

CENTREX METALS LTD

Port Spencer Stage 1 Public Environmental Report Executive Summary Only



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Centrex Metals Ltd

ABN 97 096 298 752

Unit 1102, 147 Pirie Street

Adelaide, South Australia 5000

Telephone: +61 8 8100 2200

Fax: +61 8 8232 0500

Web: www.centrexmetals.com.au

Golder Associates Pty Ltd

ABN 64 006 107 857

199 Franklin St

Adelaide, South Australia 5000

Telephone: +61 8 8213 2100

Fax: +61 8 8213 2101

Web: www.golder.com.au



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EXECUTIVE SUMMARY

This Executive Summary was prepared to accompany the Port Spencer Stage 1 Public Environmental Report (PER). It provides an overview of the Project, a summary of the technical studies completed and the management measures proposed by Centrex Metals Ltd (Centrex) to minimise potential negative impacts arising from Port Spencer's development. The PER was prepared by Golder Associates Pty Ltd on behalf of Centrex.

Introduction

Centrex is proposing to develop Stage 1 of the private multi-user Port Spencer (the 'Project' or the 'Port') located on the east coast of Eyre Peninsula, South Australia, approximately 21 km north-east of Tumbay Bay and 20 km south-west of Port Neill. This PER is submitted pursuant to the provisions of section 46 ('Major Development') of the *Development Act 1993* and the requirements of the project specific 2011 *Guidelines for the Preparation of a Public Environmental Report, Sheep Hill Deep Water Port Facility (Stage 1) on Eyre Peninsula* (the 'Guidelines') prepared by the South Australian Development Assessment Commission (DAC). The Project, formerly referred to as Sheep Hill Port, was renamed Port Spencer in late 2011.

Incorporated in 2001, Centrex is a publicly listed South Australian iron ore exploration and mining company. Centrex has extensive tenement holdings over iron ore resources and exploration targets on Eyre Peninsula in the southern Gawler Craton. They cover an area of 2,000 km² of iron ore deposits and prospects, including hematite and magnetite sources. Large iron ore reserves and other valuable minerals are yet to be recovered on Eyre Peninsula and across South Australia more generally. Recently Centrex obtained approval to undertake mining at the Wilgerup hematite deposit, which will be one of a number of Centrex's iron ore projects to be developed on the Eyre Peninsula in coming years. Other companies with mineral tenements and projects within the region include Eyre Iron Pty Ltd, IronClad Mining Ltd, Iron Road Ltd, Lincoln Minerals Ltd, Lymex Ltd, Minotaur Exploration Ltd, OneSteel Ltd, Samphire Ltd and Terramin Australia Ltd.

While resource demands continue to grow, particularly from China, there is increasing pressure for industry to plan for efficient transportation options, both from a carbon and energy efficiency perspective as well as reducing impacts from other transport options. Central to this is the development of suitable infrastructure to facilitate cost-effective and environmentally responsible transportation options for industry. The Project offers a significant regional opportunity to develop an alternative port and shipping option to Port Lincoln, create a localised option for the southern and mid-regions of Eyre Peninsula, reduce transport distances and improve the time taken to move product to market. In addition it offers the potential for a port capable of receiving Cape class vessels, not currently available on Eyre Peninsula, and a viable export option for mineral and agricultural businesses.

Contact details for Centrex are:

Address: Unit 1102, 147 Pirie Street, Adelaide SA 5000

Phone: (08) 8100 2200

Fax: (08) 8232 0500

Email: admin@centrexmetals.com.au

Web: www.centrexmetals.com.au

Centrex proposes to construct a deep water marine port in Spencer Gulf, with a view to exporting Centrex's iron ore from Eyre Peninsula and providing the mining industry with effective access to international markets. The Project would be developed as a multi-user bulk commodity export facility capable of accommodating Panamax (65,000 to 90,000 tonne capacity) and Cape class (165,000 to 200,000 tonne capacity) vessels suitable for export of up to 20 million tonnes of ore per annum (mtpa) from a single berth configuration and single ship loader. The proposal also includes a road transport and infrastructure access corridor that would generally follow the alignment of the existing ungazetted Swaffers Road from Lincoln Highway. The Project may also serve as a multi-use export gate for grain and other mining companies in the Eyre Peninsula region.

The Project is proposed to be developed in four stages with Stage 1 being the subject of this PER. Stage 1 would be constructed to allow the export of hematite and grain. Stages 2 - 4 would allow for export of magnetite and be subject to further development approvals. Stage 2 would include development of a desalination plant for mine operation and Port use, and magnetite storage and processing infrastructure. Stages 3 and 4 of Port expansion (post-2014) would include expansion of magnetite storage and addition of extra hematite and grain storage facilities.

Investment in the Project is estimated to total approximately \$AUD250 million, (within a possible provisional estimate of 30% over or under spend), including detailed design and construction of the jetty, outloading materials handling system and ship loader, site access, establishment of onsite services and site preparation for fully enclosed receipt and storage facilities. The capital and operating cost of receipt and storage facilities would be the responsibility of each intended end user.

The location of the Project was selected on the basis of sea water depth to accommodate Cape class vessels without dredging, within a reasonable distance of the shore, as well as its close proximity to Centrex's mineral reserves on the Eyre Peninsula. The current marine shipping facility at Port Lincoln poses challenges and limitations for Centrex on a number of aspects, including local development opposition and sensitive port use by Port Lincoln fisheries. Marine shipping facilities outside of the Eyre Peninsula, such as Port Adelaide or Darwin, are high cost transport options which would result in larger economic impacts and carbon footprints. It is anticipated that use of the Port would reduce transportation costs and time, as well as the carbon footprint, of transporting minerals elsewhere for export.

Planning and Policy

This PER has considered relevant strategic and statutory planning context relevant to Port Spencer development. As a declared 'Major Development' this Project requires development approval by the Governor under section 48 of the *Development Act 1993* and will be assessed by the Minister for Planning (coordinated by DPTI). The assessment will take into consideration government agency and public comment on the PER, and will require Centrex to formally respond to these comments as part of the process. The final decision on approval will take into consideration the PER, Response Document to government and public comments, and the government's Assessment Report. The Project was not referred to the Commonwealth Government under the *Environment Protection and Biodiversity Conservation Act 1999* as it is considered the Port does not have potential to negatively impact matters of National Environmental Significance.

Key strategic planning policy documents include the South Australia Strategic Plan 2011, the Strategic Infrastructure Plan for SA 2004/5 – 2014/15 and Regional Plan of the Eyre Peninsula. Port Spencer's development would support and contribute to a number of Strategic Plan targets including *Growing Prosperity* related to mineral production and exploration and increasing export values. Under the Strategic Infrastructure Plan for SA the Project would contribute to development of efficient, affordable and safe transport systems within South Australia that contribute toward increasing the value of South Australia's export income and increased investment in strategic areas of infrastructure (such as ports). These strategic plans also recognise the potential for improved port facilities on the Eyre Peninsula, which this Project would directly facilitate and export and port development related objectives.

The Project site is located within the jurisdiction of the Tumby Bay District Council Development Plan (consolidated 13 January 2011) and Land Not Within a Council Area (Coastal Waters) Development Plan (consolidated 31 March 2011).

Project Need, Benefit and Alternatives

The Project's viability directly relates to the feasibility of Centrex's magnetite mines on the Eyre Peninsula, and would only commence construction upon receipt of development approval from the government for both Stages 1 and 2, and determination of the viability of developing a magnetite mine. Centrex's current proposed program is for Port Stage 1 construction to start in Q3 2012, with operations commencing in Q4 2014.

Existing ports and alternative routes to market were considered as part of the early planning and feasibility studies for this Project. Seven alternative ports were considered including Port Lincoln, Whyalla and the proposed Port Bonython. Existing ports were not considered suitable to meet Centrex's mining and shipping needs, due to a number of reasons including proximity to iron ore deposits, ability to receive Cape class vessels, potential environmental impacts, economic costs, terminus congestion and likely community support.

Without the Project, Centrex and developers of other mineral deposits may face increased transport and economic costs and limited transport export options that could negatively impact the viability of mine development. Centrex has secured land at the Port and is well advanced in discussions with utility providers, other potential Port users and local government. The development of the Port as a multi-user facility offers potential commercial opportunities to other businesses on the Eyre Peninsula including agricultural and mineral sections.

The site was selected based on a range of considerations including access to deep water close to shore, potential environmental and social sensitivity, proximity to potential mineral resources, availability of land, and economic viability. Point Gibbon was also considered, however the Port Spencer site was considered to be a better option in all of the considerations listed previously.

The Project is proposed to be undertaken in Stages to reflect expected Centrex mining export requirements over time. This staged approach allows a more balanced investment with regard to capital expenditure and would facilitate Port development in the shorter rather than long term. Rather than waiting for all mine projects to develop at the same time, the Port can be developed to meet Wilgerup and other party needs. Port design provides for flexibility by considering potential future transport and other facility expansion options. In addition the Port's development would facilitate a number of benefits at local, regional and State level including environmental, economic and social aspects.

Stage 1 Infrastructure

Port Spencer Stage 1 development would provide for hematite ore and grain export capacity. Approximately 48 ha of land would be required for Stage 1 development and the total site footprint is 140 ha. Although the site layout was designed to provide flexibility for a potential rail corridor Centrex does not require rail for mine development in the short or long term. The site has considered rail in layout design in line with good engineering practice and providing flexible infrastructure options for possible future users. Stage 1 site infrastructure includes the following:

- Hematite storage shed, with a storage capacity of up to 240,000 t and an in-loading shed, site office, site warehouse for equipment storage.
- A number of grain storage options are being considered at this time and will be finalised during detailed design phase:
 - Grain storage shed, with a storage capacity of approximately 60,000 t, or
 - Three 20,000 t grain storage silos with a maximum height of 30 m, or
 - One bunker style grain storage area with a capacity of approximately 60,000 t.
- Grain in-loading shed, site office and warehouse for equipment storage.
- Site administration/office building, suitable for occupation by 20-30 personnel and associated amenities.
- Enclosed conveyor galleries for proposed ore and grain in-loading and out-loading conveyor.
- Sampling station and enclosure for automatic sampling of iron ore and grain for quality assurance.
- A truck weighbridge station, located at the haul road entrance point on Swaffers Road at the northern side of the site.
- Electrical switch room; approximate dimensions 12 m long x 5 m wide x 4 m high.
- 68,000 L heavy fuel oil storage tank and 10,000 L bulk diesel fuel tank.
- The jetty would extend from the shoreline into the marine environment 515 m to a lowest astronomical tide water depth of approximately 20 m. Dredging is not required as part of Project operational activities due to location of the jetty within deep water.
- Industrial ship loader located on the berth stand suitable for loading ore and grain material into Cape class and Panamax sized vessels with an approximate loading capacity of 5,000 ton per hour (t/h) for iron ore and 1,400 t/h for grain.
- Haul road transport and infrastructure access corridor, which is 5 km in length from the Lincoln Highway and generally follows the alignment of the un gazetted Swaffers Road.
- Light vehicle access is proposed from Lipson Cove Road to the south of the site.
- Fire service tanks and pump systems.
- Car parking, and
- Stormwater drains and detention basin.

Consultation

A major part of the Project has been the stakeholder consultation undertaken from initial concept through to development application and PER production. Centrex has met with local residents, landowners, local authorities and government regulators to discuss the Project, and listen to potential concerns. These discussions have influenced the proposed design and management of the Project. Since 2008 Centrex has published a series of newsletters to inform stakeholders regarding the Project and its progression. In 2011 Centrex undertook three major community consultation events in Tumby Bay, Port Neill and later in Port Lincoln, to which members of the public and local authorities were invited. In August 2011 as follow up to these consultations and to ensure transparency Centrex published a public Stakeholder Response Report. This report provided up to date information on the queries raised by stakeholders, and informed all stakeholders on the matters raised.

As part of the PER review process, Centrex provided draft copies of the PER and this Executive Summary to the government in December 2011.

Qualitative Risk Assessment

A qualitative environmental and social risk assessment was undertaken to consider potential Project impacts before and after proposed mitigation and management measures. Risk rankings considered the likelihood or frequency of the incident/impact occurring in the context of this development and consequence of an impact occurring. Risk categorisation included 4 possible rankings of low, moderate, high or extreme.

The findings of the risk assessment identified the residual risk for import or export of marine pests from the Port as the only high risk. This is a potential impact and risk that would be expected with any commercial port facility accepting foreign vessels for export or import activity. This residual risk is considered to be As Low As Reasonably Practicable (ALARP) and can be effectively managed with appropriate management and monitoring measures implemented at the site. The appointed port operator would be required to develop suitable environmental management and incident response plans for all onshore and marine impact scenarios and comply with all environmental monitoring requirements, including of marine pests. The potential risks associated with development of Port Spencer are considered to be commensurate with such activities and the site offers an overall low risk environmental and social impact option for such a facility. This site does not pose expected medium or long term negative impacts to terrestrial or marine flora or fauna species of regulatory listed conservation significance.

Existing Environment and Impact Assessment

Land use

Port Spencer is located on undulating land, with the shore line located on the eastern boundary of the site. Historically, the majority of the Port site was used for agricultural activities and is currently free of built development. The eastern coastal allotments of the site have not previously been used for any agricultural activities. Excluding the coastal boundary of the site, the Port is located within freehold land that is covered by two Tumby Bay District Council development planning zones; coastal and general farming zones. The adjoining properties and surrounding environment are predominantly large agricultural allotments for crop and livestock activities.

Climate

The climatic conditions at Port Spencer are characterised by hot, dry summers and cool moist winters, typical to those of a temperate zone. The Project area receives approximately 385 mm of rain per annum, the majority of which falls during the winter months. The wind direction varies throughout the year; during spring and summer the winds are predominantly from south-east and during autumn and winter predominantly north-west through to west.

CSIRO climate change risk scenarios predict the southern parts of South Australia are likely to become warmer and annual rainfall will decline. Sea levels are predicted to rise and ocean waves are predicted to change, resulting in increased risk of coastal inundation during severe storm events, coastal erosion and seabed disturbance. Due to Port Spencer's proximity to the coast, climate change impacts have been considered during the development and design of the Project. The jetty design has included potential sea level rise scenarios.

Port Spencer potential greenhouse gas (GHG) emissions were estimated including transport of ore and grain. GHG emissions during Stage 1 construction phase are estimated to be 33.5 kt CO_{2-e}. GHG emissions during the operational phase were considered in terms of electricity, fuel usage (associated with plant and equipment) and transport of ore and grain. Operational emission estimates vary depending on the transport option being considered. Providing an Eyre Peninsula based port to accommodate Cape class vessels, where extensive overland transport is not required, has the potential to reduce GHG emissions generated by existing transport options by between 40% and 90% for ore, and up to 50% for grain. Port Spencer offers a significant opportunity to reduce the GHG intensity of export transport from the Eyre Peninsula.

Geology and Soils

Port Spencer is located in the Kalinjala Shear Zone, which is a large-scale crustal structure on the Eyre Peninsula that separates the Donington Suite granites of the Project area from the Hutchison Group of metasedimentary schist, quartzite, dolomite marble and banded iron formations to the west. Soil profiles within the Project area consist of sodosols and tenosols and existing soil mapping indicates there is an extremely low probability of acid sulfate soil presence in the Project area.

A potential existing contaminant assessment indicated chemical concentrations in the soils were generally below the adopted guidelines for the protection of human health and ecological receptors, as well as the waste fill disposal limits. Chemical concentrations were below National *Environmental Protection (Assessment of Site Contamination) Measure 1999* for commercial/industrial land use, which is the measure consistent with the future use of the site.

During construction phase vegetation would be removed exposing soil to potential erosive processes from wind and water. During operations, potential impacts to soil include erosion of exposed natural surfaces from wind, rain or site stormwater and creation of dust through exposed soils. There is also potential for soil contamination as a result of chemical and fuel handling and storage onsite, material spillages and wastewater treatment.

Surface Water

There are no watercourses that traverse the Project site. The existing Port Spencer catchment drains to Rogers Beach which abuts the north of the Project boundary. Based on field inspections the overall catchment shows little erosion in areas exhibiting signs of overland and concentrated runoff. The region is characterised by predominantly winter rainfall.

The location of Port infrastructure has the potential to alter surface water flows to existing receiving environments and increase the volume and speed of water runoff due to the hard surfaces associated with Port infrastructure. Increased sediment loads in surface water may also result from increased erosion from exposed natural surfaces and build up of sediment in stormwater management channels. Potential contamination of surface water may result from activities such as refuelling of plant, spills or leaks from bulk storage of fuel or hazardous substances. Surface water and stormwater design was undertaken to reflect the principles of Water Sensitive Urban Design Principles, recognising water as a valuable resource and applying both precautionary and site specific solutions to water demand and resource management. Stage 1 Project design includes stormwater controls, such as drainage channels, and a detention basin sized to contain a 100 year storm event to prevent discharge of stormwater to the marine environment. Design has redressed the capture and reuse of stormwater from built infrastructure and site surface run-off.

Groundwater

The uppermost groundwater aquifer at the site is just above the mean sea level at < 3 m Australian Height Datum (AHD) in either fractured rocks or loose and unstratified sediments. Regionally groundwater flow direction is towards the coast. It is estimated groundwater flow direction at the Project moves towards the coastline and ocean to the east, Rogers Beach to the north and to the west-north-west of the site.

Groundwater quality at the Project area is typical of coastal groundwater discharge areas (i.e., brackish to saline). Groundwater samples taken as part of baseline studies recorded metal exceedances in unpredictable patterns. Given the current land use and lack of potential contaminants, the most likely explanation for metal exceedances is that metals occur naturally and are the product of groundwater-metamorphic rock interactions. Groundwater would not be used as part of Project activities. It is unlikely that groundwater would be directly impacted by the Project.

Air

The existing air quality in the vicinity of the Port is relatively pollutant free and is typical of a rural environment. The main sensitive receptors within close proximity to the Port (i.e. within 5 km) are considered to be rural residences. There are five sensitive receptors for air quality impact purposes within close proximity to the Port, that is, 400 m to 2 km.

Air modelling of the expected operation infrastructure and materials was undertaken for potential PM₁₀ and PM_{2.5} concentrations. Modelling outcomes indicated the Port would comply with the air assessment criteria at all sensitive receptors. The Project is not expected to negatively impact air quality.

Noise

No significant, permanent man-made noise sources are located at or near the Port. The Port is located in a rural, coastal environment with four sensitive receptors for noise impacts within close proximity. Noise limits and criteria for the Port are based on the *Environmental Protection (Noise) Policy 2007* noise levels consistent with the existing land use.

Noise modelling for Port activities, including vessels at berth, and associated transport corridor along Swaffers Road indicate that noise criteria would not be exceeded at sensitive receptors. For road transport activities along Swaffers Road, the noise criteria for night-time exposure are exceeded at one of the sensitive receptors. It is considered this can be managed with appropriate mitigation.

Traffic

Port Spencer can be accessed via Swaffers Road and Lipson Cove Road, both of which connect to the Lincoln Highway. Swaffers Road is located to the north and north-west of the Project site and would be the main heavy vehicle and infrastructure corridor for the Port. It is currently an unsealed no through road that terminates at private property near the coast. Lipson Cove Road is also a no through road located along the southern boundary of the site that terminates at the Lipson Cove camping ground. Lipson Cove Road would provide light vehicle access.

Potential impacts associated with heavy vehicle movements associated with the Port include increased pressure on the Lincoln Highway and Swaffers Road junction, light vehicles increasing pressure on the Lincoln Highway and Lipson Cove Road junctions, and potential noise impacts. Both roads would be sealed as part of any Project related development. The additional vehicle movements were assessed through actual road survey and predicted transport volumes. Based on the traffic assessment undertaken for this Project road safety upgrades are not required, however a number of turning and other road improvements to improve road safety would be considered should the Project be approved. Further discussion would be undertaken with the Department of Planning, Transport and Infrastructure through the detailed design phase to reach agreement on the scope of potential improvements, particularly as it relates to providing acceleration lanes for heavy vehicles on Lincoln Highway.

Terrestrial Ecology

The Port is situated within the Eyre Hills (EYB-3) subregion of the Eyre Yorke Block Bioregion. The Eyre Yorke Block Bioregion has been severely impacted due to vegetation clearance for agriculture and pastoral land use. The majority of the surrounding area is historically agricultural land with remnant vegetation largely restricted to a narrow strip along the coastal cliffs or within roadside reserves. The surrounding environment is similar to that of the Project area in so much as remnant native vegetation is concentrated along the coastal cliffs. Three distinct plant associations are present at the Port including degraded Low Shrubland along the coastal strip, highly degraded Tall Open Shrubland and fallow paddock characterised by weed and colonising species. The Tall Open Shrubland associated with Rogers Beach would be protected by a development exclusion zone.

A total of 19 introduced species, representing 33% of all species identified, were recorded within the Project area. No weeds of national significance were identified at the Port or along Swaffers Road. Three declared plant species (as per the South Australian *Natural Resources Management Act 2004*) were identified at the Port and along Swaffers Road. The presence of weeds and other invasive species is further indication the native vegetation associations are much degraded.

A spring field survey of the Project area identified 43 fauna species, which comprised 26 bird, 7 reptile, 1 frog, 6 mammal and 3 butterfly species. No flora or fauna species identified were listed under either the *National Parks and Wildlife Act 1972* or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Eight introduced species were identified during the survey. The Project area does not contain habitat that is critical or limiting (as per the EPBC Act) for any listed fauna species.

Some native vegetation clearing would be required for Stage 1 development, which requires an approximate total area of 48 hectares. The area of expected native vegetation clearance for the Port site and Swaffers Road corridor is estimated at 15.66 hectares. Vegetation clearance is not expected to be a major impact for the Project. While the Low Open Shrubland along the coastal strip is degraded it remains of regional importance. Project onshore infrastructure is sited to minimise the requirement for clearing in this vegetation area. Only the jetty and related infrastructure would be required to cross this coastal vegetation, which is estimated to be an area of approximately 0.77 ha.

An offset is required for the approved removal of native vegetation and this offset is known as a significant environmental benefit (SEB), as defined by the *Native Vegetation Act 1991* (NV Act). Under the NV Act, terrestrial and marine native vegetation should be considered for SEB. Based on the total area and condition of terrestrial and marine flora (seagrasses) proposed to be cleared or impacted by Project activities. A total SEB of 21.02 ha was estimated to offset both terrestrial native vegetation (15.66 ha) clearance and the proposed impact upon marine seagrass beds (5.36 ha) in Port's vicinity. Proposed revegetation and rehabilitation along the south-east aspect of the site would significantly enhance the biodiversity value of the site including the coastal Low Open Shrubland. It is estimated that an area of 25.73 ha would be revegetated or enhanced through rehabilitation activities. This would result in a possible overall SEB credit of 4.71 ha.

Lipson Island

Lipson Island is located in the Lipson Island Conservation Park, located 1.5 km south from the proposed jetty. It is a low-lying island with extensive areas of bare rock and some sandy areas. It is recognised as a significant bird rookery and roost for a number of species listed under the NPW Act and EPBC Act.

Based on desktop review and field survey undertaken for this PER, Lipson Island is a nesting site for the little penguin (*Eudyptula minor*) and other burrow-nesting seabirds (a listed marine species under the EPBC Act). Other breeding colonies on Lipson Island include the black-faced cormorant (*Phalacrocorax fuscescens*), silver gull (*Larus novaehollandiae*) and crested tern (*Sterna bergii*), which are listed as marine species under the EPBC Act. The rock pigeon (*Columba livia*) and the common starling (*Sturnus vulgaris*) were the only introduced species of fauna recorded on Lipson Island. No significant flora is present on the island. No introduced or conservation listed marine flora or fauna species were found in the intertidal survey.

Given the distance of the Port to Lipson Island, existing oceanographic processes and the results of air, noise and hydrodynamic modelling potential negative impacts arising from the Project are not expected.

Marine Ecology

The following summary relates to the marine environment in and around the actual Project jetty site. Intertidal communities in the vicinity of the Port include small rocky headlands, which lie between intertidal sandy beaches to the north and south. Species recorded during marine field surveys are considered to be typical of species found on South Australian intertidal rocky shores. The intertidal sandy beaches in the vicinity of the Port are interspersed with outcrops of granite, basalt and other boulders. No significant intertidal shellfish beds, marine mammal haul out sites or seabird habitats were noted on the sandy beaches.

Subtidal communities include rocky reefs, seagrass and sandy substrate habitats. The composition of species in the shallow, rocky reef zone at the Port is typical of that described for temperate Australian subtidal reefs. The seagrass meadows present are considered to be typical of assemblages found in shallow, moderately-exposed locations across much of South Australia. Benthic macro-infauna of the seagrass habitat was dominated by the presence of crustaceans followed by annelids and to a lesser extent, molluscs. Benthic macro-infauna of the sandy mid benthic sites was dominated by annelids.

There were no endangered or threatened species under the NPW Act or EPBC Acts recorded during marine surveys. A male/female pair of crested threefin (*Trinorfolkia clarkei*) was recorded in rocky reef areas. Crested threefin are not a listed species. They are endemic to South Australia and in those areas they inhabit are recognised as common.

The Asian mussel (*Musculista senhousia*), an invasive marine species in Australia was found in the seagrass habitat in the vicinity of the Port. Although the Asian mussel is found elsewhere in South Australia, the recording of Asian mussels in the vicinity of the Port is an extension of the species' known distribution.

The key potential impacts to marine flora and fauna associated with Port development and operation are expected to relate to jetty shading of the sea floor and potential pest or invasive species from visiting shipping vessels. Shading by the jetty may result in the loss of species which are dependent on high levels of light in the area of the jetty. This impact is expected to be limited to a small area of direct influence and would not damage any areas or species of listed conservation significance. Significant environmental benefits (SEB), as defined by the *Native Vegetation Act 1991*, were estimated for potential construction and operation impacts to seagrass communities. An area of 0.52 ha is estimated to be impacted by the Project and a conservative SEB estimate of 5.36 ha was calculated for potential offset. Marine vegetation loss was considered as part of terrestrial native flora revegetation and rehabilitation offset planning.

The increase in density or introduction of pest/invasive species may potentially occur as a result of organisms being released as part of a ballast water discharge or as hull biofouling being translocated with shipping traffic. Australian rules for ballast water management would form part of overall Port management.

Shipping and Spills

The number of vessels expected at the jetty during early Project stages would be approximately 12 Cape class or 27 Panamax vessels per year for ore and 8 Panamax vessels for grain (i.e. a vessel every 18 days). 2 million tonnes of hematite and 0.5 million tonnes of grain would be exported.

The seawater depth at the jetty is approximately 8 m at the coast and drops to 20 m approximately 500 m off-shore and then continues to slowly increase in depth to 27 m. There is no current recommended shipping lane for vessels from the Project at this time, however a suitable path exists to the main shipping lane currently used by Cape class size vessels to access Onesteel Whyalla operations. Port related navigation aids and emergency response plans would be reviewed and established prior to operations.

Anchor dragging risks were investigated and anchor dragging is not expected to occur given the prevailing mild wind and wave conditions. In rough conditions, with wind speed exceeding 40 knots or current speed exceeding 3 knots, ships would be moved from the berth and anchored offshore. Vessels would be anchored approximately 4 km offshore in a minimum of 24 m depth of water for rough conditions and if waiting for berth access. A hydrographic study of the seabed would be undertaken prior to operations to ensure suitable obstruction free shipping lane and determine seabed bottom suitability for Cape class vessel anchors.

The majority of major oil spills in Australia have been associated with grounding as a result of high seas, poor weather conditions or uncharted reefs, and also associated with berthing incidents at wharves. The Project would not undertake hydrocarbon loading or unloading at the jetty or during shipping movement within Spencer Gulf. Offshore anchoring during rough weather is proposed 4 km offshore in deep water and the deep water Spencer Gulf shipping lane would not pose reef or grounding risks during Spencer Gulf transport. The Project poses a low risk of oil or chemical spill in the vicinity of the Port or Spencer Gulf.

Coastal Processes

Port Spencer is located within the Spencer Gulf, which is a relatively shallow embayment with an average depth of approximately 20m. The seafloor in the gulf is generally smooth with the predominant seafloor substrates characteristic of cool-water, high salinity carbonate sedimentation. Tidal variation in the Spencer Gulf is generally in the order of 2 m, but can be almost 0 m during neap (dodge) tides when virtually all tidal movements cease for a period of approximately 24 hours at 14 day intervals. Gulf waters become highly saline during summer owing to considerable evaporation. Salinity also varies across the gulf, increasing from west to east. The ambient average monthly water temperatures range from 10°C to 12.5°C in winter to 24°C to 28°C in summer.

Marine wind and wave surveys were undertaken at the Port site during winter, autumn and spring months. Overall the maximum current speeds measured at Port Spencer were between 0.34 metres per second (m/s) and 0.69 m/s, with larger current speeds observed at the top of the water column. Mean current speeds were 0.14 m/s at the top of the water column and 0.10 m/s and 0.09 m/s for the middle and bottom of the water column, respectively.

Wave energy in the Spencer Gulf ranges from moderate at the mouth of the gulf to very low in the upper regions. Wave heights were typically less than 1.0 m, but waves of up to 1.8 m have been recorded in the gulf. The Port location is largely protected from the strong swells; however, some swell waves do penetrate through the islands and headlands at the entrance to the gulf, with a medium swell height of 0.1 m. The largest waves occurring at the Port are generated by winds from the south-east, with the largest wave height calculated at 3.6 m (from a six year dataset).

Marine sediment movement is due to a combination of waves, tidal currents and wave induced currents. Predictive modelling of the potential impact of the Port on sediment movement indicated there would be a decrease in wave movement, and therefore a decrease in the amount of sediment moved in the lee of a vessel moored at the jetty. At the south of the jetty, the actual movement of sediment would slightly increase.

Changes in wave height directly inshore of a vessel moored at the jetty would result in changes to flows in the area near to shore, resulting in a change to the impact on the immediate beach. The environmental effects modelled showed that the jetty construction and operation would only affect the immediate local area around the jetty. No negative erosion, deposition or sedimentation impacts are predicted to occur at surrounding beaches or coastal areas outside the immediate area of the jetty, including Rogers Beach and Lipson Island.

Heritage and Native Title

A desktop review of Indigenous, European and maritime registered heritage sites in and around the Project area was undertaken as part of preparation for field based cultural heritage survey works. There are no registered heritage sites located within the Project area. At the time of the survey, the then Department of Environment and Heritage (DEH) records showed the listed *Three Sisters* maritime heritage site to be located in the immediate vicinity of the proposed jetty. Through research and field investigation it was identified this heritage site is actually located adjacent Lipson Island and not within the Project area. This was communicated to DEH and the site location amended in DEH records.

The proposed Port is not expected to impact on heritage values. There is potential for Indigenous heritage items to be exposed during construction earthworks. As part of construction preparation an Indigenous heritage monitor inspection would be undertaken of the proposed Stage 1 works areas, and cultural heritage management procedures would be developed and implemented as part of the overall construction management planning.

Visual

The Port is flanked to the north, west and south by rounded hills of approximately 50 m elevation, while the coastline to the north consists of a small bay with a sandy private beach, known as Rogers Beach. This is currently accessible by a dirt track through private land. The Port is surrounded by farmland with approximately 10 households within a 5 km radius of the site. Lipson Cove is approximately 1.5 km to the south of the site and a Crown Land coastal corridor approximately 50 m wide, extends along the eastern boundary of the Port. The site is not currently faced by any built formal tourism or recreational buildings however the shore is visible from Lipson Cove Beach but not the small informal camping ground present at the site, and from Rogers Beach which abuts the north of the site.

During the construction phase there is likely to be a slight visual impact of the jetty and buildings being constructed. Viewshed modelling was undertaken for operations phase and identified areas across the landscape that can be seen from different observation points reflecting the potential of the site to be viewed from recreational user areas, potential for views over larger landscape portions and accessible public areas with ease of access. Based on this five viewpoints were used for the model including Rogers Beach and Lipson Cove Beach.

The existing environment landscape was rated based on scenic quality and user sensitivity and then considered in the context of proposed Project infrastructure and activities. The assessment further considered the significance of this and identified impact significance rating ranging from negligible to moderate. While the Project would be visible, consideration of existing land uses and values were also included in the visual modelling impact assessment. The outcome of this assessment predicts the development's impact on visual amenity is not of high significance and would be negligible to moderate significance.

Stage 1 Port infrastructure would be constructed to consider reducing visual impacts to as low as reasonably possible by considered screening and infrastructure design. Existing topography was considered as part of engineering design and would provide screening to much of the onshore infrastructure from southern viewpoints. Infrastructure would be constructed with low visibility colours and vegetative native screening would be used along the southern boundary of Lipson Cove Road. Rogers Beach abuts the northern boundary of the site and, while the site would be visible, it is a private beach.

Decommissioning phases are expected to be decades in the future however removal of onsite infrastructure would be included in planning to redress potential visual impacts as well as other environmental risks.

Socio-economic

Port Spencer is located within the District Council of Tumby Bay (the District). The dominant industry within the District is agriculture, having the largest contribution to the economy and employment. Tourism is increasing in its contribution to the District economy. Other key economic sectors are fishing, aquaculture and mining. Tumby Bay is the main service centre for the District.

Potential socio-economic impacts will vary depending on the phase of development. During construction, it is predicted there would be an increased demand on local services and accommodation. This demand would decrease during the operational and decommissioning phases. The construction phase would have the largest workforce requirements, which would reduce during the operational phase. Centrex is committed to employing and procuring locally where possible. The Project offers significant export potential for mining and agricultural sectors in the region, which may also positively contribute to economic and employment development.

Management and Mitigation

A general environmental management framework for construction and operations is proposed based on the outcomes of the impact assessment. The framework provides the basic components of the proposed Construction Environmental Management and Monitoring Plan (CEMMP) and Operations Environmental Management and Monitoring Plan (OMMP).

An ISO14001:2004 *Environmental Management System* would be developed for the site as part of operations. The PER also proposes a number of specific environmental management and monitoring programs required for the Project, including, but not limited to, marine water quality, noise, air, site water management, marine pests, revegetation and rehabilitation, weeds, and waste. A detailed Emergency Response and Incident Management Plan, including maritime and terrestrial response processes and procedures would also be developed. It is noted that a suitably qualified commercial port operator would be appointed to manage Port Spencer, and be expected to develop and implement all required environmental, security and safety management procedures and processes.

Conclusion

The proposed Project location is considered to be a suitable site for a deep water commercial port facility based on consideration of potential social, environmental and economic impacts. It is considered that potential impacts can be managed effectively and the Project does not offer any unmanageable or extreme risks. The potential environmental, social and economic benefits of the Project offer significant opportunity to positively contribute to strategic development goals for both the Eyre Peninsula and South Australia. The Port also offers a significant private investment development that will allow Cape class vessels to export from the Eyre Peninsula, making it the first of its kind in the region.

The potential social, environmental and economic benefits and impacts of the Project were considered as part of this PER. Management and monitoring measures to both enhance potential benefits and mitigate potential negative impacts are identified. The Project's proposed design and layout has included consideration of sustainability principles including resource and energy efficiency, through water reuse, waste management and civil construction approaches, as well as ensuring the Project makes use of existing topography and considers colour and form to ensure visual impacts are minimised to the extent practicable along the coast. As a whole it is considered this multi-user Project offers significant opportunity to contribute to not only mineral and agricultural development, but the short and long term social and economic sustainability of the region and State through direct and indirect business, infrastructure, employment and contractor opportunities. The Project also aligns and supports key State and regional strategic development goals. In addition the Project offers the potential benefit to support population levels and growth in rural communities and townships.

It is considered the proposed private multi-user Port Spencer should be granted development approval.

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