A3)

0 1 2 4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: Geographic Datum of Australia
Grid: Map Grid of Australia 1994, Zone 53

2.4.2. Bulk Storage Facility

The bulk storage facility includes the following components:

- Ore unloading facilities
- Iron ore storage facilities, including three sheds initially (Two 270,000t capacity Hematite sheds and one 225,000t capacity Magnetite concentrates shed). Further storage facilities may be required to meet the 50Mtpa capacity
- Iron ore receival, storage and export operations
- Conveying and material handling equipment suitable for exporting in excess of 50Mt of iron ore per annum.

The BCEF will contain a refuelling facility for maintenance vehicles, ancillary infrastructure and an administration and amenities building, discussed below in **Section 2.4.4**.

A concept plan for the BCEF is shown in **Chapter 1, Project Introduction.**

The materials handling system will operate as a part of the BCEF. This system is a fully enclosed conveying system equipped with individual dust control systems. A concept flow diagram of the process is shown in drawing 60051283-SK-100 in **Appendix E.1**. The materials handling system comprises of:

- Rail dump: designed to accommodate moving bottom dump wagons capable of clearing at least 4000TPH with capacity to handle up to 55 wagons per hour. The hopper is cleared via an apron feeder that discharges onto a transfer conveyor for either direct loading onto ships or storage in the sheds
- Feed conveyors to storage sheds: The apron feeder from the dump hopper feeds the transfer conveyor which, via a trouser leg chute, can either directly feed the out-loading conveyor or the shed feed conveyor. The shed feed conveyor is capable of feeding either the Hematite or Magnetite sheds. Each shed is then fed via high mounted conveyors fitted with trippers to distribute the ore throughout the respective storage shed. Each conveyor is fully enclosed and each transfer point is fitted with a dust extraction unit to minimise fugitive dust emissions
- Belt feeders: Ore is reclaimed from each shed via Front End Loaders and transferred to hoppers located on the south eastern side of the sheds. Each shed will have a number of reclaim hoppers. The ore is discharged from each hopper via the belt feeders and transferred to conveyors
- Reclaim conveyors: The ore is transferred from the sheds via reclaim conveyors. These reclaim conveyors transfer the product via conveyor to the transfer station, sampling station and then onto the jetty conveyor. Each conveyor is fully enclosed and each transfer point is fitted with a dust extraction unit to minimise fugitive dust emissions
- Sampling station: An automated sampling system is design to take a representative sample of the ore as it passes through the transfer tower. The principal system is compliant with relevant American Society for Testing and Materials (ASTM) standards and is a three stage sampling system:
  - Primary cut
  - Crusher
  - Secondary cut
- The remaining primary sample is transferred via a bucket elevator back to the reclaim conveyor.

The material is then transferred to the conveyors on the jetty and wharf, as further described below.

2.4.3. Jetty and Wharf

A 3km jetty will support the material handling infrastructure and provide access to the berthing wharves (refer to **Appendix E.1** for concept design drawings). The enclosed conveyor belt (s) shall pass the iron ore from the railway and storage sheds to the end of the three kilometre long jetty. Two berthing wharves (one is required to support 25Mtpa export capacity with an additional wharf required to support the 50Mtpa export capacity) will provide the interface for export of the ore to ships. Each berthing wharf is nominally 250m long and can load 220m of hatches. Each ship loading facility will be capable of exporting 4000TPH of iron ore. These elements are further described below:

- Jetty conveyor: The ore is transferred from conveyors and conveyed approximately 3000m. The jetty conveyor is an overland conveyor structure enclosed along its full length including a walkway. The jetty conveyor elevates and discharges to the elevated wharf conveyor
- Conveyor on wharf: The ore is transferred from the jetty conveyor to the elevated wharf conveyor, a conveyor with a tripper transferring ore to the ship loader conveyor. This conveyor is fully enclosed with walkways both sides and access to the tripper. The face of the enclosure has a shielded opening along the length to allow the tripper to discharge to the ship loader conveyor
- The proposed jetty shall be erected parallel to the 2.4km Santos jetty at a separation distance of approximately 1.4km. This is outside the safety buffer zone of the Santos Jetty of approximately 1km when ships are loading (400m during normal operations)
- A jetty abutment will be constructed to facilitate initial jetty construction activities, and will extend approximately 15-30m into the inter-tidal zone and is approximately 50m wide. A rock bund together with geotextile filters will prevent material loss to the marine environment.

There will also be mooring facilities for up to three tug boats located at an appropriate depth as well as suitable distance from shore (away from sensitive receptors such as the Cuttlefish aggregation zone) on the eastern side of the main jetty. The final location will be determined during detailed design and will consider any potential adverse environmental impacts to minimise risks during construction and operations. Minimal infrastructure will be required to support these mooring facilities, they will be parallel to the new jetty and involve some structural protection and additional local piling to strengthen and protect the mooring facility.

2.4.4. Supporting Infrastructure

2.4.4.1. Buildings

The BCEF will contain a number of ancillary structures including:

- Administration and amenities building
- Maintenance shed
- Hazardous good storage
- Car-parking (approximately 27 car spaces provided).

2.4.4.2. Road Access

The main access corridor will be Port Bonython Road, a sealed road which joins the Whyalla-Port Augusta Highway. A 6m wide sealed access road will be constructed to pass from Port Bonython Road due south to form a direct route to the storage facility and associated buildings. The permanent maintenance access track for the railway will run parallel to the railway.

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.

2.4.4.3. Electricity

An 11 kV high voltage (HV) supply will be required at the proposed storage facility site. Currently this will be supplied through a new spur line from the existing 132kV HV line which passes the boundary of the Project site and terminates at the Santos facility at Stony Point Sub Station. The spur line will run to a new 132 / 11kV switchyard for the Project. Onsite HV shall be transformed to low voltage (LV) via three HV switch rooms with six transformers within this site.

2.4.4.4. Water

Potable water at the BCEF will be required to be reticulated around the site and stored for fire and spray water in onsite tanks. This may be supplied through either onsite water harvesting or from existing water supply networks.

Due to the nature of the ephemeral flow that occurs after heavy rain, there is limited potential for surface water harvesting. However, it is proposed to harvest, store and re-use the stormwater collected on site for dust suppression and other minor uses.

Depending on the volume requirements, water is likely to be obtained utilising the existing 200mm pipe that extends to Port Bonython from the Morgan – Whyalla No.2 pipeline, or a new pipeline could be established that connects into the No.2 pipeline.

2.4.4.5. Sewage

A 5000L packaged sewer treatment plant will be used to treat sewage during Project operation. Wastewater from the plant will be reticulated to landscaping.

2.4.5. Site layout

A preliminary site layout for the landside infrastructure is shown in **Figure 2.4a**.

2.5. Project Staging

It is expected that the BCEF will open immediately following the construction phase from 2015 to 2017 with the operational phase assumed to commence in 2018 subject to financial close. Initially, the BCEF will operate at a capacity of 25Mtpa (Stage One). Once sufficient demand is generated, the infrastructure to reach a total capacity of 50Mtpa (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 25Mtpa (Stage One) to 50Mtpa (Stage Two) will include construction of the following elements:

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

Construction for the expansion to 50Mtpa will occur while the facility is in operation.

The Project phases are further broken down in the following sections.

2.6. Construction Phase

2.6.1. Scheduling

Construction is expected to commence in 2015 and will take approximately 30 months to complete (Stage 1, 25Mtpa). The Project is currently proposed to be operational by 2018, subject to financial close. The current construction program assumes that onshore and offshore construction works will take place concurrently. Construction for the expansion (Stage Two) will occur while the BCEF is in operation. Construction of the second stage to upgrade the Project to 50Mtpa will occur over approximately two years (24 months).

A preliminary construction program is provided in **Figure 2.6a**.

Figure 2.6a: Preliminary Construction Program – 25Mpta

Activity	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Procurement												
Mobilisation												
Site establishment												
Construction												
Rail loop												
Rail dump												
Onshore conveyors												
Storage sheds												
Other onshore infrastructure												
Jetty												
Berthing area												
Wharf												
Ship loader												
Other marine infrastructure												
Commissioning												

2.6.2. Work Hours

Construction is scheduled to 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.

These standard hours may be impacted by tides and weather conditions causing certain normal works to be carried out outside standard hours. In addition it may be necessary to undertake certain works on a two shift basis in order to complete the works in a timely manner.

The EPA restricts construction activities to the hours 7am-7pm, Monday to Saturday. Work hours for the project are proposed to be between 6am – 6pm. Permission for 'standard' working hours to be amended will be sought from the EPA. Occasionally, work may need to be undertaken outside of these 'standard' hours. Permission for 'out of hours' work that is likely to generate excessive noise must be obtained from the EPA. Potentially affected residents will be notified prior to 'out of hours' construction work occurring.

2.6.3. Construction Workforce

Estimates of the numbers and requirements of the workforce required for construction of the Project have been made, which will be further progressed and refined during the detailed design phase prior to construction.

2.6.3.1. Stage One, 25Mtpa

The construction workforce 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. It is anticipated that approximately 25 percent of the workforce will use private vehicles to get to the Project site with the remainder using a combination of bussing (provided by the Construction Contractor) and carpooling.

2.6.3.2. Stage Two, 50Mtpa

The peak construction staff requirement is assumed to be 60 percent of the peak during Stage One, accounting for the fact that Stage Two has a smaller scope (and does not require railway construction). Therefore, the peak construction workforce is estimated to be 120 people, with an ancillary workforce of 20-30 people (workshop, office support, cleaning, food services etc.) Accommodation and travel arrangements for Stage Two construction workers will be the same as that for Stage One.

2.6.4. Construction Activities

2.6.4.1. Pre-Construction Activities

Detailed Design

As stated previously, the Project has currently progressed through to concept design phase to provide sufficient detail and information to inform this EIS. Detailed design will occur at a time closer to construction, following the approvals process, likely in 2014.

Planning and Approvals

A number of planning and environmental approvals and permits may be required beyond the EIS approval, and will be sought prior to construction commencing. For details of potential approvals, refer to **Chapter 3, Legislation and Planning.**

Procurement and Site Mobilisation

Prior to work commencing, mobilisation activities will occur including the procurement of goods and services.

Environmental and Safety Management

Prior to works commencing, a site-specific Safety Plan and Construction Environmental Management Plan (CEMP) will be developed by the Contractor and approved by SGPL and relevant government agencies; a draft CEMP is provided in **Chapter 19, Environmental Management Plan**.

2.6.4.2. Construction Activities

Construction Site Layout

Storage and lay-down areas will be defined for the site prior to the commencement of works. Plant, equipment and materials storage shall be restricted to constructed laydown areas with topsoil from access tracks and lay down areas to be stockpiled separately to subsoils and retained for rehabilitation following construction.

Generally, construction works will be completed in areas that are disturbed as part of the permanent works. The exception to this is the Material Offloading Facility (MOF) and shoreline storage area.

Works areas will be defined with minimal area disturbance and material will not be stored where environmental harm can result from pollution of water. Site layout and controls will be documented in construction management plans, including the CEMP.

Site Preparation and Vegetation Clearance

Site preparation will involve clearing vegetation on the site as required and removing topsoil, which will be stockpiled for future use. Clearing activities shall be staged to minimise the areas of exposed earth. Vegetation to be retained shall be protected from disturbance with fencing or other measures.

Mitigation measures for erosion prevention and water quality control during vegetation clearing and construction will be detailed in the Construction Environmental Management Plan (CEMP).

Earthworks

Cut and fill will be balanced with no materials to be transported off site. The volumes estimated below for cut and fill are based on the concept design and will be further refined during the detailed design phase:

- The cut volume for the rail is estimated to be 1,000,000m^3
- The fill volume for the rail is estimated to be 800,000m^3
- The cut volume for the jetty abutment is estimated to be 2000m^3
- The fill volume for the jetty abutment is estimated to be 7000m^3
- Cut to fill of the general site is estimated to be 620,000m^3
- Spoil is estimated at 200,000m^3 (remaining spoil will be utilised for landscaping purposes).

The construction corridor for the railway construction is estimated to be typically 50m wide. In areas of large cuts and fills, this corridor will extend beyond 50m to the extent required to complete the cut or embankment construction and installation of any boundary fencing (if required).

Offshore Construction - Jetty

The three kilometre jetty that links the shipping berth with the onshore facilities will be constructed using a purpose built cantitraveller. The traveller has been designed to carry out all jetty construction operations including:

- Piling
- Crosshead and beam installation
- Pre-cast concrete deck installation.

Marine infrastructure is able to be installed without any dredging occurring or explosives being used.

Cantitraveller Operations

During construction of the jetty substructure, the leading end of the cantitraveller will be supported from the seabed by temporary spud piles which will be raised when the traveller is being advanced to the next pier position. The construction process is illustrated in the drawings in **Appendix E.1.**

A 200t crawler crane mounted on a powered trolley can travel the length of the traveller. The crane handles pitches and drives the piles (delivered to the traveller along the wharf or by barge) to the required founding level. Piles will be pitched into piling gates forming part of the traveller system and driven to set with a hydraulic hammer from a hanging leader. After both piles are driven, the top of the pile will be trimmed to final level, the crosshead installed and welded to the piles and the traveller

temporary support rollers fitted to the crosshead. The spuds are raised and the traveller advanced to the next bent position by an in-built hydraulic powered pusher.

Once the traveller is moved forward, work platforms at the back two piers will be lowered into position and any final finishing of the crosshead is completed. The jetty deck support beams and pre-cast deck slabs will be delivered to the rear of the traveller and placed into final position utilising in-built monorail cranes.

Piling

Piles will be installed at locations shown on the design drawings (refer **Appendix E.1)** for the jetty and shipping berth works. Piles are expected to be "open-end" driven and are generally 1200mm maximum diameter.

Spud piles will be installed as temporary piles to support the jetty construction cantitraveller. The spuds have a nominal footprint of 2.5m^2 and are lowered to the seafloor once the cantitraveller has launched forward to a new jetty pier location. On completion of pier construction, the spuds are withdrawn from the seabed and the cantitraveller launched forward to the next jetty pier location.

Typical hammer times per day in good conditions is expected to be four piles at 30 minutes each, and may be more or less pending ground conditions. The pile driving methodology may also vary pending geotechnical conditions.

Offshore Construction – Wharf and Shipping Berth

The strategy behind the delivery of the wharf and shipping berth is to adopt construction methods that minimise exposure to marine conditions which could negatively impact construction and also allows two independent work fronts.

The following plant has been preliminarily identified, which provide fixed platforms for construction activities:

- A self-elevating platform (SEP) equipped with a 200t crawler crane, piling and welding plant
- A travelling bridge that will travel on rails attached to the rear ship loader runway girder and a temporary girder. The bridge will be equipped with a 200t crawler crane, piling, welding and plant.

Operation of these equipment spreads will be supported by a marine fleet.

Construction of the shipping berth will commence with the SEP constructing the wharf strongpoint substructure and concrete deck to form a platform on which of the travelling bridge will be assembled and mobilised for operation.

SEP Operations

Once the travelling bridge is mobilised the SEP will continue construction of the wharf structure undertaking all works including pile driving, installation of crossheads, ship loader runway girders and bracing members.

On completion of the wharf structure, the SEP will then move to construct the link bridge/transfer tower platform followed by construction of the two mooring Dolphins. In addition it will when necessary supplement the wharf bridge crane operations by undertaking piling and fender installation works.

Once the jetty traveller and the wharf bridge crane have completed all their respective construction activities, the SEP will be used to dismantle this equipment and load it onto barges for shipment to shore. The final operation for the SEP will be to erect the rising sections of the conveyors that connect to the transfer station located at the wharf and jetty intersection.

On-shore Support Facilities

There will be three sites to support the off-shore construction operations.

1. Personnel boats used to transport workers and supervisors will operate from the public boating facility located at Point Lowly
2. A load out wharf in Whyalla. This will be the major supply base for the off-shore construction operations and will comprise approximately 100m of shipping berth backed by hardstand paved storage area. A 150t crawler crane will operate to load and unload boats and barges with piles, structural steelwork, conveyor galleries and consumables
3. A load out wharf in Port Pirie. Piles manufactured overseas will be delivered to Port Pirie (or Whyalla if suitable) and loaded onto transport for delivery either to the site at Port Bonython or to the Whyalla load out facility. Approximately 15,000 tonnes will pass through this facility.

Onshore Construction

Rail

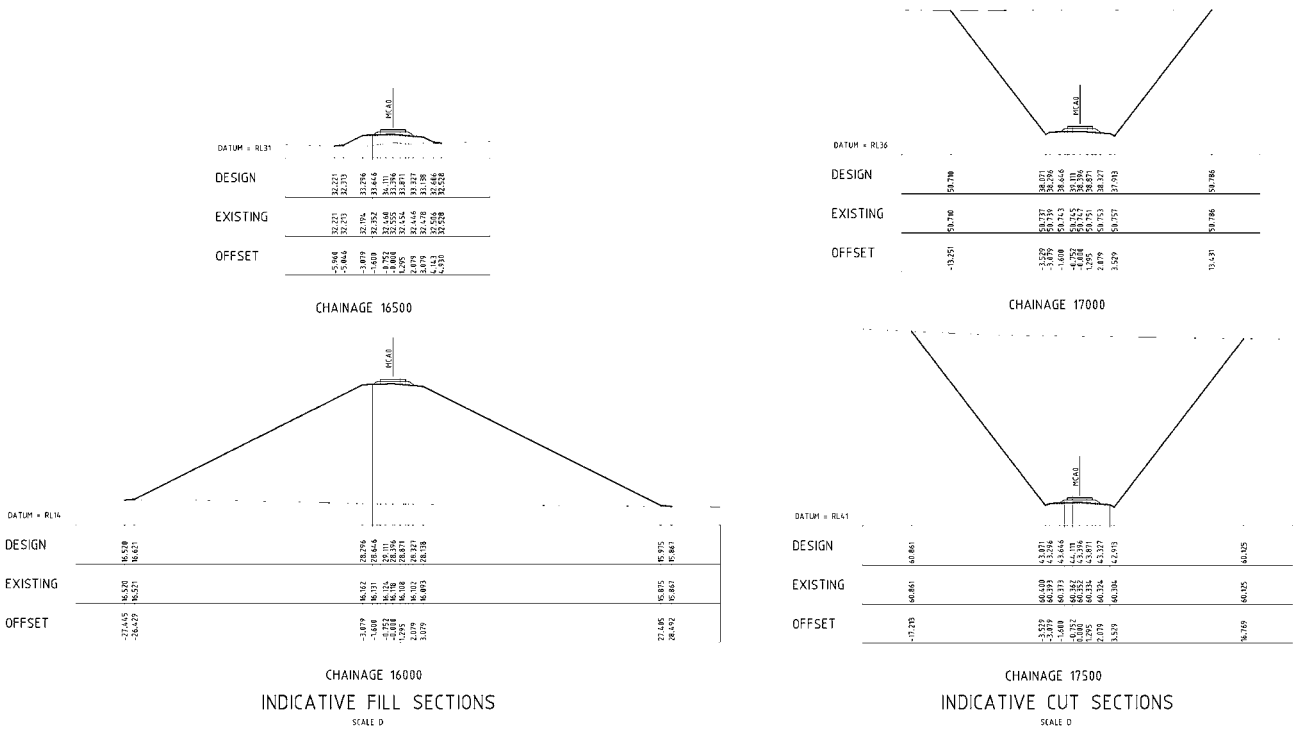
Typical cross sections have been developed (refer to **Figure 2.6b**), but the detailed design of the road crossing has not yet been completed and may involve some realignment of the road to achieve a crossing with adequate sight distance to ensure safety in design.

The balloon loop will be fenced and culverts constructed in alignment with existing road culverts. Several culverts will be constructed along the proposed rail alignment that discharge the surface flows to adjacent waterways. The concept design has included 11 culverts of approximately 1200mm diameter along the flood plain and 38 culverts of 1200mm diameter along the fill areas. Further detailed design of culverts will be undertaken to ensure that they meet flood immunity standards, and do not exacerbate the current flooding regime.

Post-Construction Activities

Following completion of construction, any necessary post-construction surveys and clean-up will be undertaken including revegetation of disturbed areas (noting this would be undertaken progressively where possible). The topsoils and other material removed and stored during the initial phases of construction will be used for rehabilitation of the site.

Figure 2.6b: Typical cross sections for rail line; refer to drawing 60051283-SK-052 in Appendix E.1.



2.6.5. Construction Services

2.6.5.1. Energy and Electricity

Portable diesel generator sets will be used to supply power for construction activities. Mainline power from the existing supply point on Port Bonython Road will be used for some construction activities once construction of this supply is completed. The estimated fuel consumption during the construction phase of the Project is three million litres of diesel.

2.6.5.2. Water Supply

There will be a turkey's nest tank or dam constructed for water storage at the commencement of the construction phase (or earlier, to allow sufficient time for it to fill with stormwater). A stand pipe will be used to pump water from the turkey's nest into water-carts for application as dust suppression. Groundwater may be used during construction depending on water quality testing and available supply.

Tanks will be installed for fire-fighting purposes during construction. Additionally, the turkeys nest dam will be available for water-cart and fire fighting use.

Should insufficient water be available onsite, water carts from external supplies may be used and will be subject to further detailed design and analysis.

2.6.5.3. Sewage

Portable self-contained units will be used during construction works. Offshore plant sewage will be treated and disposed in accordance with Australian Maritime Safety Authority (AMSA) regulations.

2.6.5.4. Waste

Waste generated during construction will be managed through a detailed waste management plan to be finalised prior to the commencement of works. This plan will document the likely waste streams, requirements for the disposal/reuse/recycling of each identified waste stream, measures for tracking and recording waste information and provide a schedule of inspections and audits that will be undertaken during construction. This plan will be in line with the EPA Waste Management Hierarchy and refer to the State-based waste management guidelines or strategies, the EPA waste tracking system along with state requirements for waste reporting.

2.6.6. Construction Transport, Access Routes and Storage

2.6.6.1. Transport and Vehicle Movements

The majority of materials delivered to site 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.

Delivery trucks will be utilised to deliver prefabricated components for jetty construction, railway materials, buildings, conveyors and the like in addition trucks will deliver consumables such as welding supplies, fuel and lubricants, plant maintenance items.

For maritime works, over-dimension loads are likely to be transported via road for piles and jetty deck beams and shipping berth prefabricated structural steel elements. Alternatively, piles and other construction materials manufactured off-site will be transported to site via barges. For land based works, structural steel for storage sheds, train unloader station, conveyor galleries and support will be typically transported as standard oversized loads via the existing road network.

A number of transport barges will be utilised on site to ferry equipment, materials and staff to and from maritime construction works. On a typical work day tugs may make two trips towing transport barges between the jetty, shipping berth works and the Project load-out facility. The tug may also be used for transport of small items of plant and consumables including potable water and diesel fuel. The workboats may also be used to:

- Make a number of trips to transport personnel between the landing and the worksites
- Tow piles from launch facility to jetty and shipping berth worksites
- Transport small items of plant and consumables including potable water and diesel fuel.

Two personnel boats will transport personnel between the on-shore landing facility and the worksites, with one boat to be deployed as a safety rescue vessel stationed adjacent to the shipping berth work area.

Generally, the following road vehicle movements are expected during construction:

Phase	Traffic Generation (vehicles per day)
Construction (Stage One)	200
Construction (Stage Two), occurring simultaneously with Operations (Stage One)	180

Traffic impacts and management are outlined further in **Chapter 8, Transport**.

2.6.6.2. Site Access

A temporary access track will be constructed along the rail corridor and parallel to the permanent jetty access road, and roads around the perimeter of the sheds.

Access tracks will be covered with crushed rock or other material in required areas to reduce mud collection on vehicle wheels and dust generation.

2.7. Operation Phase

2.7.1. Operating Hours

The Project has been designed to be capable of operating continuously 24 hours a day, seven days a week.

2.7.2. Personnel

2.7.2.1. Stage One, 25Mtpa

Operations will have a peak workforce of approximately 48 shift personnel. Personnel will work in four shifts of eight persons, with an additional six persons working permanent days.

2.7.2.2. Stage Two, 50Mtpa

The staff levels will be higher by approximately 50 percent (peak workforce of 24) than that required for operation of the first stage of the BCEF.

2.7.3. Operational Activities

2.7.3.1. Rail Movements

Fully loaded 1800m trains will deliver iron ore to the BCEF from various supply sources. A fully loaded train has approximately 80 wagons (maximum), with each wagon carrying approximately 144 tonnes of ore (approximately 11,520t of iron ore per train).

Trains will be pulled by four AC locomotives under distributed power (locomotives in the middle of the trailing wagons).

Initially for the 25Mtpa operation, it is expected that there will be six trains arriving at the BCEF per day, with operation expected to occur over seven days throughout the year. The final schedule for train movements has not yet been determined, but at this stage there is allowance for trains to operate during both the day and night.

This number of trains arriving at the site is expected to double to 12 per day when the site is expanded to process 50Mtpa.

2.7.3.2. Vessel Movements and Operation

Ship Loading

The anticipated design loading rate for the BCEF is 4000TPH, expanding to 8000TPH for the full 50Mtpa capacity, with each Cape-size vessel to be loaded in approximately 2 days.

Vessel Navigation and Operation

The BCEF has been designed to accommodate a maximum–sized bulk carrier of 180,000t (Cape-size vessels). These bulk carriers are approximately 290m in length with an 18m draft and a maximum water displacement of 213,200t. **Figure 2.7a** illustrates the vessel approach and departure paths for the BCEF. There is no requirement for ongoing dredging in order to maintain the wharf or approach and departure channels.

An area 20km to the south of Port Bonython is designated as a holding anchorage (Refer to **Figure 13.4h in Chapter 13, Marine Water Quality and Coastal Processes**). All large vessels entering the Upper Spencer Gulf will be managed from this holding bay – with Flinders Ports calling the vessels when it is safe to continue manoeuvring towards the wharf and the port is ready for the ship. The vessels reach the holding anchorage un-piloted. Un-laden vessels will approach the berth on a similar path as currently in use for the Santos Facility. The vessel will only berth port side, to be able to depart straight off the berth in the required water depth for laden condition. 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 speeds of the Cape-size vessels will be approximately 12-14 knots (22-26km/hour). These speeds will be maintained until the vessel reaches the approach and departure channel, where the pilot boards the ship and tugboats assist in berthing the ship in accordance with approved port rules governing the operations of the BCEF. Vessels will maintain speeds with the tugs of less than six knots for this approach.

Ship Movements

The operation of the BCEF will increase the number of large vessel movements in the Spencer Gulf. Cape-size vessels (with a nominal capacity of 180, 000t) will contribute the majority of ship movements, although Panamax vessels (with a capacity of 80, 000t) may occasionally be utilised. Significant use of Panamax-size vessels is not considered commercially viable however; therefore Cape-size vessels will carry the majority of iron ore from the BCEF. 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 50Mtpa capacity). The number of ships will also be dependent on export levels i.e. if the full 50Mtpa 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.

Navigational Aids

Navigation aids will be located in the channel. It is anticipated that the existing Navigation Beacon No. 10 will be relocated south to the 18m depth contour line to improve navigation for vessels approaching the proposed BCEF.

2.7.3.3. Maintenance

Maintenance and asset management procedures for site infrastructure and facilities will be developed and finalised prior to commencement of operations. Operation management plans will include standard management activities similar to other facilities operated by Flinders Ports to ensure infrastructure is maintained to a high standard in a safe and efficient manner.

2.7.4. Operating Life and Decommissioning

The BCEF infrastructure has been designed assuming standard service lifespans for each element of the Project. Generally, the service life span has been assumed to be:

- Rail – 100 years
- Jetty – >25 years
- All other major infrastructure – 50 years.

To account for the full life cycle of the Project, decommissioning will be considered in detail during subsequent Project phases.

Activities likely to be associated with the decommissioning of the Project include:

- Dismantling of the jetty (or upgrading if appropriate)
- Removal of piles
- Demolition or relocation of on-site buildings and infrastructure
- Recycling of materials from Project infrastructure where feasible
- Revegetation and regeneration of the Project area.

Disassembly for the jetty will be undertaken using a jack-up barge and 200t crane dismantling the jetty span by span with 95 percent of materials being recycled. Piles can be cut off at sea-bed level. Demolition of the buildings will be done in accordance with industry standards with the majority of the materials likely to be reclaimed for recycling.

Figure 2.7a: Vessel approach (red) and departure (green) for the Port