SMITH BAY WHARF

DRAFT ENVIRONMENTAL IMPACT STATEMENT

EXECUTIVE SUMMARY and THE PROPONENT'S CASE FOR THE DEVELOPMENT

PREPARED FOR KANGAROO ISLAND PLANTATION TIMBERS BY ENVIRONMENTAL PROJECTS

JANUARY 2019

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THE PROPONENT'S CASE FOR THE DEVELOPMENT

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KANGAROO ISLAND PLANTATION TIMBERS

THE PROPONENT'S CASE FOR THE DEVELOPMENT

The Draft Environmental Impact Statement (EIS) is the culmination of more than two years of research and analysis on the physical, biological, and socio-economic impacts of the proposed KI Seaport. Appropriately, the Draft EIS is a lengthy and comprehensive assessment of these matters.

On behalf of Kangaroo Island Plantation Timbers, I would like to take this opportunity to summarise the case for the development.

PLANTATION TIMBER – AN ENVIRONMENTALLY SUSTAINABLE FUTURE FOR KANGAROO ISLAND

The development of large-scale plantation forests on Kangaroo Island was the consequence of supportive State and Commonwealth government policies which actively encouraged farm forestry and private-sector investment in so-called managed investment schemes. These policies give effect to the commitments embodied in the 1992 National Forest Policy Statement, which was a national agreement signed by the Commonwealth and all state and territory governments. The objective of the agreement was to protect native forests from logging and create jobs and economic activity in rural communities across Australia.

The plantation timber on Kangaroo Island is now ready to be harvested. KIPT has sufficient timber to produce a sustainable average harvest of 600,000 tonnes per annum (tpa) for the first 13 years (the first rotation) and a further 500,000 tpa in the following 12 years (the second rotation). To put this into perspective, the typical grain harvest on Kangaroo Island is less than 40,000 tpa.

The market for this timber is in Asia, principally Japan and China. At present, there is no feasible method of exporting plantation timber products from Kangaroo Island.

The trees are mature, and customers are ready to receive the product. The proposed KI Seaport is the essential piece of infrastructure to establish a new, sustainable industry on Kangaroo Island.

ECONOMIC IMPACTS

Once operations begin, the KI Seaport would have a substantial economic impact on Kangaroo Island. For example, in the first five years it would add about $42.0 million each year to Kangaroo Island's gross regional product, which represents a 16 per cent increase in the size of the Island's economy. More than 230 new full-time jobs would be created on the Island; 160 at the port and in forest operations (e.g. harvesting, haulage, forest management etc.) and a further 70 jobs would be created from the flow-on benefits associated with this new activity.

The year-round economic activity associated with plantation forestry would broaden the Island's economic base, which is currently dominated by seasonal agriculture and tourism. At the current rate of economic growth in South Australia, it would take nearly 30 years of growth to match the impact of the proposed KI Seaport on the Kangaroo Island economy.

WHY SMITH BAY?

KIPT purchased the Smith Bay site in February 2014 after evaluating several alternative locations and site options. Smith Bay was considered to have a number of advantages that make it the best site on Kangaroo Island for a deep-water port:

- It is the only site which can accommodate the export of both logs and woodchips without significant extra costs associated with on-site roadworks and constructing the in-sea components of the facility.
- It is the closest practicable sheltered north coast site to the timber resource that is suitable for deep-draft ocean-going vessels to transport timber products directly to Asian markets.
- Deep water (necessary to berth large ocean-going vessels) is relatively close to the shore.

- The adjacent land is relatively flat, which makes it suitable for storing logs, woodchips and other cargo safely and securely, and for transferring material from the stockpile to ships efficiently.
- The area is already industrialised and the site itself is cleared and degraded.
- There are no significant conflicts with tourism or marine parks.

IMPACT ON YUMBAH

No issue has been analysed more comprehensively than the impact of the proposed KI Seaport on Yumbah Aquaculture's neighbouring on-land abalone aquaculture operation.

The analysis includes a review of the scientific literature, a comprehensive review of data published by Yumbah (2018) on the ambient water quality characteristics for their Narrawong farm in Victoria, as well as new information obtained from targeted replications of ecotoxicology studies undertaken on juvenile greenlip abalone.

The literature review provides an understanding of land-based abalone farming operations in Australia; the biology of the greenlip abalone; the tolerance of greenlip and other abalone to relevant water quality parameters; and the thresholds at which abalone are adversely affected by physical changes to the environment.

The review of the Yumbah (2018) ambient water quality data (collected over a 17-year period) provides insights on the resilience of farmed abalone to suspended sediments in a commercial abalone farming operation, and additional data on issues such as the sensitivity of farmed abalone to noise and vibration.

The ecotoxicology studies provided quantitative data on thresholds for juvenile greenlip abalone in response to elevated levels of suspended sediments (which could be an issue during the three-month period of construction of offshore infrastructure) as well as data that were used to determine values for exposure to hardwood wood-dust (relevant to possible issues during operation).

The outputs from the modelling studies at key receivers within the abalone farm, including seawater intakes and grow-out areas, were compared with the abalone thresholds derived from this body of work.

Where management measures were recommended to mitigate potential impacts, additional modelling was undertaken to determine the predicted effectiveness of the management measures.

Opportunities to improve ambient water quality in Smith Bay, to offset potential impacts on the quality of seawater taken into the abalone farm, were also investigated.

The analysis shows that the initial dredging program to create the berth pocket may affect water quality at Yumbah's seawater intakes under some limited dredging scenarios. This means the construction activities would need to be managed to ensure that water quality at the seawater intakes is protected. This can be easily achieved by avoiding dredging during certain tidal conditions and implementing real time monitoring of in-situ turbidity, with appropriate turbidity thresholds to trigger management interventions.

There are not likely to be any substantive issues on the operations of the abalone farm from noise and vibration, light spill or air-borne dust, or shipping activities.

The analysis also highlighted potential benefits from the creation of the causeway. Discharges from Smith Creek currently affect water quality in Smith Bay. The construction of a solid causeway would be likely to provide ancillary benefits to the aquaculture farm by directing the Smith Creek discharges further offshore. This would reduce the extent to which the discharges mix with the intake water flowing onto the abalone farm and the risk that such discharges may compromise animal health.

OTHER IMPACTS

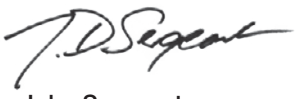
Of the other impacts assessed in the EIS, the most significant for the Kangaroo Island community is likely to be the impact of hauling timber products from the plantations to Smith Bay.

KIPT has worked constructively with the Kangaroo Island Council to choose a route for the timber trucks which minimises these impacts, and we will continue to work with Council to ensure the funds required for the necessary road improvements are provided by the South Australian and Commonwealth Governments, as occurs elsewhere in South Australia where plantation forests have been established.

Impacts on Kangaroo Island's unique environment, and on matters of national environmental significance in particular, are relatively minor and can be readily mitigated and offset. KIPT has made a number of commitments in this regard.

IN CONCLUSION

This development represents a once-in-a-generation opportunity for Kangaroo Island and is unambiguously good for South Australia, while adding a significant boost to Australia's timber exports. We welcome input from the public about how the project can be delivered in a way that maximises these benefits and minimises or eliminates any negative effects.



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SMITH BAY WHARF

DRAFT ENVIRONMENTAL IMPACT STATEMENT EXECUTIVE SUMMARY

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PART 1: INTRODUCTION

PROJECT OVERVIEW

Kangaroo Island Plantation Timbers (KIPT) is seeking approval to build a deep-water port and associated infrastructure at Smith Bay, from which it proposes to export logs (softwood) and woodchips (hardwood) from its Kangaroo Island plantation forests to markets in Asia. The facility, to be called the Kangaroo Island Seaport (KI Seaport), would also be available to the Island's independent timber growers and to other approved users and cargoes.

THE PROPONENT

Kangaroo Island Plantation Timbers (KIPT) is Australia's only ASX-listed traditional timber company.

KIPT's assets include 25,400 ha of land on Kangaroo Island, comprising 14,200 ha of plantation timber, of which 12,780 ha (90 per cent) consists of the hardwoods Blue gum (*Eucalyptus globulus*) and Shining gum (*Eucalyptus nitens*), and 1420 ha consists of the softwood Monterey pine (Pinus radiata). See Figure 1.

KIPT also owns the 11.7 ha site at Smith Bay and 173 ha of adjoining land to the west, the disused sawmill at Timber Creek, and a 20.8 ha site at Ballast Head.

THE PROPOSAL

KI SEAPORT COMPONENTS

The on-land components of the KI Seaport would include log and woodchip storage areas, a laydown area, materials handling infrastructure (e.g. woodchip conveyor), road transport access, and ancillary facilities and infrastructure including administration buildings, car parks and security fencing.

The in-water structures would include a causeway, suspended jetty, link span bridge, floating pontoon, tug mooring facilities, berthing pocket and mooring dolphins.

Ancillary services would include electricity, water storage and supply, wastewater and stormwater management facilities, telecommunications and security.

The maintenance/building of a new public boat ramp at Smith Bay and use of the KI Seaport by cruise ships (both of which were described in the initial proposal submitted to the SA Government) are no longer within the scope of the development.

THE LOCATION

The proposed facility would be in Smith Bay, on the north coast, approximately 20 km west of Kingscote and approximately 10 km west of Emu Bay. Figure 1 shows Smith Bay, KIPT's plantation forests, and other plantations owned by independent growers.

The proposed facility would be on freehold land owned by KIPT, identified as Allotment 51 and 52, Certificate of Title Volume 6217 Folio 273, Hundred of Menzies in the area of Wisanger (see Figure 2).

PROJECT PHASES AND TIMING

Construction and on-ground works would commence after all relevant primary and secondary approvals had been granted, with construction expected to take about 20 months.

Timber harvesting operations would begin about four months before the facility was commissioned, which would allow timber products to be stored at Smith Bay before the arrival of the first vessel. In all likelihood, and subject to market conditions, operations would begin with log exports before the woodchip handling system was completed.

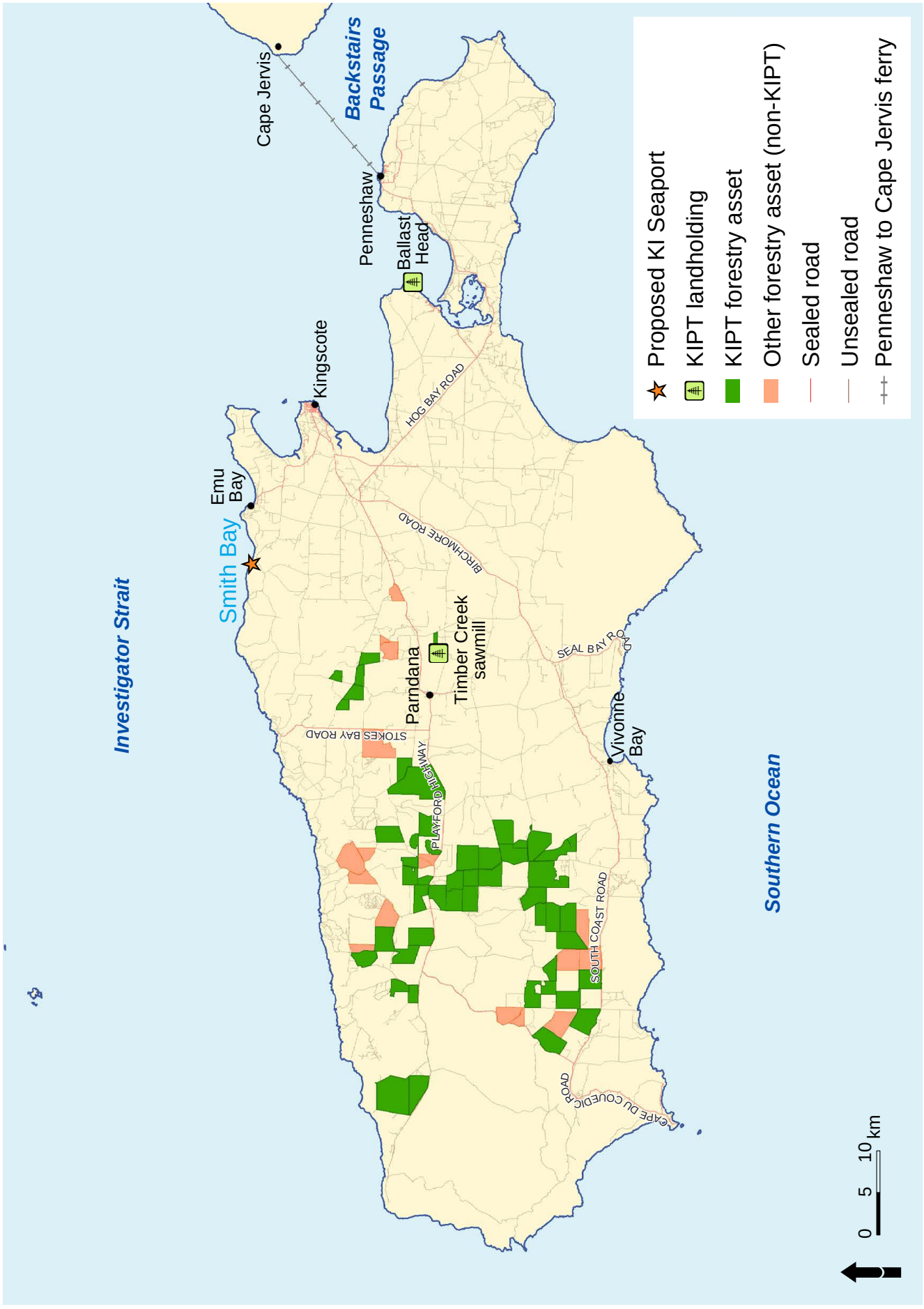

FIGURE 1 KIPT'S PLANTATION ASSETS

FIGURE 2 AERIAL VIEW OF WESTERN SMITH BAY INCLUDING ALLOTMENTS 51 AND 52

THE PROCESS

THE ENVIRONMENTAL IMPACT ASSESSMENT

On 16 February 2017, the Minister for Planning (the Minister) declared the proposal would be assessed as a 'major development' pursuant to s.46(1) of the *Development Act 1993* (the Act). The Development Assessment Commission subsequently determined that an environmental impact assessment of the proposal was required, and an environmental impact statement (EIS) should be produced, to assess the potential impacts and risks associated with the construction and operation of the proposed facility.

On 14 December 2016, the proposal was declared a Controlled Action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, which also requires the preparation of an EIS. Under a bilateral agreement between the South Australian and Commonwealth governments, it was agreed that the state-administered EIS would satisfy the statutory requirements of both governments. See Figure 3.

EIS SCOPE

The scope of the Draft EIS is to assess the potential impacts associated with the construction and operation of offshore and onshore infrastructure at Smith Bay, including site access from North Coast Road.

The potential impacts of using Kangaroo Island's road network to transport timber products from plantations to KI Seaport are also discussed to a level which enables further detailed assessment should the development be approved.

All other aspects of KIPT's operations, including forest management, harvesting, developments on any other land owned by the Company, and any other associated licences and/or approvals, are outside the scope of the Draft EIS.

STAKEHOLDER ENGAGEMENT

Relevant stakeholders were consulted and engaged with during the preparation of the Draft EIS. Key themes from the stakeholder engagement conducted to date addressed social, economic and environmental factors.

The opportunities for Kangaroo Island which would be expected to flow from a sustainable forestry industry are understood and would be welcomed. However, there were some concerns associated with a sustainable forestry industry, including that employment in the forestry industry may lead to job losses in other industries, including tourism and agriculture.

It was felt that the projected population growth would be particularly beneficial, especially if it led to an inflow of skilled workers with their families, but there are concerns about the capacity of a range of community services to cope with this projected growth. The impact on the availability of housing is a particular concern.

There are concerns about the environmental impact of the proposed development, particularly in relation to the operation of the neighbouring land-based abalone farm, and the ongoing use of roads to transport logs and woodchips to Smith Bay.

The issues and concerns raised by stakeholders have been considered in the design concept for the KI Seaport and have informed the impact assessments and management measures adopted in the Draft EIS. The proposals to maintain/upgrade the public boat ramp near the site, and allow cruise ships to use the KI Seaport have been removed from the scope of the proposed development in response to stakeholder feedback.

Further feedback from agencies and the community during the statutory public consultation period will also be considered as part of the Response Document.

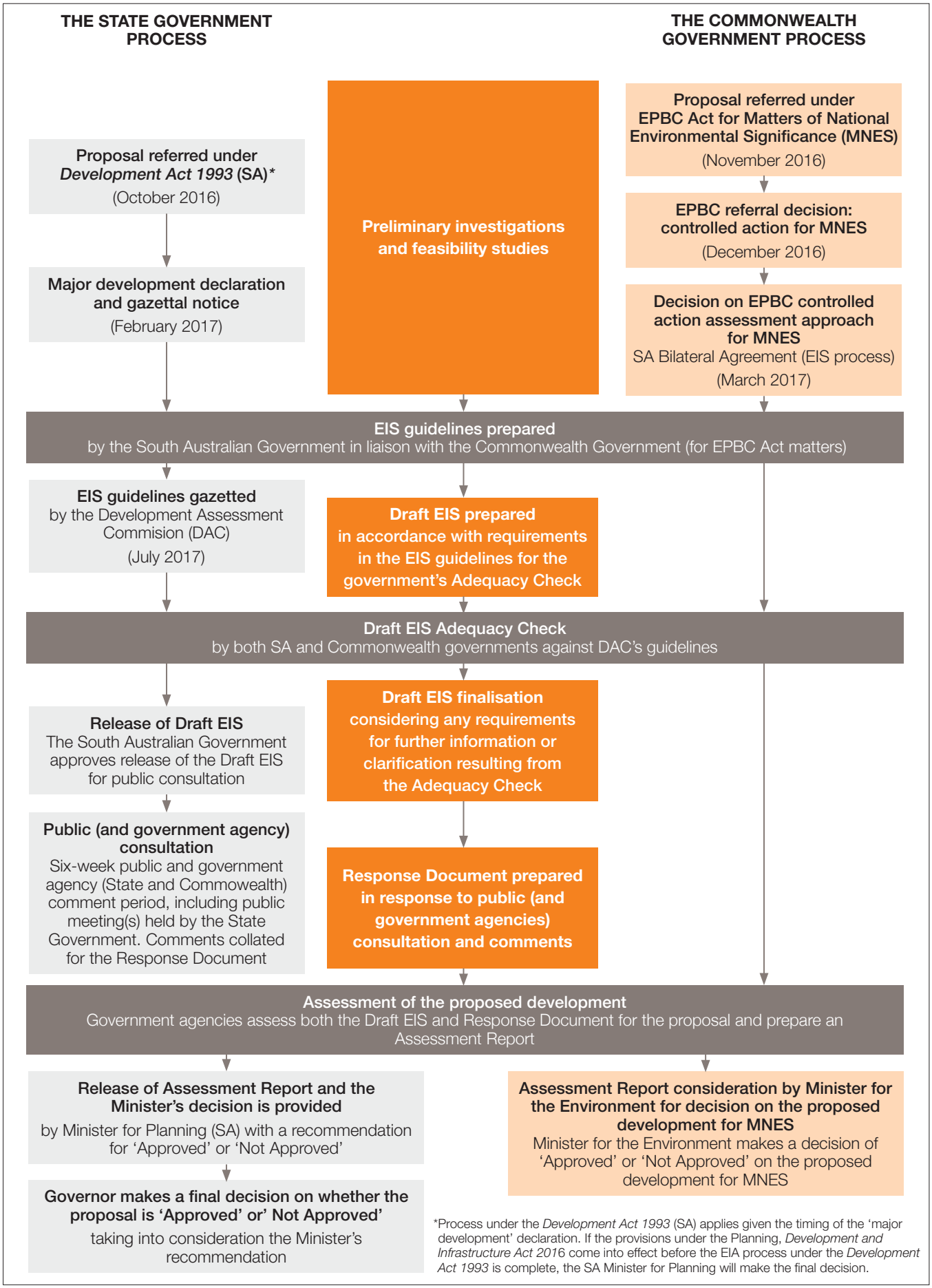

FIGURE 3 OVERVIEW OF THE ASSESSMENT PROCESS

PROJECT RATIONALE

KIPT's objective is to build and operate a deep-water port with associated on-land facilities suitable for storing and exporting logs (softwood) and woodchips (hardwood). There is no facility on Kangaroo Island capable of handling the proposed volume of timber products economically.

KIPT's timber assets are now approaching 20-years-old and are ready to be harvested.

KIPT has sufficient timber to produce a sustainable average harvest of 600,000 tonnes per annum (tpa) for the first 13 years (the first rotation, or R1) and a further 500,000 tpa in the following 12 years (the second rotation, R2).

The market for this timber is currently in Asia, principally Japan and China.

TIMBER EXPORTS OVERVIEW

The vast majority of Kangaroo Island's plantation timber resource is currently suitable only for international export; there are no domestic facilities suitable for economically processing the expected volumes of product.

There are two options for exporting timber products in commercial quantities. One is transhipment of logs by barge, either to a vessel anchored in deep water off Kangaroo Island, or to a mainland port such as Port Adelaide, Portland or Port Giles for storage and ultimate loading onto timber product ships. The other is direct loading of timber products to ships.

The transhipment option has a number of disadvantages, including significant extra costs, and greater worker safety risks. Development of an onshore site capable of storing 15,000 to 30,000 tonnes of unprocessed logs and a loading facility to load this timber onto a barge would still be required as there is no such facility on Kangaroo Island.

OTHER USERS AND CARGOES

The KI Seaport would be available to other approved users, including to import containerised agricultural commodities and farm inputs. The design of the proposed development takes this into account.

The environmental impacts associated with other users would be assessed via separate approvals processes that would be the responsibility of the individual proponents.

EXPECTED CONSEQUENCES OF NOT PROCEEDING – THE 'DO NOTHING' OPTION

At present, there is no feasible method of exporting plantation timber products from Kangaroo Island. The trees are mature, and customers are ready to receive the product. The proposed KI Seaport is the essential piece of infrastructure required to realise the inherent value in approximately 20,000 ha of plantation timber, most of which is now ready to harvest.

The 'do nothing' option means forgoing that opportunity, and the next best option would entail a significant loss of value for KIPT, and a significant loss of opportunity for both Kangaroo Island and South Australia.

This option would also present challenges with ongoing maintenance of the forests such as controlling weeds and feral animals, and managing bushfire risks. It would also reduce the available plantation timber in the market, increasing the pressure to harvest non-plantation timber from natural forests.

The 'do nothing' option would also mean there would continue to be no alternative way of importing or exporting bulk products to and from Kangaroo Island, other than on the SeaLink ferry, potentially influencing the viability of current and future (primarily agricultural) ventures on the Island.

PROJECT ALTERNATIVES

KIPT purchased the Smith Bay site in February 2014 after evaluating several alternative locations and site options.

The assessment process included reviewing government policy documents, data and reports available on the public record, discussions with key stakeholders, and inspections of all potential locations/sites.

Initially, 16 different options at 12 potential locations and sites were evaluated to determine their suitability for use as a deep-water export facility (see Figure 4). A shortlist of four options was chosen for more detailed evaluation based on physical setting, environmental impacts, social and community impacts, and economic and financial impacts. These sites were at Ballast Head, Cape Dutton, Point Morrison and Smith Bay (the current proposal). Each option was subsequently evaluated in terms of distance to deep water from shore, the topography of the coastal environment, the ability to establish a multi-user, multi-cargo operation (physical), the impact on sensitive receptors (environmental), potential impacts on neighbours (social and community), and the estimated capital and operating costs (economic).

THE SELECTION PROCESS FOR ALTERNATIVE SITES

Only the Smith Bay site was considered suitable for exporting both logs and woodchips, although a woodchips-only operation could be established at the three alternative sites (with the installation of a single conveyor system to load ships). There were three disadvantages associated with these alternative sites. Firstly, the inability to export logs would represent a material loss of value and income for KIPT and leave the independent growers who have 100 per cent pine facing financial hardship. Secondly, the capital and operating costs would be greater than at the Smith Bay site, which would result in a material impact on the profitability of plantation forestry on Kangaroo Island. Thirdly, there would be no scope for other cargoes and other users to use the facility if it were designed and built only for a conveyor system because they would require infrastructure similar to that used to export logs.

Smith Bay was considered to have a number of advantages that make it the best site on Kangaroo Island for a deep-water port. It is the only site which can accommodate the export of both logs and woodchips without significant extra costs associated with on-site roadworks and constructing the in-sea components of the facility. It is the closest practicable sheltered north coast site to the timber resource that is suitable for deep-draft ocean-going vessels to transport timber products directly to Asian markets. Deep water (necessary to berth large ocean-going vessels) is relatively close to the shore at Smith Bay, and the adjacent land is relatively flat, which makes it suitable for storing logs, woodchips and other cargo safely and securely, and for transferring material from the stockpile to ships efficiently. The site at Smith Bay is also cleared and degraded, and there are no material conflicts with tourism or marine parks.

ALTERNATIVE STRUCTURES (IN-WATER)

CONCEPT DESIGN

After Smith Bay was chosen as the preferred site, a design brief was issued to KIPT's engineering consultant to devise the best in-water structure for loading woodchips and logs efficiently and to enable other possible future uses.

The design required a berth face water depth of 13.5 metres to accommodate a fully-loaded vessel of Panamax size. At the Smith Bay site the 13.5-metre depth contour is at a variable distance from the shore (from approximately 540 to 620 metres).

IN-WATER DESIGNS CONSIDERED

Twelve combinations of designs were evaluated. The main considerations in evaluating the options were construction costs and anticipated environmental impacts.

Three alternatives were considered for the approach structure leading to the berth face. These were a solid causeway, a fully piled suspended deck, and a combination of both.

Four alternatives were considered for the built form of the berth face itself. These were a sheet-piled solid fill structure, a solid fill structure with a projecting suspended deck, a totally suspended deck structure, and a floating berth face.

Numerous distances of the berth face from shore were examined. The flow-on effects included the length of the approach structures, and the extent and location of the dredged area.

Building the approach to a depth that avoids dredging altogether was not considered practicable because it would require a total jetty length of approximately 620 metres, much of which would involve screw piling, as opposed to driven piles.

The cost of this option would be such that the development would be economically unviable. Maintenance costs and operating costs would also be high for such a long structure in open water.

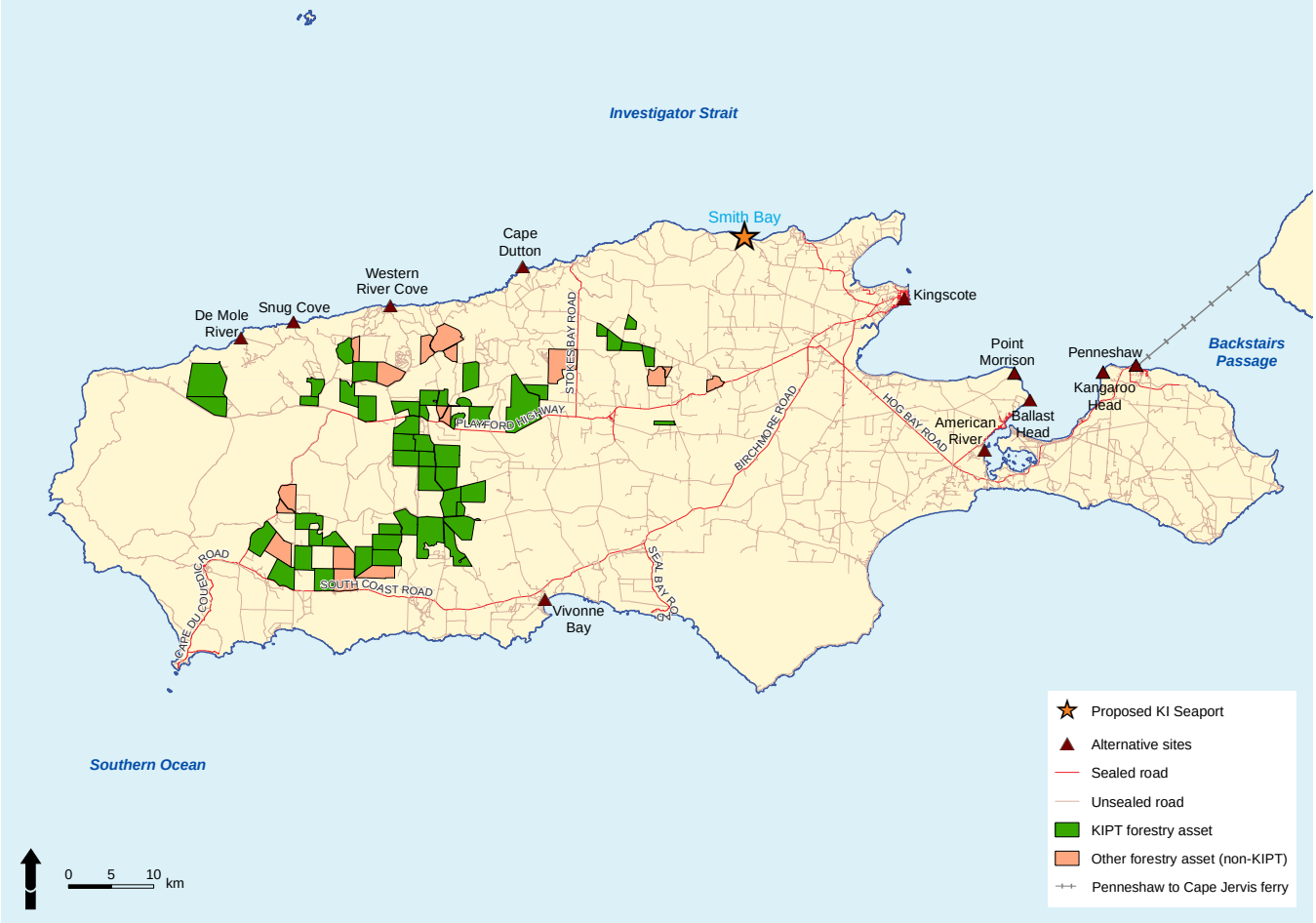

FIGURE 4 ALTERNATIVE LOCATIONS INVESTIGATED

PROJECT DESCRIPTION

The evaluation of alternative designs revealed that the most cost-effective approach was a combination of a rock-armoured causeway extending to a depth of about eight metres, followed by a suspended deck jetty connected to a floating pontoon by a linkspan.

The onshore timber storage area would be divided into two terraces providing approximately 4.1 ha of flat land on the otherwise gently sloping site.

The design layout aims to maximise the distances between onshore operational activities and adjacent landholdings, with the log and woodchip storage and reclaim areas to the west of the site, and offices, car parking and ablutions facilities to the east. Surface water management infrastructure would be designed to collect and treat surface waters that have interacted with site activities, with retention and detention ponds located adjacent to the coastline to reduce the need for pumping.

The revised concept design is shown in Figure 5.

IN-WATER INFRASTRUCTURE

The main in-water infrastructure components for KI Seaport include wharf infrastructure and a berth pocket. The wharf would have a floating pontoon (consisting of a refurbished barge imported to site and fixed in place) with a nominal displacement of 37,600 tonnes, a freeboard of approximately 3.5 metres and a length and beam of 168 and 41 metres, respectively. Restraint dolphins at either end of the pontoon would be installed for attaching vessel head and stern lines when vessels are berthed. Evenly spaced bollards would also be installed along the berthing face of the pontoon.

The 420-metre approach to the pontoon would consist of a 250-metre rock-armoured causeway (to a depth of approximately eight metres), and a 170-metre suspended deck jetty and a linkspan bridge connected to the pontoon.

A berth pocket would be dredged to a depth of 13.5 metres to allow access by Handymax and Panamax-class vessels.

ONSHORE INFRASTRUCTURE

The main onshore infrastructure components would consist of an access road, timber product storage areas, materials handling systems and ancillary infrastructure.

Freeoak Road, which provides access to the site from North Coast Road, and the intersection of Freeoak Road and North Coast Road, would require upgrading.

An area of approximately 2.5 ha would be provided for storing up to 56,250 tonnes of logs, with a further 1.7 ha provided for storing up to 80,000 tonnes of woodchips.

Materials handling systems would consist of woodchip reclaim equipment, conveyors and a ship loader to load woodchips onto berthed vessels. Logs would be loaded directly by the ship's cranes.

Ancillary infrastructure would include a weighbridge, site warehouse, administration and ablutions buildings, a 20-vehicle car park, a diesel fuel storage tank, tormwater and wastewater management infrastructure, security and fire fighting systems, and landscaping.

INFRASTRUCTURE CONSTRUCTION

MARINE AND CONTRACTOR ACTIVITY ZONES

A Marine Activity Zone (MAZ) would be established around the construction site to restrict public access to Smith Bay and reduce navigational risks during construction. A Contractor Activity Zone (CAZ) would be established for the construction of the shore-based infrastructure.

DREDGING

The existing water depth at the location of the proposed wharf face is approximately 11.5 metres. The berth pocket and approaches would be dredged to a design depth of 13.5 metres using a cutter suction dredge to remove about 100,000 cubic metres of sediment and rock. The dredged material would be pumped ashore to a number of ponds for settling of fine sediments and dewatering.

The dredging program is likely to take about two months.

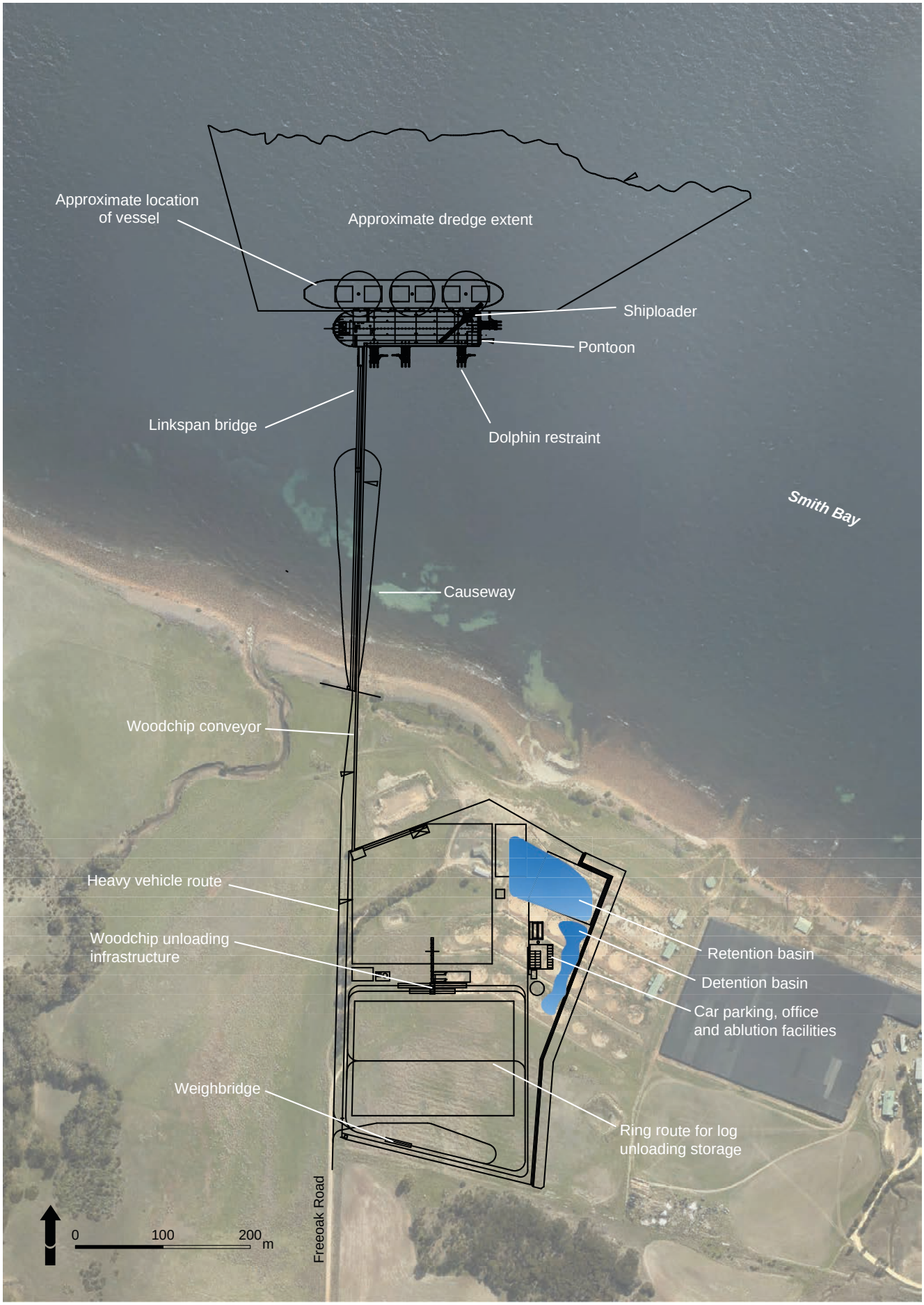

FIGURE 5: KI SEAPORT DESIGN CONCEPT

CAUSEWAY AND JETTY

The coarse dredged material would be used to construct the core of the causeway after settlement and dewatering onshore. After progressive placement of dredged material in the sea to form the core of the causeway, it would be rock-armoured for protection from erosion by waves.

Structural steelwork including the jetty, linkspan bridge, piles, mooring dolphins and barge restraint dolphins would be fabricated elsewhere and barged to Smith Bay from Port Adelaide for assembly and installation.

WHARF

The barge would be towed to Smith Bay from the mainland and secured to the restraint dolphins to become the pontoon.

LOG AND WOODCHIP STORAGE AREAS

Level log and woodchip storage areas would be developed by cut and fil excavation.

MATERIALS HANDLING INFRASTRUCTURE

The materials handling infrastructure, including conveyors, hoppers and ship loading facilities, would be constructed in modules offsite and barged from Port Adelaide for assembly on site.

OFFICES, WORKSHOPS AND ONSHORE FACILITIES

Site office and ablution facilities would be groups of portable 'ATCO-style' buildings transported from elsewhere on Kangaroo Island, or the mainland. Approximately six buildings would be delivered during the construction period, and these would remain for operational use.

SHIPPING OPERATIONS

VESSEL ROUTES

It is expected that most vessels would use established east coast shipping lanes for voyages to and from north Asian ports, and would be subject to the usual controls and protocols applying to those shipping lanes.

VESSEL NUMBERS

The number of vessels visiting each year depends on the sequence of plantation harvesting, commodity prices and availability of shipping.

During the first years of production there are likely to be 10 to 20 Handymax vessels a year, loading approximately 22,000 tonnes of pine logs in each shipment.

Thereafter, there would be approximately eight to 10 Panamax vessels a year, loading up to 60,000 tonnes of woodchips each. An additional five to 10 Handymax vessels would be required towards the end of the first rotation to export pine logs that are currently too immature for harvesting.

It is expected that vessels would be berthed at the KI Seaport for a total of 30 to 75 days a year.

DISCHARGES AND BALLAST WATER MANAGEMENT

All vessels would adhere to international and Commonwealth law protocols for complete ballast water exchange enroute, so ballast water taken on board in the high seas (which entails the least risk for biosecurity concerns) would be displaced within KI Seaport as ships were loaded.

ROAD TRANSPORT

PREFERRED STRATEGY

KIPT's preferred strategy to transport timber products to the KI Seaport is to establish a transport route that is as short as practicable, and minimises the potential impacts associated with traffic movements (i.e. noise, dust, ecological impacts and safety hazards). The strategy would require road and intersection upgrades along the proposed transport route to permit the use of high-productivity vehicles (B-doubles and/or A-doubles). Training and safety initiatives that reduce the potential for timber haulage vehicle crashes and incidents would also be implemented during the operational phases, in consultation with the logistics provider and key stakeholders.

KIPT does not have the authority to directly implement its preferred strategy because the road network is managed and maintained by the Department for Planning, Transport and Infrastructure (DPTI) and the Kangaroo Island Council. For this reason, discussions with DPTI and the council have commenced and will continue throughout the detailed design phase of the development until an agreement is reached regarding the route, the use of high-productivity vehicles and associated funding.

Pending agreement on a transport route, KIPT would implement an 'open network' model, under which single articulated trucks (19 metres long and with a 30-tonne payload capacity) would use passable roads to transport timber products to the KI Seaport, in accordance with existing rules and regulations governing road use. This open network model is assessed as the 'base case' in the traffic impact assessment.

CONSTRUCTION PHASE

The majority of bulky construction materials for the KI Seaport would be delivered by barge from the mainland.

The most significant road freight during construction would entail transporting up to 20,000 tonnes of rock from a Kangaroo Island quarry to armour the causeway. This would require approximately 700 vehicle movements over 150 to 200 days, averaging up to five round trips a day.

Other road freight would include office buildings, a weighbridge, ablutions buildings, lighting equipment and security fencing. This would require up to 20 vehicle movements over the construction period.

OPERATIONAL PHASE

Timber products from the various plantations would be transported continuously (24-hours-a-day, seven-days-a-week) from the plantations to the main road network via a series of plantation feeder roads.

Vehicles would travel on the main road network along a route determined by the route length and prevailing road conditions.

At peak production (up to 730,000 tpa of timber product) a single articulated truck would be expected to pass along the transport route in each direction approximately every 22 minutes.

Over 12 months, transport of diesel to the KI Seaport (for site equipment and generators) would require approximately 10 diesel supply truck movements to Smith Bay and 50 movements to an intermediate logistics yard near the plantation estates.

MATERIALS HANDLING

Logs would be delivered to the KI Seaport by truck and offloaded by mobile material handling machines. The log bundles would be stockpiled in the log yard, before being transported to the berth face for loading onto vessels using vessel cranes.

Woodchips would be delivered to the KI Seaport by truck, unloaded into hoppers and conveyed to a woodchip stockpile.

Vessels would be loaded by a belt conveyor and ship loader. The ship loader would be fitted with a slinger on the discharge to throw the woodchips into the corners of the cargo holds.

PART 2: THE LEGISLATIVE AND PLANNING FRAMEWORK

LEGISLATION AND PLANNING

ENVIRONMENTAL LAWS

Commonwealth and State legislation imposes a range of environmental management obligations on KIPT during the initial environmental assessment and anticipated construction and operational phases of the KI Seaport.

The applicable legislation for the environmental impact assessment of the proposed seaport is the South Australian *Development Act 1993* (being replaced by the *Planning, Development and Infrastructure Act 2016* (PDI Act 2016)), and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*

The proposed development is subject to a range of South Australian and Commonwealth legislation which, in addition to environmental impact assessment, relate to the following issues:

- pollution, waste management and petroleum storage
- climate change and greenhouse gas reduction
- natural resource management
- marine conservation, fisheries and aquaculture
- cultural heritage
- harbour management and coastal processes
- shipping and biosecurity.

PLANNING FACTORS AND THE ENVIRONMENTAL IMPACT ASSESSMENT

An EIS prepared under the Development Act must assess the extent to which the expected effects of the development are consistent with the Planning Strategy (Kangaroo Island Plan) and relevant Development Plan. Accordingly, the Draft EIS refers specifically to the relevant principles and objectives of the Kangaroo Island Plan (which is one component of the South Australian Planning Strategy), the Kangaroo Island Council Development Plan, and the Out of Council Areas (Coastal Waters) Development Plan, as they apply to the proposed KI Seaport.

ASSESSMENT OF KANGAROO ISLAND PLANS

The following conclusions have been made from the review of the Kangaroo Island Plan (Planning Strategy):

- The Smith Bay site was chosen, in part, because it is the most suitable location for the proposed KI Seaport in terms of protecting Kangaroo Island's environmental assets (consistent with Principle 1.5)
- The site is not in an area of significant or high biodiversity value and the proposed seaport would not result in an unreasonable impact on marine or terrestrial ecology (consistent with Principle 1.9)
- Appropriate environmental offsets would be provided where necessary (consistent with Principle 1.11)
- The development would not result in an adverse impact on landscape or amenity value, in part because the site has already been developed for large-scale onshore aquaculture (consistent with Principle 1.13)
- The Smith Bay location has historically been used for land-based aquaculture and farming (consistent with Principle 1.14)
- The Smith Bay site minimises impacts on landscapes compared with other alternatives that were considered (consistent with Principle 1.15)
- Sea level rise and hazard management have been adequately considered within the Draft EIS document (consistent with Principle 2).

The Kangaroo Island Council Development Plan (KIDP) encourages economic initiatives and employment opportunities that support a robust and sustainable economic climate on the Island. The facility would allow the benefits of this government policy to be realised with the export of timber products to markets in Asia.

The planning assessment also considered the provisions of the KIDP related to the existing natural environment, bulk handling and storage, visual impact, public access, design and appearance, hazard minimisation, infrastructure, interface between land uses, natural resources, transportation and access, pollution, and heritage.

The assessment concludes that the proposal generally complies with these policies and provisions. In terms of interface issues, the design is such that buildings and storage areas would be oriented away from sensitive land uses, and the residual impact can be appropriately managed.

The EIS study area is also subject to several easements. KI Seaport's onshore wharf infrastructure has been designed to ensure the rights conferred by these easements are not compromised.

Three land-based aquaculture licences have been issued for operations within Smith Bay. It is not considered that the proposed KI Seaport would adversely affect any aquaculture operations conducted under these licences.

PART 3: ASSESSMENT OF POTENTIAL IMPACTS

THE PHYSICAL, BIOLOGICAL AND SOCIO-ECONOMIC ENVIRONMENTS

THE PHYSICAL ENVIRONMENT

MARINE WATER QUALITY

KEY ISSUES

The potential effect on marine water quality resulting from dredging operations, constructing the causeway and ship movements is one of the most significant issues associated with the proposed development. The sensitive receptors in relation to adverse effects on water quality are the local marine communities, and in particular seagrasses, and the adjacent land-based Yumbah abalone farm located east of the development site.

The key issues addressed are:

- the effects of dredging on water quality, particularly in relation to the mobilisation of sediments and increased turbidity, and the release of inorganic contaminants such as heavy metals, organic matter and soluble organic compounds
- the effects of re-mobilisation of sediments on water quality during storm events
- the effects of propeller wash and mobilisation of sediments on water quality
- the potential effects on water quality at the seawater intakes for Yumbah's abalone farm.

METHODOLOGY

A number of baseline studies were undertaken to inform the marine water quality assessment, including:

- geotechnical investigations, including seabed drilling and seismic surveys, to determine the physical and chemical nature of the seabed sediments
- bathymetric surveys to determine depth contours in Smith Bay (see Figure 6)
- monitoring of ambient water quality in Smith Bay over a year using a variety of instruments and data loggers to provide a baseline of water quality, and in particular, an understanding of natural variability of water quality – with particular attention paid to ambient turbidity, seawater temperature and light attenuation
- monitoring of the current and wave regime in Smith Bay over a year using oceanographic instruments and data loggers.

Three models were developed, calibrated and validated to assess the effects on marine water quality:

- a 3D hydrodynamic model (TUFLOW FV) used to predict water levels and currents in Smith Bay
- a sediment transport model (TUFLOW FV ST module) used to predict sediment suspension, transport and sedimentation
- a wave model (SWAN) used to predict wave conditions and sediment mobility.

Numerous water quality model scenarios were run, covering the range of seasonal and weather conditions likely to occur at Smith Bay.

Two design scenarios were modelled: an 'expected' or likely scenario assuming a wharf located 420 metres offshore and a dredging volume of 100,000 m^3, and a 'worst case' scenario with the wharf located 370 metres offshore (and therefore closer to Yumbah), and a dredging volume of 200,000 cubic metres.

Sediment plume modelling, in particular, was undertaken to describe the behaviour and intensity of the sediment plume that would be generated during dredging and causeway construction. Outputs from the model runs in the form of concentrations of total suspended solids (TSS) as percentiles focused on Yumbah's seawater intakes, but were also provided for locations throughout Smith Bay.

Other model outputs included sedimentation and resuspension of sediment, light attenuation and seawater temperature.

The potential impacts to marine water quality are presented as carefully defined 'zones of impact', which is recognised as 'best practice' in assessing the environmental impact of dredging and is regularly used in such assessments throughout Australia. The zones adopted for the assessment were: Zone of High Impact, Zone of Low to Moderate Impact, and Zone of Influence.

The ANZECC/ARMCANZ (2000) guidelines were used as trigger values for aquatic ecosystems and aquaculture to indicate where the receiving environment is potentially at risk of being harmed. The guideline values most relevant to the proposed dredging program are:

- Turbidity: 0.5 nephelometric turbidity unit (NTU) (protection of aquatic ecosystems)
- TSS: 10 mg/L (protection of aquaculture).

A site specific TSS guideline of 25 mg/L for the protection of greenlip abalone was also derived from laboratory based ecotoxicology studies (see Chapter 11 – Land-Based Aquaculture).

EXISTING ENVIRONMENT

SEDIMENTS

The offshore sediment sampling and analysis revealed that the sediments in Smith Bay are relatively pristine, with no evidence of synthetic or natural pollutants. The sediment samples consisted mostly of sand and gravel (70 to 90 per cent), with a smaller proportion (10 to 25 per cent) of fine sediments (silt and clay).

TURBIDITY

Turbidity remained below 1 NTU in Smith Bay for most of the 12-month monitoring period, which is considered to be very low.

Turbidity was lower during the spring and summer months (September to February) when rainfall is lower and the winds are predominantly from the south (offshore at Smith Bay). During the winter months when rainfall is higher and winds are predominantly from the north (onshore), the turbidity was noticeably higher.

SEAWATER TEMPERATURE, SALINITY AND PH

Surface water temperature ranged from 14°C during winter to 21 to 22°C during summer, with occasional, brief spikes to 25°C that coincided with low tidal movement and high atmospheric temperatures during heatwaves.

Salinity ranged from 34 to 35 parts per thousand (ppt) during winter, to 36 to 39 ppt during summer. Salinity profiling data showed the same pattern throughout the water column.

The pH of marine water in Smith Bay ranged from 7.9 to 8.6, which is similar to the typical pH of marine water of around 8.2.

ASSESSMENT OF POTENTIAL IMPACTS

The following conclusions are drawn regarding potential impacts on seawater quality.

Capital dredging:

- For 80 per cent of the time, sediment plumes exceeding 3 mg/L above ambient are restricted to within 300 metres of the dredging footprint, and do not overlap Yumbah's seawater intakes.
- For 90 per cent of the time the near-bed TSS (including ambient) at the Yumbah seawater intakes is predicted to be less than 8.6 mg/L during the dredging program (worst-case scenario).
- On rare occasions (less than one per cent of the time) the 10 mg/L threshold is exceeded at the intakes for periods of up to several hours during times of minimal tidal movement and westerly winds.
- Yumbah's intakes would not be within either the 'zone of high impact' or the 'zone of low to moderate impact' for the expected case.
- Under worst-case conditions, however, the 'zone of low to moderate impact' is predicted to overlap Yumbah's intakes.
- The 'zone of high impact' under both expected and worst-case conditions is predicted to be restricted to an area within 100 to 200 metres of the dredge footprint.

Other impacts:

- **Causeway construction.** Sediment plumes generated during causeway construction are likely to be much less significant than those generated during dredging. The modelling revealed no 'zone of low to moderate impact' or 'zone of high impact' associated with causeway construction.
- **Sediment deposition.** The ecological effects associated with sediment deposition are likely to be confined to a 'zone of high impact' within 100 metres of the dredging footprint, and a zone of 'low to moderate impact' within 200 to 300 metres of the footprint. Final sediment deposition exceeding 10 mm (500 mg per square centimetre) would be restricted to within 240 metres of the footprint.
- **Benthic light reduction.** The amount of light available for the photosynthetic processes of seagrass communities would be reduced during the dredging construction program, but this reduction is likely to have only a temporary minor impact.

- **Mobilisation of contaminants from sediments.** The analysis of marine sediments at Smith Bay revealed nothing of concern when compared with sediment quality guideline levels. The potential mobilisation of contaminants during capital dredging is therefore likely to result in a temporary negligible risk to water quality.
- **Fuel/oil and chemical spills.** The risk of fuel, oil or chemical spills would be minimised through mandated compliance with established fuel/oil storage and handling standards and protocols.
- **Shipping contaminants.** The risk of shipping contaminants being discharged to the marine environment would be minimised through mandated compliance with international conventions, Commonwealth and state legislation, shipping codes of practice and the operational procedures that would be prepared for the wharf.
- **Operational propwash.** The effects on water quality from propwash during operations are likely to be minor as the frequency of shipping is low, and sediments on the sea floor are relatively coarse and would therefore tend to settle rapidly after disturbance. Effects on water quality would be confined to the berth pocket and not extend to Yumbah's seawater intakes.
- **Maintenance dredging.** The need for future maintenance dredging to maintain depths is likely to be minimal and infrequent. Effects on water quality are likely to be much less than those predicted for capital dredging due to the smaller maintenance dredge volumes and shorter dredging timeframes.

MANAGEMENT AND MITIGATION MEASURES

It is considered that it would be possible to mitigate unacceptable effects on water quality at Yumbah's seawater intakes during capital dredging through the adoption of appropriate management measures with the implementation of the dredging management and monitoring plan, which is a normal industry practice adopted during dredging activities. The risk of exceeding TSS thresholds at the Yumbah intakes would be managed (and reduced) by installing alarms and live monitoring of water quality at a point between the dredging footprint and the intakes. Dredging would cease if the alarms were triggered.

COASTAL PROCESSES

KEY ISSUES

The development of the KI Seaport, and in particular the construction of the causeway, has the potential to affect coastal processes by altering wave energy and interrupting the movement of tidal and wind-generated currents along the shore. The key issues addressed in the assessment include:

- potential effects on coastal erosion
- the interruption of near-shore tidal flows by the causeway, potentially causing seawater temperatures in the lee of the causeway to increase during heatwaves
- the effect of the causeway in interrupting the long-shore drift of sand and seagrass wrack along the shore
- potential seabed erosion caused by altered current flows and wave energy in the vicinity of the causeway and dredged berth pocket.

METHODOLOGY

A number of models describing various aspects of the coastal processes within Smith Bay were developed, calibrated and validated. These were largely the same as the models used to model effects on water quality:

- a 3D hydrodynamic model (TUFLOW FV)
- a sediment transport model (TUFLOW FV ST module)
- a wave model (SWAN) (including extreme waves).

The current and wave regime in Smith Bay was monitored over a year using oceanographic instruments and data loggers to calibrate and validate the model, and provide a baseline of existing oceanographic conditions.

Ambient seawater temperature in Smith Bay was monitored over a year using a water quality monitoring instrument and data logger to provide a baseline of water temperature.

Numerous coastal processes model scenarios were run over two-month periods covering the range of seasonal and weather conditions likely to occur at Smith Bay.

EXISTING ENVIRONMENT

The main environmental features at Smith Bay that are relevant to the assessment of coastal processes are:

- **Coastal and sea floor morphology**. The intertidal beach consists almost entirely of round rocks and boulders (see Plate 1). The initial subtidal area (up to seven metres depth) consists of reef, which is gradually replaced by a mixture of sand, silt and shell grit that supports dense seagrass communities. The seagrass progressively thins in the deeper water (>11 metres) to a relatively bare sea floor at 13 to 14 metres depth. The sediments range from sand and coarse shell grit in the shallows to a mixture of silty sand, rubble and shell fragments in the deeper water.
- **Bathymetry.** The results of the bathymetric survey of the Smith Bay site are shown in Figure 6, which shows the 11-metre contour is located approximately 400 metres from shore, and the presence of a probable paleo-channel where a 100-metre wide section of the Smith Bay seafloor near the shore is up to 2.5 metres deeper than the adjacent seafloor.
- **Wind**. From May to October winds are predominantly from the west-south-west to north, and from November to April predominantly from the east-south-east to south, which is onshore and offshore, respectively, at Smith Bay. During winter and spring, wind speeds frequently exceed 20 knots, and during summer and autumn winds are generally mild and very rarely exceed 20 knots.
- **Tides and water levels**. Water level variations are driven by a combination of tides, local wind stresses and storm surges. The spring tidal range is typically around one metre. Surges exceeding 0.7 metres above the predicted (astronomic) tide level are relatively common during winter storms.
- **Waves**. The waves in Smith Bay are mainly wind-driven. The ambient waves are from the north-north-west to north-north-east, with a median height of 0.52 metres. The 99th percentile wave height (exceeded on average for 3.65 days a year) is 1.51 metres.
- **Currents**. A combination of tides, local wind stresses and storm surges drive the Smith Bay currents, which are predominantly along-shore and are typically directed to the east-south-east on flooding tides and west-north-west on

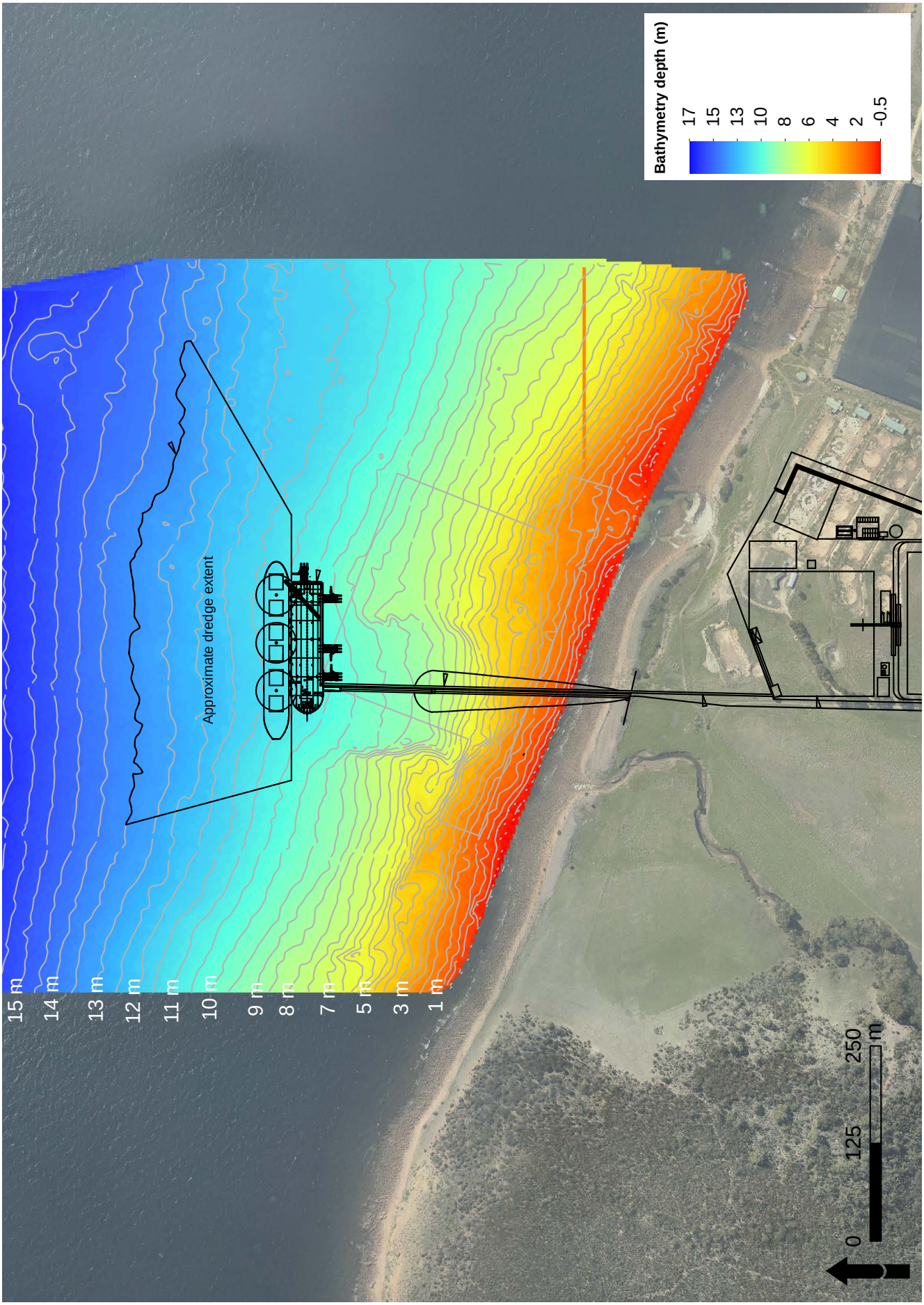

FIGURE 6 BATHYMETRIC SURVEY OF SMITH BAY

ebbing tides. Peak spring tide current speeds are typically around 0.3 m/s.

- **Water temperature**. Summer temperatures are in the range 21ºC to 23ºC, with occasional peaks to 25ºC during summer heatwaves. Average winter minimum temperatures are approximately 14ºC.

ASSESSMENT OF POTENTIAL IMPACTS

The boulder lined beach at Smith Bay is likely to be highly resistant to coastal erosion.

The modelling of coastal processes has shown that the causeway and wharf are likely to have the following effects on coastal processes:

- Wave height is likely to be reduced by around 30 to 50 per cent in the immediate lee of the structures, and by less than five per cent at the nearest of Yumbah's seawater intakes. The zone of reduced wave height extends approximately 500 to 750 metres from the causeway and wharf.
- Current speeds are likely to be reduced by approximately 0.1 m/s in the lee of the structures. The reduction in current speed at Yumbah's westerly seawater intakes is approximately 30 per cent under typical conditions.
- Seawater temperatures during summer are likely to increase by a maximum of approximately 0.2ºC in the shallow water east of the causeway and inshore of Yumbah's seawater intakes. The temperature increase at the seawater intakes would be less than 0.1ºC.
- Sediment plumes associated with flood flows from Smith Creek would be directed further offshore by the causeway, resulting in a significant reduction in TSS in the near-shore zone east of the causeway, including at Yumbah's seawater intakes.
- Bed shear stress (sediment mobility) would be reduced east of the causeway but would remain too high for fine sediment fractions to settle and form stable deposits. This also indicates that sediment deposition is unlikely to occur within the dredged berth pocket and approaches. It is therefore unlikely that regular or substantial maintenance dredging would be required.
- The proposed causeway is unlikely to interrupt active littoral zone sediment transport within Smith Bay as the shoreline and shallow sub-tidal zone consists largely of boulders and reef rather than sand.
- Drift seagrass and macroalgae (wrack) may sometimes accumulate against the causeway in response to prevailing winds and currents.

MANAGEMENT AND MITIGATION MEASURES

Should sediment or wrack accumulate adjacent to the causeway, it would be moved occasionally to the other side using an excavator and dump truck.

PLATE 1 BOULDER-LINED BEACH AT SMITH BAY

GEOLOGY, SOILS AND WATER

KEY ISSUES

The key issues associated with geology, soils and water in the context of the proposed development are:

- the potential release of contaminants into the freshwater and marine environments
- soil erosion and the contamination of fresh and marine waters by sediment in runoff.

METHODOLOGY

The site assessment methodology entailed a preliminary investigation to establish the site history, intrusive soil sampling onshore and intrusive sediment sampling offshore.

Assessment of hydrology and groundwater was also undertaken to establish the potential impacts to surface water flows and groundwater characteristics as a result of construction or operational activities.

A range of potential environmental issues associated with the proposed construction and operations were investigated, including:

- exposure of contaminated soil, if present at the site, during site excavation and pile driving
- exposure of coastal acid sulfate soils (CASS) during deeper site excavation and pile driving
- surface water impacts from sediment and contaminants in general stormwater runoff during construction and operation
- surface and groundwater impacts associated with runoff of leachate from the woodchip stockpile and log storage areas.

EXISTING ENVIRONMENT

The assessments indicate:

- no physical evidence of contamination of site soils, and no CASS was intercepted
- that previous site activities had not caused groundwater contamination
- marine sediments were evaluated as being unpolluted, with the concentration of all tested elements and synthetic compounds below the low trigger levels of the relevant Australian Interim Sediment Quality Guidelines.

Surface water flow in the area is generally seasonal and adhoc. Several ephemeral creeks/drainage lines enter Smith Bay, with generally shallow, localised catchments. The largest, Smith Creek, traverses the western edge of the parcel of land adjoining the Smith Bay site and discharges to the sea approximately 100 metres west of the site. The western portion of the study area is within the Smith Creek catchment and the eastern portion is within the Smith Bay catchment. Both catchments are quite shallow in the study area but deeper further inland.

Although the system of off-site creeks has been highly disturbed by past agricultural practices, they continue to support some remnant vegetation along their banks. The proposed development would not have any impact on these watercourses or the associated vegetation.

Groundwater beneath the site was intercepted at a depth of 1.65 mBGL near the northern (marine) boundary. Groundwater was found to have very slow recharge, suggesting low aquifer yield and had a total dissolved solids (TDS) concentration of 18,000 mg/L, indicative of saline conditions, potentially connected to the marine environment. The low yield and high salinity suggested that beneficial use of groundwater was unlikely.

ASSESSMENT OF POTENTIAL IMPACTS

The following conclusions were drawn from the assessment:

- Soil investigations showed there were no contaminants that would affect the viability of the proposed site use.
- The sediment load in the dewatering discharge from the dredge slurry potentially could be high if not managed effectively.
- Stormwater runoff could cause surface and beach wall erosion and could transport sediment to surface water bodies if not appropriately managed.
- Site activities during operations could result in the release and accumulation of chemicals which could result in site contamination (soil and groundwater) and the contamination of stormwater runoff if not appropriately managed.
- Leachate from the woodchip stockpile and log storage could harm surface water via direct runoff or through stormwater transport, and groundwater via infiltration through a permeable base.

MANAGEMENT AND MITIGATION MEASURES

Potential impacts associated with soil and water contamination would be managed through the implementation of control measures described in the Construction Environment Management Plan (CEMP) and the Operational Environment Management Plan (OEMP). Key measures to mitigate potential impacts would be:

- suitably sized and designed dredge spoil dewatering ponds to maximise sediment removal
- management of stormwater runoff via drains and bunds to eliminate uncontrolled runoff and erosion
- a suitably designed and sized wetland pond, retention basin and swale system to capture and treat all general stormwater runoff
- storage of hydrocarbons and other chemicals in accordance with Australian standards
- continued percolation of treated stormwater into groundwater via wetland pond and retention basin so as to not significantly affect groundwater levels
- grading of the pontoon surface to prevent any runoff entering the ocean, drains fitted with a litter basket to trap debris and a gross pollutant trap/oil water separator to intercept pollutants prior to discharge to the sea
- timber log and woodchip storage yards with bunding and impermeable base and all leachate draining to a lined retention basin to prevent any runoff or infiltration.

AIR QUALITY

KEY ISSUES

The key issues associated with air quality at Smith Bay are:

- generation of dust emissions during construction activities
- generation of dust emissions during the storage, handling and loading of logs and woodchips
- compliance with air quality standards and guidelines
- potential effects of dust emissions on neighbours, including Yumbah's abalone farm
- potential impacts of dust emissions on the terrestrial and marine environment.

METHODOLOGY

Existing climatic information near Smith Bay, including temperature, rainfall and evaporation and wind speed and direction, was reviewed for use in the air quality dispersion modelling. Kangaroo Island has no air quality monitoring stations. Consequently, baseline air quality for the assessment was estimated using the results of monitoring at other similar sites within South Australia

The effects on air quality were assessed using the Calmet (meteorology) and Calpuff (emissions) system of dispersion modelling. Model outputs were used to:

- assess potential changes to the baseline air quality environment at Smith Bay
- determine ground-level concentrations and dust deposition rates
- determine compliance with relevant criteria described in the Environment Protection (Air Quality) Policy 2016 and potential impacts on human health.

The modelling assumed that the following control measures were in place:

- unpaved roads were watered during construction and operation
- cleared areas were watered during construction/land clearing activities
- the woodchip ship loading conveyor was covered
- vehicle speeds within the site were limited to 15 kph.

EXISTING ENVIRONMENT

The existing rate of dust deposition, based on benchmarking against similar sites in South Australia, was estimated to be 2 g/m^2/month, with typical ground-level dust concentrations of around 15-22 $\mu g/m^3$ for PM_{10}-sized dusts and 7-10 $\mu g/m^3$ for $PM_{2.5}$-sized dusts. This is considered to be typical of coastal and agricultural sites elsewhere in the state.

The only significant human sources of gaseous pollutants in the study area are vehicle exhaust emissions on nearby roads and seasonal prescribed burning of vegetation. For the purposes of this air quality assessment, the baseline ground-level concentration of gaseous pollutants was assumed to be zero.

ASSESSMENT OF POTENTIAL IMPACTS

The dispersion modelling shows the predicted dust deposition rate is a total of 2.3 g/m^2/month during construction and 2.4 g/m^2/month during operations at the nearest sensitive receptor, including a contribution of 2.0 g/m^2/month from background. This represents a 15 to 20 per cent increase in dust deposition over background as a result of KIPT construction and operational activities. These rates compare favourably to the relevant regulatory criteria, suggesting that a project should contribute no more than 2.0 g/m^2/month and a total (from all sources) of 4 g/m^2/month.

On this basis, no significant impacts to amenity in relation to dust or air pollutants are predicted as a result of the proposed development. All areas outside the boundary of the operation would comply with air quality criteria, inclusive of background, during both construction and operation of the facility.

The air quality impact assessment also demonstrated that predicted ground-level concentrations of dust, including the contribution of background dusts, will not exceed the relevant regulatory criteria at the nearest sensitive receptors, and thus the development is not expected to have an impact on human health through air emissions

MANAGEMENT AND MITIGATION MEASURES

The following mitigation measures (to be included in the CEMP and OEMP) may be implemented to reduce emissions during construction and operations:

- scheduling construction works where practical to avoid dry, windy conditions where the wind is blowing towards sensitive receivers
- covering loads
- using water sprinklers on cleared areas before infrastructure construction during periods of adverse (hot and windy) weather
- damping down internal tracks during periods of dry and windy weather, or when dust crosses property boundaries
- using water sprays on bare stockpiles during hot and windy weather
- using variable-height woodchip stackers and/or telescopic chutes for ship loading
- using water sprays during woodchip and log handling and loading.

NOISE AND LIGHT

KEY ISSUES

The key issues associated with noise and light are the potential impact of:

- construction and operational noise on neighbours
- underwater noise on marine fauna, particularly marine mammals
- light spill on neighbours during construction and operational activities.

METHODOLOGY

The assessment of noise impacts associated with construction and operation of the KI Seaport included both terrestrial and underwater noise. The assessment methodology included the following steps:

Terrestrial noise

- Baseline ambient noise and vibration around Smith Bay were monitored at several locations over nine days.
- Terrestrial noise emissions from the site have been modelled in SoundPLAN using the CONCAWE method.
- Noise sources during construction included trucks, excavators, bulldozers, generators, cranes, concrete pumps, hand tools, dewatering plant (for dredge spoil) and other plant.
- Noise source during operations included bulldozer, trucks, log handlers, generator, conveyer, woodchip stacker and crane.
- Sensitive receptors at Smith Bay, comprising several residences, were identified.

Underwater noise

- Ambient noise monitoring in the marine environment at Smith Bay was undertaken using a hydrophone deployed near the sea bed at one location for nine days.
- The US Naval Research Laboratory's Range-dependent Acoustic Model (RAM) has been used to compute acoustic propagation via a parabolic equation solution to the acoustic wave equation.
- Noise sources during construction included dredging, piling and vessels.
- Noise sources during operations were associated with vessel movements.
- Sensitive receptors were considered to include whales, the Australian sea-lion, the great white shark and turtles.

Light

A detailed lighting assessment for the KI Seaport was not undertaken. Rather, the assessment qualitatively outlined the existing lighting environment in Smith Bay, relevant legislation and standards, and the conceptual basis of design for KI Seaport lighting.

EXISTING ENVIRONMENT

Measured terrestrial baseline noise and vibration levels were relatively low at all locations around Smith Bay, particularly at night, and are consistent with expected noise levels in a rural area.

Measured underwater baseline noise levels showed a reasonably strong correlation between wind speed and overall sound pressure level due to noise from waves. Averaged noise data at the site were within the expected limits for prevailing noise. One noise level (exceeding 130 dB re 1 µPa) was recorded, possibly associated with a fish or boat interacting with the noise monitoring equipment.

The major source of artificial lighting at Smith Bay is associated with the existing land-based aquaculture operation, which is continuously lit at night, illuminating the beachfront north of the facility and the abalone tanks, and the western side of the facility. Other minor sources of light are a number of residences and vehicles travelling along North Coast Road.

ASSESSMENT OF POTENTIAL IMPACT

The following conclusions are drawn regarding the impact of terrestrial noise:

- Construction noise levels are predicted to comply with the relevant criteria described in the Environment Protection (Noise) Policy 2007 at sensitive receptors, provided the majority of construction work is carried out during normal hours, and reasonable and practicable steps are taken to minimise noise.
- Operational noise levels at the KI Seaport are predicted to comply with the daytime noise criterion and slightly exceed the night-time criterion at sensitive receivers.
- With the application of appropriate controls, operational noise emissions are predicted to comply with both daytime and night-time criteria at all noise-sensitive receptor locations.

The following conclusions are drawn regarding the impact of underwater noise:

- The overall risk of adverse noise effects on most of the relevant marine species was found to be low, with hearing damage, in most instances, only occurring within approximately 100 metres of piling.
- The significant exception was a medium level of risk associated with impact piling potentially resulting in permanent hearing damage to southern right whales within 900 metres of the piling, and temporary hearing damage within 6.5 km of piling.
- Management measures are required to protect southern right whales during construction.

The following conclusions are drawn regarding the impact of lighting:

- Occupiers of the two nearby residences may be sensitive to changes in lighting due to the area's generally dark surroundings.
- The proposed lighting system at the new facility is likely to be similar to existing lighting from the nearby onshore aquaculture facility, which is likely to lessen its impact to a significant degree.
- The KI Seaport's lights would likely blend into the existing lighting of the abalone farm and thus the cumulative impact of additional lighting is expected to be low.

MANAGEMENT AND MITIGATION MEASURES

The following management measures may be adopted to mitigate potential impacts:

- During construction as much work as possible, including very noisy activities, would be carried out during daylight hours.
- Numerous noise abatement strategies, to be implemented during construction and operations, would be outlined in the CEMP and OEMP.

The following management measures would be adopted to mitigate the impact of pile driving on marine fauna:

- A 'soft start' would be used to deter fauna from remaining close to the construction area.
- Pile driving would cease if a marine mammal was sighted within 1 km of the construction site.
- No pile driving would occur at night, when it would be difficult to detect the presence of marine fauna.

The following management measures are likely to be implemented to mitigate the impact of lighting:

- Lighting would be located and oriented where it would have the least effect on neighbouring properties.
- Floodlights, in particular, would be oriented so neighbouring properties were shielded from direct view of the brightest parts of the lights.
- Consideration would be given to adding louvres, baffles or shields to floodlights to control spill light.

CLIMATE CHANGE AND SUSTAINABILITY

KEY ISSUES

The key issues associated with climate change and sustainability are:

- protecting the proposed infrastructure from the expected long-term impacts of a changing climate
- reducing greenhouse gas emissions associated with the KI Seaport's construction and use.

EXISTING ENVIRONMENT

The impact of climate change on the KI Seaport and Smith Bay can be inferred from work prepared for Alexandrina Council in 2015, which examined a number of scenarios or potential outcomes. The 'intermediate stabilisation scenario' (RCP4.5), which assumes the impact of climate change is stabilised before 2100, predicts a number of changes to the Kangaroo Island climate, including less rainfall, higher average temperatures, a 33 cm rise in sea levels and a 1.2°C increase in sea surface temperatures by 2090.

ASSESSMENT OF POTENTIAL IMPACTS

CARBON SEQUESTRATION IN PLANTATIONS

The estimated mass of timber in the KIPT-managed plantations is approximately 3.87 million tonnes of hardwood and 0.71 million tonnes of softwood. The total carbon sequestration of the KIPT-managed plantations is conservatively estimated to be approximately 6.8 million tonnes of CO_2-e. As individual plantations would be replanted or coppiced following harvesting, this amount of sequestration would remain relatively constant over the life of the operation.

GREENHOUSE GAS EMISSIONS

It is estimated that during peak operations, up to 500,000 litres of diesel would be used annually at the Smith Bay site, and a further 2,430,000 litres by trucks transporting timber products from the plantations to Smith Bay. The total peak CO_2-e emissions from these operations is estimated to be 1700 tonnes a year. These emissions equate to an increase of 0.008 per cent of South Australia's annual greenhouse gas emissions by 2030, and 0.0003 per cent of Australian emissions.

MANAGEMENT AND MITIGATION MEASURES

GREENHOUSE GAS EMISSIONS

KIPT is committed to reducing its carbon footprint to as low as is reasonably achievable for the KI Seaport (and downstream operations). Mitigation and management measures specific for the KI Seaport that would be investigated during the detailed design phase and optimised during operations would include:

- minimising electricity consumption through the use of energy-efficient infrastructure such as low-friction conveyors, lighting and air-conditioning
- installing solar photovoltaic panels to supply electricity to site buildings and for site lighting
- regular maintenance schedules for site vehicles and timber transport trucks to ensure they remained compliant with relevant legislation and operated as efficiently as possible.

RESPONDING TO CLIMATE CHANGE

The following design and management measures would be implemented to minimise the potential impacts to the KI Seaport infrastructure and operations as a result of climate change:

- The marine and coastal infrastructure would be designed to address the predicted worst-case sea level rise.
- The causeway structure would be designed for a 1-in-500-year storm event.
- The size of surface water catchments, including sedimentation ponds and drainage/diversion infrastructure, would be determined by considering the likely worst-case changes in the magnitude and duration of rainfall events.
- Habitable buildings would be designed to promote passive cooling, thereby reducing energy demands and providing respite for the workforce during extreme heat days.

THE BIOLOGICAL ENVIRONMENT

MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

KEY ISSUES

The Commonwealth Department of Environment and Energy (DoEE) determined that the proposed development is a 'controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and that it has the potential to have a significant impact on the following matters of national environmental significance (MNES):

- the southern right whale
- the Kangaroo Island echidna
- the hooded plover
- the southern brown bandicoot.

METHODOLOGY

The following studies were undertaken to determine potential effects on MNES:

- desktop assessments of the recorded sightings and habitat preferences of each species, including database searches and reviews of relevant literature and previous surveys within the Smith Bay area
- terrestrial and marine field surveys at Smith Bay
- reviews of southern right whale sightings in South Australia, and of the literature concerning whale strike by vessels
- a modelling assessment of the likelihood of whale strike occurring as a result of KIPT shipping operations.

EXISTING ENVIRONMENT

As previously discussed, the Smith Bay site is almost entirely cleared but supports 2.9 ha of degraded remnant vegetation. The surrounding area is also largely cleared and the remnant vegetation is fragmented, which lowers its habitat value.

There are occasional sightings of southern right whales traversing Smith Bay during winter.

Ecological surveys of the site have revealed echidna 'diggings', however it is unlikely that a major portion of their home range is within the study area.

There are records of the hooded plover having been occasionally sighted foraging on the foreshore at the eastern end of Smith Bay.

There are no records of the southern brown bandicoot in the area.

ASSESSMENT OF POTENTIAL IMPACTS

The proposed development was assessed using the MNES Significant impact Guidelines (2013).

SOUTHERN RIGHT WHALES

Smith Bay lies within an area described as the 'current core coastal range' for southern right whales. However, it is not near any of the known aggregation areas and is just outside the 'historic high use' area. The National Conservation Values Atlas identifies the entire coastline of Kangaroo Island, to a distance of 1.5 km offshore, as seasonal calving habitat for the southern right whales.

Potential impacts to southern right whales during construction is from piling activity which would increase underwater noise levels. During operation impacts are possible from the movement of vessels into the Smith Bay waters.

The whale strike probability modelling found that the average number of strikes resulting from the shipping associated with KIPT's operations would be 0.00334 a year; that is, once in about 300 years).

It is concluded that the risk to the southern right whale from KIPT shipping operations would be negligible.

KANGAROO ISLAND ECHIDNA

Kangaroo Island echidnas are relatively common across the Island and may use the Smith Bay site intermittently for foraging. However, the study area is unlikely to include a major portion of their home range.

Potential impacts to the echidna during construction and operation are from vehicle movements. The number of echidnas likely to be killed by haulage trucks travelling from plantations to the KI Seaport and back is estimated at between six and 21 a year. The assessment concluded that there is

potential for residual significant impact to the Kangaroo Island echidna and an offset under the EPBC Act is required.

HOODED PLOVER

A pair of hooded plovers was recorded at the eastern end of Smith Bay, approximately 1.8 to 2.0 km from the study area, in 2010, 2014 and 2016, which suggests the birds may forage occasionally within the area. There is, however, no evidence to suggest that plovers breed at Smith Bay.

It is possible the plover may be disturbed by construction activity but would temporarily move to other suitable foraging sites along the north coast, of which there are many.

SOUTHERN BROWN BANDICOOT

It appears unlikely that the southern brown bandicoot currently inhabits the Smith Bay area because the habitat is degraded and the animals prefer dense understorey, so the effects on the species from the proposed development are likely to be negligible.

MANAGEMENT AND MITIGATION MEASURES

SOUTHERN RIGHT WHALE

Potential impacts on the southern right whale during construction would be mitigated by:

- ceasing piling if trained observers detected the presence of a whale within 1 km of the construction site
- limiting piling to daylight hours so whales could be seen
- implementing a soft-start procedure for the commencement of piling activity.

KANGAROO ISLAND ECHIDNA

An offset acceptable to the Department of the Environment and Energy (DoEE) would be developed (consistent with the EPBC Environmental Offsets Policy 2012) to compensate for the expected ‘worst-case’ impacts on the echidna population associated with trucking operations. The offset would include contributing to the feral cat eradication program on Kangaroo Island.

HOODED PLOVER

Should a hooded plover nest be detected on the foreshore at Smith Bay, an exclusion zone around the nest would be established to protect it. This is a standard practice currently adopted by local councils across South Australia.

BIOSECURITY

KEY ISSUES

The key issues associated with biosecurity at Smith Bay relate to protecting:

- Yumbah's abalone farm and other agricultural enterprises on Kangaroo Island from introduced pest plants, pest animals and/or diseases
- the marine (in particular) and terrestrial ecosystems from introduced pest species and/or diseases.

METHODOLOGY

Field surveys were undertaken to identify terrestrial and marine pest species present within the study area. The literature was reviewed to determine priority marine pest species for Kangaroo Island. The regulatory arrangements and protocols for managing biosecurity associated with shipping were reviewed.

EXISTING ENVIRONMENT

KANGAROO ISLAND

Kangaroo Island promotes an image of being clean and green. The Island is free of some mainland pests, including rabbits, feral goats and foxes. The potato and honey industries, in particular, are free of major diseases, and the Island is a sanctuary for Ligurian bees.

One of the most important threats to native fauna on Kangaroo Island is feral cats, which are relatively abundant.

SMITH BAY TERRESTRIAL ENVIRONMENT

The Smith Bay site is dominated by weeds, which reflects the degraded nature of the site. Of the 19 weed species recorded there, four are listed as declared weeds under the *Natural Resources Management Act 2004* (NRM Act).

Although no introduced fauna species were recorded at Smith Bay during the field surveys, a number of pest species, including cats, rats and mice, are likely to exist there.

SMITH BAY MARINE ENVIRONMENT

Yumbah's abalone farm at Smith Bay would be at risk should an abalone disease be introduced. The two most significant diseases are abalone viral ganglioneuritis (AVG), which has been detected in wild abalone stock in Victoria and in farms in Victoria and Tasmania (but not in South Australia), and the parasite *Perkinsus*, which has been found in wild abalone populations in South Australia at Neptune Island and on Yorke Peninsula.

More than 20 introduced marine species have been recorded around Kangaroo Island, but none at Smith Bay.

ASSESSMENT OF POTENTIAL IMPACTS

Construction activity, which includes dredging and the movement of domestic shipping vessels into Smith Bay, has the potential to spread or introduce marine pests and/or aquatic diseases.

The vectors of marine pest species most relevant to the proposal are the management of ballast water for any vessels entering Smith Bay and biofouling (plants and animals that attach and grow on the submerged parts of a vessel) from international and domestic vessels. It would be essential to minimise the risk of introducing pests and aquatic diseases by implementing appropriate biosecurity controls for international and domestic shipping during operations.

Movement of domestic ships into Smith Bay from Port Adelaide is considered to pose a higher biosecurity risk than international shipping and would be managed accordingly.

MANAGEMENT AND MITIGATION MEASURES

The Commonwealth Department of Agriculture and Water Resources (DAWR) and Biosecurity SA have been, and would continue to be, consulted to determine the most appropriate practical measures for minimising the risk of introducing marine pests and diseases into and out of Smith Bay.

Vessels entering Smith Bay and using the KI Seaport (during construction and operation) would be required to comply with the *Biosecurity Act 2015* as well as relevant Australian government guidelines for ballast water management.

All vessels and equipment used during construction, as well as the vessels using the KI Seaport during its operation, would be required to comply with state policies regarding biofouling and pollution prevention. No in-water or dry dock cleaning would be permitted at Smith Bay.

The CEMP and OEMP would include a detailed marine pest management plan produced in consultation with DAWR, South Australian Research and Development Institute (SARDI), Biosecurity SA and the Biosecurity Advisory Committee of the Kangaroo Island Natural Resources Management Board. The focus of management strategies would be prevention and early detection. These plans would be consistent with the principles and objectives of the Kangaroo Island Biosecurity Strategy.

Marine pest surveillance would be undertaken at Smith Bay to detect marine pests as early as possible. Monitoring would include diving and inspection of artificial infrastructure as well as shoreline searches for any exotic marine species.

Weed management and vehicle hygiene measures would be incorporated into the CEMP to minimise the spread of weeds from Smith Bay.

KIPT will also contribute with funds to NRKI for the marine pest and eradication surveys of Smith Bay.

MARINE ECOLOGY

KEY ISSUES

The key issues associated with marine ecology are:

- the direct loss of seagrass and other marine communities as a result of dredging and wharf construction
- indirect effects on seagrass and other marine communities as a result of dredging operations and shipping movements mobilising sediments, increasing turbidity and causing siltation
- potential effects on listed species, and in particular ship collisions with southern right whales
- effects of underwater construction noise on marine fauna, particularly marine mammals
- the potential introduction of marine pests and diseases to Smith Bay.

METHODOLOGY

The assessment methodology was as follows:

- The marine communities in the vicinity of the development site were surveyed by divers on three occasions using scuba equipment and underwater cameras (See Plate 2).
- A literature review and search of government databases was undertaken to extract records of marine fauna, seagrasses, macroalgae and marine habitats recorded in the vicinity of the development.
- The DoEE Protected Matters Search Tool (extracted February 2016) was deployed using a 10 km buffer to extract records of significant marine species reported in the Smith Bay area.
- The literature concerning the southern right whale, the impacts of dredging and marine pests was reviewed.

EXISTING ENVIRONMENT

The main features of the Smith Bay marine environment are as follows:

- The intertidal beach area consists almost entirely of boulders supporting communities of mainly molluscs, crustaceans and polychaetes.
- The sub-tidal area to a depth of approximately 10 metres supports mixed reef and seagrass communities, with the seagrass becoming more dominant in the deeper water. The seagrass communities are dominated by *Posidonia sinuosa* and *Amphibolis* spp., and the reef communities by dense macroalgae.
- In the deeper water (10–14 metres) the density of the seagrass communities reduces with depth, until at 14 metres the sea floor consists of rubble, shell fragments and silty sand, supporting very sparse seagrass and a community of invertebrates (See Plate 3).

Forty-six listed marine species have been recorded within 10 km of Smith Bay, including whales, turtles, seals, dolphins, syngnathids (seahorses and pipefish), and migratory marine species.

Only one listed marine species was found during the survey: the ring-backed pipefish (*Stipecampus cristatus*) in *Posidonia* seagrass habitat.

The only other listed marine species that are likely to be regular visitors to Smith Bay are the southern right whale, the long-nosed fur seal, the Australian sea lion, dolphins and the great white shark.

With the exception of silver trevally, catch records of commercial fishers show that the Smith Bay area is relatively unimportant for the high-value fisheries around Kangaroo Island.

PLATE 2 A DIVER TAKING A SEDIMENT SAMPLE IN SMITH BAY (DEPTH 13 M)

Rocky foreshore and intertidal zone

Reef communities supporting macroalgae (6–7 metres)

Dense seagrass *Posidonia sinuosa* (10 metres)

Sparse seagrass *Posidonia sinuosa* on rubble/sand substrate (14 metres)

PLATE 3 COASTAL AND MARINE HABITATS IN SMITH BAY

ASSESSMENT OF POTENTIAL IMPACTS

The following conclusions have been drawn from the assessment.

LISTED SPECIES

- Impacts on most listed species are not considered to be credible as most have been recorded around Kangaroo Island only on rare occasions, none is considered to have limited habitat along the north coast, and most are highly mobile and therefore would be able to move from an area of impact to adjacent unaffected habitat.
- Effects on the southern right whale during construction of the port are expected to be minor, and entail temporary behavioural changes in response to construction noise.
- The risk of vessels colliding with southern right whales during operations is expected to be very low, with collisions predicted to occur about once in every 300 years.
- The marine-listed ring-backed pipefish (*Stipecampus cristatus*) may be impacted during dredging operations. However, the impact is expected to have a negligible effect on the population of pipefish in the area.

SEAGRASS LOSS

- The construction of a causeway (0.95 ha) and the dredging of the berthing pocket and approaches (9.2 ha) would result in the direct loss of about 10 ha of mixed habitat, including the seagrasses *Posidonia sinuosa*, *Amphibolis antarctica* and *A. griffithii*, and associated invertebrate communities.
- Secondary impacts on seagrass communities adjacent to the development site are likely to result from localised increased turbidity and sedimentation during dredging.
- The ecological significance of the loss of seagrass communities would be minor as there is a vast amount of similar habitat within Smith Bay, at Emu Bay and elsewhere along the north coast.
- Although the health of seagrass within several hundred metres of the dredge footprint may be compromised to some degree by turbidity and sedimentation effects during construction, recovery is likely to be rapid after construction is completed.
- Sediment plumes generated by propwash would have a negligible effect on seagrass and other benthic communities as they would be infrequent, of short duration, of relatively low intensity and of limited extent.

NOISE AND VIBRATION

- Damage to the hearing of marine fauna is considered to be unlikely as the normal behavioural response to loud noise would be to move away.
- Behavioural changes in response to noise, including vessel noise, are expected to be temporary and ecologically inconsequential as Smith Bay is not known to provide important feeding or breeding habitat for any species likely to be affected by construction or operational noise.

BIOSECURITY

- It is considered that the risk of introducing marine pests and/or diseases to Smith Bay could be reduced to an acceptable level by adopting the most rigorous biosecurity standards prescribed by Biosecurity SA.

MANAGEMENT AND MITIGATION MEASURES

- With the adoption of standard mitigation measures such as ‘soft starts’ when piling, and shutting down piling should a whale be sighted within 1 km of the construction site, impacts from underwater noise are likely to be minimal.
- The loss of approximated 7.5 ha of seagrass during construction would be offset by providing financial support to an extension program whose aim would be to encourage seagrass recovery in Western Cove by limiting fertiliser-enriched runoff entering Cygnet River through best-practice use of fertiliser on farms within the Cygnet River catchment.
- All vessels using the wharf would be required to comply with the most up-to-date South Australian and Commonwealth policies, legislation and guidelines relevant to the management of biofouling and ballast water disposal.
- Biosecurity SA would be consulted to determine the most appropriate operating procedures to ensure shipping complied with all relevant biosecurity policies and guidelines.

AQUACULTURE

KEY ISSUES

The most critical issue associated with the proposed development relates to potential impacts on the operation of Yumbah's land-based abalone farm at Smith Bay through effects on water quality during construction and operation of the port. Yumbah pumps large amounts of seawater through its farm to sustain the abalone. The key water quality issues with respect to potential impacts on abalone are:

- increased concentrations of suspended sediments resulting from capital dredging, causeway construction and shipping movements
- dust fall-out into abalone tanks and raceways
- reduced near-shore currents and increased water temperature during summer heatwaves.

METHODOLOGY

This assessment draws extensively on the seawater and air quality modelling studies described elsewhere in the Draft EIS.

An extensive review of the abalone literature was undertaken, focusing on:

- onshore abalone farm operations in Australia
- the ecology of greenlip abalone
- the tolerance of greenlip and other species of abalone to suspended sediments
- thresholds at which greenlip and other abalone are likely to be adversely affected by suspended sediments.

A professional opinion was provided by an ecotoxicologist regarding the likely threshold TSS concentrations at which the abalone described in the literature would not be expected to be affected.

Species-specific ecotoxicology studies were undertaken to determine the threshold TSS concentration at which juvenile greenlip abalone would be protected from both acute and chronic effects associated with sediment plumes and wood dust deposition at Smith Bay.

The outputs from the seawater and air quality modelling studies at key receptors within the abalone farm, including the seawater intakes and grow-out areas, were then compared with the abalone thresholds derived from the literature and ecotoxicology studies.

Seawater quality, particularly in relation to TSS, associated with Yumbah's proposed Nyamat abalone farm in Victoria was examined to determine how it compares with Smith Bay ambient water quality and modelled water quality during construction operations.

EXISTING ENVIRONMENT

Yumbah grows mainly greenlip abalone (*Haliotis laevigata*) at Smith Bay, and potentially some 'tiger' abalone, which are hybrids of greenlip abalone (*H. laevigata*) and blacklip abalone (*H. rubra*) (see Plate 4).

The abalone farm consists of four major parts:

- a broodstock holding system where mature abalone are held for breeding purposes
- a hatchery where abalone larvae are produced
- a nursery where juvenile (post-larval) abalone are raised
- a grow-out area where sub-adult (through to adult) abalone are grown out to market size.

The abalone farm draws seawater through 15 intake pipelines (in three locations) extending up to 220 metres into the sea to a depth of approximately six metres. The intake seawater is not filtered, apart from by the coarse filters covering the intakes to exclude fish. After flowing through the farm, the return seawater is discharged into Smith Bay via several outfalls on the beach.

The only part of an abalone farm that does not use the flow-through seawater system is the hatchery, which generally operates on a recirculation or static system. The seawater used in an abalone hatchery is also filtered prior to use (generally to 10 microns) to remove fine suspended matter, and ultraviolet (UV) sterilised.

Seawater used in the nursery tanks is usually run through a bank of rapid sand filters to remove most of the larger particulates (those in the 20 to 50 micron range).

Although the existing quality of the seawater in Smith Bay is considered to be high, there is evidence to suggest it may be compromised at times by inputs of suspended sediment and nutrients from the degraded Smith Creek (and other creeks) during storm events.

ASSESSMENT OF POTENTIAL IMPACTS

A range of construction and operational activities is likely to mobilise sediments and elevate the concentrations of suspended sediments in the water column, which may affect water quality at Yumbah's intakes.

THE SENSITIVITY OF ABALONE TO SUSPENDED SEDIMENTS

Greenlip abalone live in relatively high-energy environments where they are regularly exposed to high levels of suspended sediments. It is argued, therefore, that abalone are likely to be well adapted to relatively high TSS levels.

Abalone larvae have been found to be considerably more sensitive to suspended sediments than juveniles or adults. However, larvae would not be exposed to potentially elevated levels of TSS in the intake seawater as they are grown within a closed-circuit system in which filtered and UV-sterilised seawater is recirculated.

Furthermore, abalone farms generally only spawn abalone over a few days each year, which means that larvae are present and therefore vulnerable to impact for a relatively short time before settling as spat. It is considered that the risk to larvae is likely to be relatively easy to manage through the implementation of appropriate controls during construction and operation of the facility.

The literature review revealed that juvenile Pacific abalone did not suffer any mortalities when exposed to 250 mg/L TSS for 96 hours. After applying a 10-times acute to chronic conversion to this result (as per the ANZECC/ARMCANZ water quality guidelines), it is unlikely that Pacific abalone would suffer any chronic effects at TSS concentrations less than 25 mg/L (2.5 times less conservative than the existing ANZECC/ ARMCANZ guideline of 10 mg/L TSS for the protection of aquaculture).

The ecotoxicology studies revealed that the No Observable Effects Concentration (NOEC) for exposure of juvenile greenlip abalone to Smith Bay sediment for 24 hours was 250 mg/L TSS, which is consistent with the literature. After applying a 10 times acute to chronic conversion factor to the results, it is concluded that 25 mg/L TSS would provide a safe threshold for the protection of juvenile greenlip abalone from any chronic or acute effects.

The evidence suggests that TSS concentrations of less than 25 mg/L would result in negligible risk to sub-adult and adult abalone in an aquaculture setting.

This conclusion is supported by Yumbah's analysis of TSS concentrations of its proposed Nyamat abalone farm in Victoria, where the maximum TSS concentrations are reported to be 37 mg/L, and TSS concentrations are likely to exceed 15 mg/L for five per cent of the time. It is noted that Yumbah report that seawater quality at the Nyamat farm is perfect for abalone culture.

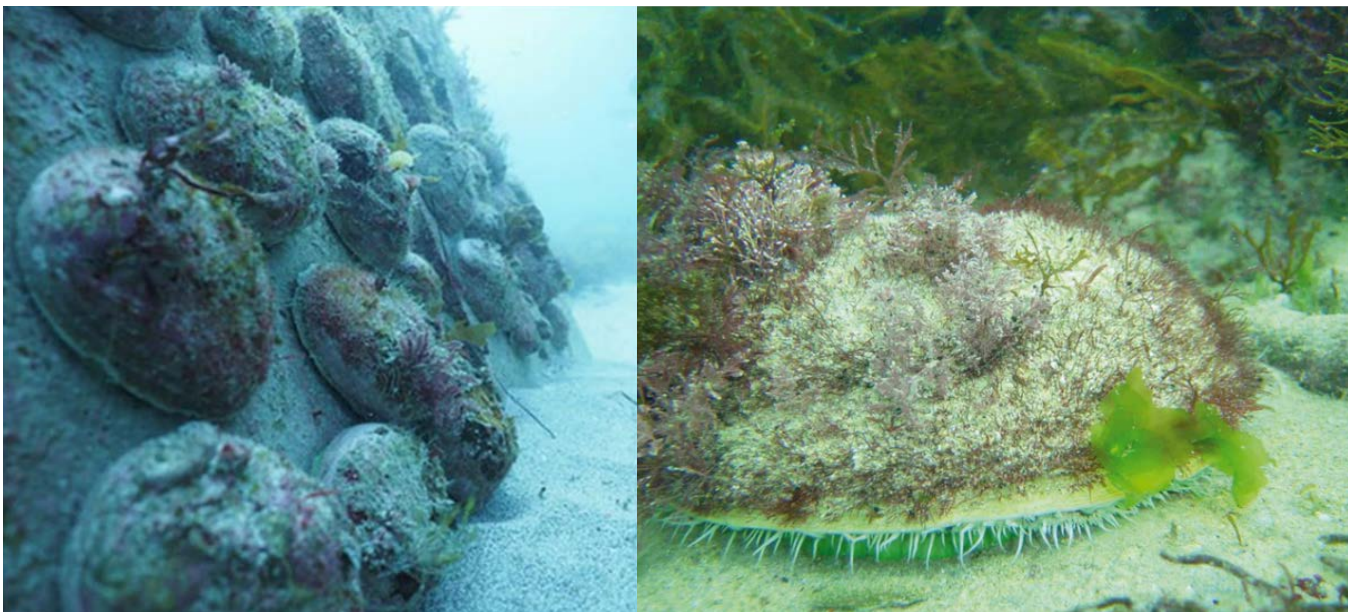

PLATE 4 GREENLIP ABALONE IN AN IN-SEA AQUACULTURE SETTING

POTENTIAL IMPACTS OF DREDGING ON WATER QUALITY

The impact of dredging on water quality is largely a function of the size of the dredging program, the type of equipment used, the rate at which dredging occurs, and the type of sediment being dredged.

The following aspects of the dredging program are considered to be significant in lessening sediment mobilisation and the risk to Yumbah's operations:

- the size of the program (up to 200,000 m^3) is considered to be relatively small
- the relatively short duration of the program (approximately two months)
- the use of a cutter suction dredge with pump-ashore and settlement of fines (rather than a bucket dredge system, or overflow hopper)
- the relatively slow rate at which dredging would occur (approximately 2000 to 3000 m^3/day)
- the relatively low proportion of clay and silt in the dredged sediments.

Hydrodynamic modelling of TSS concentrations at the abalone farm seawater intakes has shown that concentrations are less than 10 mg/L for 90 per cent of the time, with the median concentration varying between 1.3 and 3.7 mg/L, depending on the season. The 25 mg/L threshold is likely to be exceeded for less than one per cent of the time.

The hydrodynamic modelling outcomes suggest that the worst-case increases in suspended sediments at Yumbah's seawater intakes are unlikely to have any adverse effects on the health of abalone within the farm. The risk would be further reduced by managing the capital dredging program so there were no occasional extreme increases above ambient TSS at the seawater intakes (i.e. above 10 mg/L TSS).

OTHER POTENTIAL IMPACTS

- **Causeway construction.** The hydrodynamic modelling indicates that TSS at Yumbah's intakes during causeway construction would be less than15 mg/L for 99 per cent of the time, and would never exceed the 25 mg/L threshold. By far, most of the TSS at the intakes would be due to ambient conditions. Consequently, there would be no risk to abalone.
- **Propeller wash.** The resuspension of sediments during shipping activities would be highly localised in both time (during ship operations) and space (along the shipping approach). The hydrodynamic modelling indicates that there is negligible risk of propeller wash adversely affecting water quality at Yumbah's seawater intakes to the extent that there would be adverse effects on abalone health.
- **Maintenance dredging.** The need for future maintenance dredging to maintain berth and approach depths is likely to be minimal and infrequent and would not be expected to have any adverse effects on abalone heath.
- **Impact of elevated turbidity on on-farm algal production.** Suspended sediments, at the levels anticipated, would not have a material effect on the photosynthetic production of algae grown in the Yumbah farm. Similarly, there is no evidence that increases in turbidity of the magnitude anticipated would have any material effect on micro-algal and, specifically, diatom production within Smith Bay itself.
- **Impact of elevated sediment loads on farm infrastructure.** Sand filters used in on-land aquaculture operations are low-maintenance and designed to handle influent flows with elevated levels of particulate material (both organic and inorganic). It is unlikely there would be a material impact on the operation of filtration systems within the abalone farm.
- **Mobilisation of anoxic sediments, pollutants and nutrients.** No evidence was found for the presence of any anoxic sediments or pollutants, or excessive levels of nutrients within the sediments in Smith Bay. Consequently, there is a negligible risk that such materials would be mobilised during dredging and adversely affect water quality at Yumbah's intakes.
- **Dust deposition.** Ecotoxicology studies showed that the NOEC for exposure of greenlip abalone to blue gum wood dust was 3.5 mg/L. Modelling has shown that dust generated from the construction and operation of the KI Seaport would result in a 10 to 25 per cent increase over background deposition rates within the Yumbah farm (at its closest point). If all of this dust were to build up on the shade cloth covering the abalone and mix with the water flowing through the raceways during a rainfall event it would potentially cause an increase in total suspended wood dust solids of around 0.14 mg/L (90th percentile) and 0.87 mg/L (99th percentile). Such an increase would have no effect on the health of abalone.
- **Seawater temperature.** Hydrodynamic modelling has shown that the effect of the causeway in interrupting tidal currents is likely to result in a maximum increase in seawater temperature at Yumbah's intakes of less than 0.1ºC that may occur for several hours, which would be too small to have any measurable effect on Yumbah's operations.

POTENTIAL BENEFICIAL EFFECTS ON YUMBAH'S OPERATIONS

The location of the causeway to the east of Smith Creek is likely to mitigate the potentially adverse effects that discharges from the creek may be having on water quality at Yumbah's intakes during rainfall events.

Hydrodynamic modelling of storm flows from Smith Creek demonstrates that during ebb tides:

- Effluent currently flows almost directly past the Yumbah intakes and typically results in suspended sediment loads of 5–10 mg/L above the ambient conditions at the intakes.
- A solid causeway would direct effluent several hundred metres out to sea before being entrained by tidal currents, providing a reduction of up to 50 per cent of contaminants from the creek water reaching Yumbah's intakes.
- Other contaminants contained within creek flows, including agricultural chemicals, pathogenic bacteria, nutrients and other terrigenous toxicants, would also be diverted away from the intakes, which may potentially benefit Yumbah's operations.

MANAGEMENT AND MITIGATION MEASURES

The risk of exceeding TSS thresholds at Yumbah's seawater intakes would be managed by installing alarms and live monitoring of water quality at a point between the dredge footprint and the intakes during the implementation of the dredging management and monitoring plan, a normal industry practice adopted during dredging activities. Dredging would cease if the alarms were triggered.

A variety of operational management strategies would be employed to limit dust generation, including:

- halting dust-generating activities during strong westerly winds
- placing standard dust guards around chip conveyors, loaders and other equipment
- using dust suppression systems, including water damping, around roads and access tracks.

If considered necessary, an open bypass system of large culverts or a pier could be installed in the near-shore section of the causeway to minimise interruption to tidal currents and small increases in water temperature.

TERRESTRIAL ECOLOGY

KEY ISSUES

The key issues associated with the development of the onshore facilities are:

- clearance of remnant vegetation
- potential effects on habitat and/or fauna of conservation significance.

METHODOLOGY

The assessment method was as follows:

- A desktop assessment of the Smith Bay site and adjacent area was undertaken. This included reviewing spatial datasets, aerial imagery and relevant literature reporting field surveys.
- Any threatened species previously recorded within the area, or highlighted as potentially occurring there, was researched to determine whether suitable habitat for these species existed in the area.
- Field surveys of the study area were undertaken in late winter and late summer.

EXISTING ENVIRONMENT

REMNANT VEGETATION

Native vegetation in the Smith Bay area has been almost entirely cleared for agricultural use, and now supports limited native flora and fauna. Most of the area now consists of exotic grassland/herbland (see Figure 7).

The most significant remnant vegetation is a patch of Kangaroo Island narrow-leaved mallee south of the proposed seaport site. This vegetation meets the criteria to qualify as a threatened ecological community under the EPBC Act.

A search of the Biological Databases of SA (BDSA) indicate that 13 state-listed threatened flora species occur within 10 km of the site, and seven nationally listed threatened flora species may occur or have potential habitat near the site.

The ecological survey of the site recorded 30 flora species, of which 19 were exotic (weeds) and 11 were native. No threatened flora species (nationally or state-listed) were recorded during the survey, which was not surprising in view of the degraded nature of the site, the proliferation of exotic species and the lack of suitable habitat for threatened species.

FAUNA

Twenty-three fauna species were observed at or near the Smith Bay site during the field survey, comprising 18 species of native birds, three introduced birds and two native mammals. Two fauna species of conservation significance were recorded: the white-bellied sea-eagle (observed flying along the coast) and signs (diggings) of the Kangaroo Island echidna.

Seven nocturnal fauna species have been recorded within 10 km of the study area and may at times inhabit the study area.

Twenty-two nationally and/or state-listed terrestrial fauna species have been identified as having the potential to inhabit the study area. The BDSA search revealed that 18 state-listed threatened fauna species (13 bird, four mammal and one reptile) have been recorded within 10 km of the Smith Bay site.

ASSESSMENT OF POTENTIAL IMPACTS

Potential impacts to flora and fauna associated with the construction, operation and decommissioning of the KI Seaport include native vegetation clearance (construction), removal of potential habitat for native fauna species (construction), direct or indirect mortality (fauna and conservation significant species) and the introduction of pest plants, pest animals and/or diseases.

VEGETATION

Most of the Smith Bay site is completely cleared of native vegetation and consists of pasture grasses. The remaining area which does support native vegetation is in very poor to moderate condition. Up to 2.9 ha of native vegetation would be cleared during construction activities, but no nationally or state-listed flora species or threatened ecological communities would be affected.

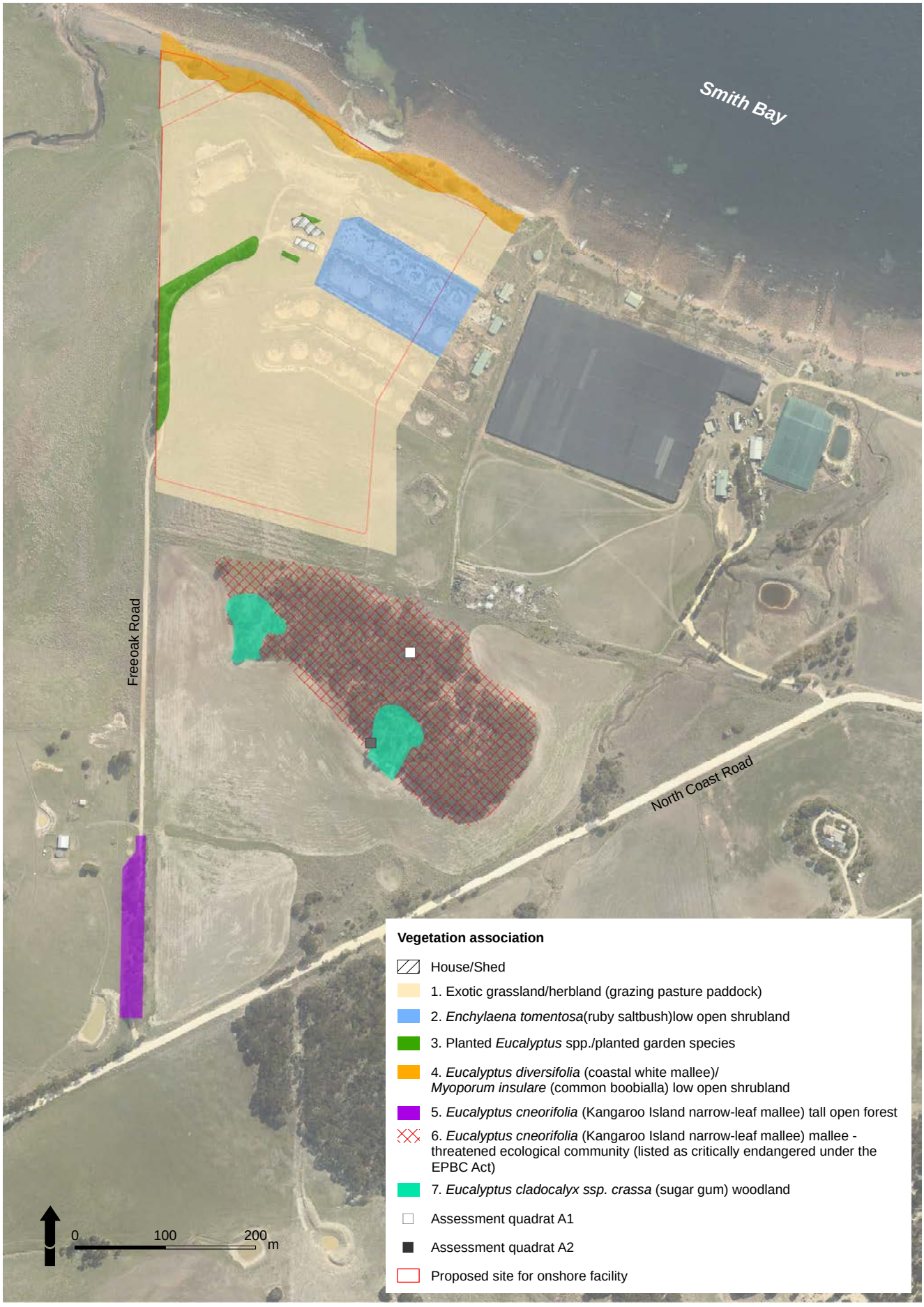

FIGURE 7 VEGETATION ASSOCIATIONS

Vehicle hygiene measures will be implemented for construction and operational activities to limit the spread of weeds from the site. Weed management activities undertaken as part of the landscaping program are likely to reduce the current level of infestation on-site.

FAUNA

The site is considered unlikely to provide important or critical habitat for any nationally and/or state-listed terrestrial fauna species identified as having the potential to inhabit the study area.

Although coastal raptors, such as the white-bellied sea-eagle and osprey, would occasionally fly over Smith Bay, the site itself does not provide suitable nesting habitat for them. The closest known nests (4.1 and 12.4 km from Smith Bay) are too far away to be affected by construction or operational activities.

The only native fauna species that may potentially be impacted by the development is considered to be the Kangaroo Island echidna. Although the site is unlikely to provide important echidna habitat, they may forage at the site and occasional deaths are likely as a result of trucking operations in the area.

MANAGEMENT AND MITIGATION MEASURES

The clearance of native vegetation would be offset by the implementation of a suitable offset strategy under the direction of the Native Vegetation Council. This is likely to comprise the management of a suitable area of native vegetation already owned by KIPT for conservation purposes.

Other management measures would include the following.

- CEMP and OEMP would be implemented to manage pest plants (weeds), pest animals and diseases.
- Measures to mitigate impacts to the Kangaroo Island echidna would be incorporated into the CEMP and OEMP.

THE SOCIO-ECONOMIC ENVIRONMENT

ECONOMIC

KEY ISSUES

The key economic issues associated with the proposed development are the degree to which the KI Seaport would directly contribute to the economy of Kangaroo Island and to the ongoing transformation of the South Australian economy.

METHODOLOGY

An assessment of the economic impacts of the proposed Smith Bay facility was undertaken using standard profiling and modelling techniques, including the use of input-output (I-O) economic models and a cost benefit study.

THE EXISTING ECONOMIC ENVIRONMENT

Gross regional product (GRP) on Kangaroo Island in 2015–16 (the most recent data) was estimated to be $257 million. It is estimated there were then approximately 2300 full-time-equivalent (FTE) jobs on the Island.

Many of Kangaroo Island's socio-economic characteristics are similar to those of other agricultural/tourism regions, including:

- slow or declining population growth
- the dominance of agriculture
- the seasonal impact of tourism, which poses a challenge to maintaining year-round hospitality and tourism businesses
- relatively low average incomes
- high freight costs
- a tight labour market with relatively poor employment opportunities.

The most significant existing economic enterprise in the Smith Bay area is Yumbah Aquaculture, which has around 25 full-time staff at its breeding, growing, harvesting and value-adding facility. Although precise figures are not available, it is likely that the Smith Bay farm produces between 100 and 170 tonnes of abalone with a current value of around $4 million to $7 million a year.

ASSESSMENT OF POTENTIAL ECONOMIC IMPACTS

CONSTRUCTION

Construction of the facilities at Smith Bay would result in the following economic benefits:

- total capital investment of around $41.2 million over three years
- total contribution to Kangaroo Island's GRP of around $7.5 million, of which $5.4 million is direct investment and $2.2 million is from flow-on effects
- the creation of 15 FTE jobs a year over three years.

OPERATIONS

The operating phase of the KI Seaport facilities (which by default includes the downstream operations – plantation harvesting and the haulage of timber products) would produce the following economic benefits:

- an expected annual average contribution to Kangaroo Island's GRP over the first five years of $41.7 million each year, of which $34.9 million is direct investment and $6.8 million is from flow-on effects
- a boost in Kangaroo Island's GRP of around 16 per cent
- the generation of 234 ongoing FTE jobs (163 directly and 71 from flow-on effects)
- the generation of a further 20 FTE jobs at the state level, and 14 at the national level, resulting in a total of 267 jobs generated
- the generation of annual household income of around $16.2 million on Kangaroo Island, of which $12.4 million is direct and $3.9 million is from flow-on effects.

At the current rate of economic growth in South Australia, it would take nearly 30 years to match the impact of the proposed KI Seaport on the Kangaroo Island economy.

ADDITIONAL BENEFITS

The development of the KI Seaport would generate the following additional economic benefits for Kangaroo Island:

- a population increase conservatively estimated at more than 330
- increased demand for new housing, with 100 extra homes being required
- an increased council rate base as a result of the higher capital value of the plantation forest estates
- increased state government expenditure on the Island, including on government services
- the broadening of the Island's economic base, currently dominated by seasonal agriculture and tourism, to year-round economic activity associated with plantation forestry
- increased job security and wages.

OTHER USES OF THE KI SEAPORT

The KI Seaport could also be used, without significant modification, to export and import containerised agricultural commodities and inputs. This is because:

- the port will have around 80 per cent excess capacity, as timber ships would use the wharf for only 30 to 75 days a year.
- it would be able to accommodate a wide range of ship types as it would be designed to accommodate vessels up to Panamax-size
- fees would be based only on the use of the port and would not require contributions to the initial capital cost of its construction.

Should other uses of the port eventuate, they would be the subject of separate assessment and approvals processes that would be the responsibility of the individual proponents.

COST BENEFIT ANALYSIS

The cost benefit analysis shows the development at Smith Bay represents a better (i.e. more efficient) outcome for Kangaroo Island than the next best alternative (i.e. the base case), which would be to develop a similar facility at Cape Dutton. The net present value of the Smith Bay proposal is $118.6 million; the ratio of net benefits to net costs is 2.2, which means every $1.00 of net costs would generate $2.20 of net benefits; and the internal rate of return is 68 per cent.

TRAFFIC AND TRANSPORT

KEY ISSUES

The key issues associated with transport of timber products from plantations to the KI Seaport are:

- community safety in relation to increased traffic volumes on roads
- impacts on social amenity caused by increased traffic noise and dust
- fauna deaths as a result of result of increased traffic
- degradation of roads and related transport infrastructure from additional use.

METHODOLOGY

The traffic impact assessment is informed by a number of studies, including:

- an assessment of the road conditions
- a comparative analysis (including an ecological assessment) of a number of options to define the preferred route to transport timber products to Smith Bay
- an assessment of road safety practices and policies to apply to the timber haulage operation.

These studies have been supplemented by extensive discussions with key stakeholders, including the Kangaroo Island Council, the Department of Planning, Transport and Infrastructure (DPTI), and the KI Road Safety Committee.

EXISTING ENVIRONMENT

The existing volume of traffic on the roads between the plantation estates and Smith Bay is considered, generally, to be very low. The volume is highly seasonal, with significantly more traffic in summer, reflecting the influx of tourists. Heavy vehicles account for approximately 15 per cent of all traffic.

Sealed roads on the transport route are generally in good condition. Of the 16 unsealed roads that may be used to haul timber products, most were assessed as being in good condition, five as being in moderate condition and two as being in poor condition. Twenty of the 30 road junctions required vegetation trimming to improve sight distance, and better signage.

In the five years to 2016 there were five fatal road crashes on the Island, and a total of 82 other serious and minor crashes. There are no statistics available for heavy vehicle crashes on Kangaroo Island.

Commercial and recreational fishing occurs in the vicinity of Smith Bay. The nearest ports or boat ramps from which commercial and recreational fishers operate are Kingscote and Emu Bay, which are approximately 20 km and 10 km east of Smith Bay respectively. Beach launching of boats at Smith Bay is possible but occurs infrequently. Smith Bay itself is used occasionally for recreational boating and fishing, and two commercial fishers operate in Smith Bay from time to time.

ASSESSMENT OF POTENTIAL IMPACTS

VEHICLE MOVEMENTS

During the construction phase, the increase in traffic (up to about 10 vehicle movements a day over the 15-month construction period) is likely to be indistinguishable from existing volumes.

During the operational phase, heavy vehicle movements are likely to reach a daily maximum of about 130 and an average of about 85. The proportion of heavy vehicles using the roads would increase from the existing 6 to 15 per cent up to approximately 11 to 22 per cent near the major population centres, and up to 28 per cent on Playford Highway.

ROAD CONDITION IMPACTS

The use of heavy vehicles on unsealed roads is likely to result in increased surface wear, including rutting, potholing and corrugations. Well-drained roads would suffer less wear than those which had simply been graded rather than formed and cambered to shed water efficiently.

ROAD SAFETY IMPACTS

The KIPT timber haulage fleet is expected to travel a maximum of about 6.6 million kilometres a year, so may be expected (statistically) to be involved in about 6.5 (non-fatal) accidents in that period – so the Island's existing crash statistics would be unlikely to change significantly.

KIPT (with the agreement of DPTI and the Kangaroo Island Council) would implement management and mitigation measures as necessary to reduce the potential for accidents to a level as low as is reasonably achievable.

ECOLOGICAL IMPACTS

The timber haulage operation would require some native vegetation clearance to upgrade roads to a suitable standard. The extent of clearing would be determined in accordance with road safety standards, in consultation with relevant authorities and with the appropriate approvals would be obtained which may include approvals under the EPBC Act, as well as approvals from DPTI and the Kangaroo Island Council.

While the timber haulage operations would increase the number of fauna deaths, the existing local and tourist traffic would remain the most significant cause of roadkill.

The movement of heavy vehicles on unsealed roads would increase dust deposition on vegetation and fauna habitat but the impact would be confined to the immediate vicinity.

SOCIAL IMPACTS

Average noise levels associated with road transport would increase along all roads when haulage operations began. Levels are expected to increase marginally (by less than 3 dB). along major roads but more significantly (about 6 dB to 12 dB) along lesser-used roads.

Peak noise levels (the level generated by a single truck passing a receiver) is not expected to be any greater than at present.

Results of the noise assessment indicate that the predicted levels would comply with the DPTI Road Traffic Noise Guidelines along the transport route.

MARINE TRAFFIC IMPACT ASSESSMENT

During construction the expected small number of vessels arriving at Smith Bay is considered unlikely to materially impact existing vessel traffic and routes. Dredging operations are likely to require restricted access within 200 metres of the dredging barge for two months, which is considered to be a minor impact.

During the operational phase up to 20 to 25 Handymax vessels may visit the KI Seaport during the first three or four years of operations, followed by up to eight to 10 larger Panamax vessels a year as the operation changed to woodchips. This represents a minor increase in the 2000 vessel movements in South Australia each year and would have no material effect on the volume of existing traffic.

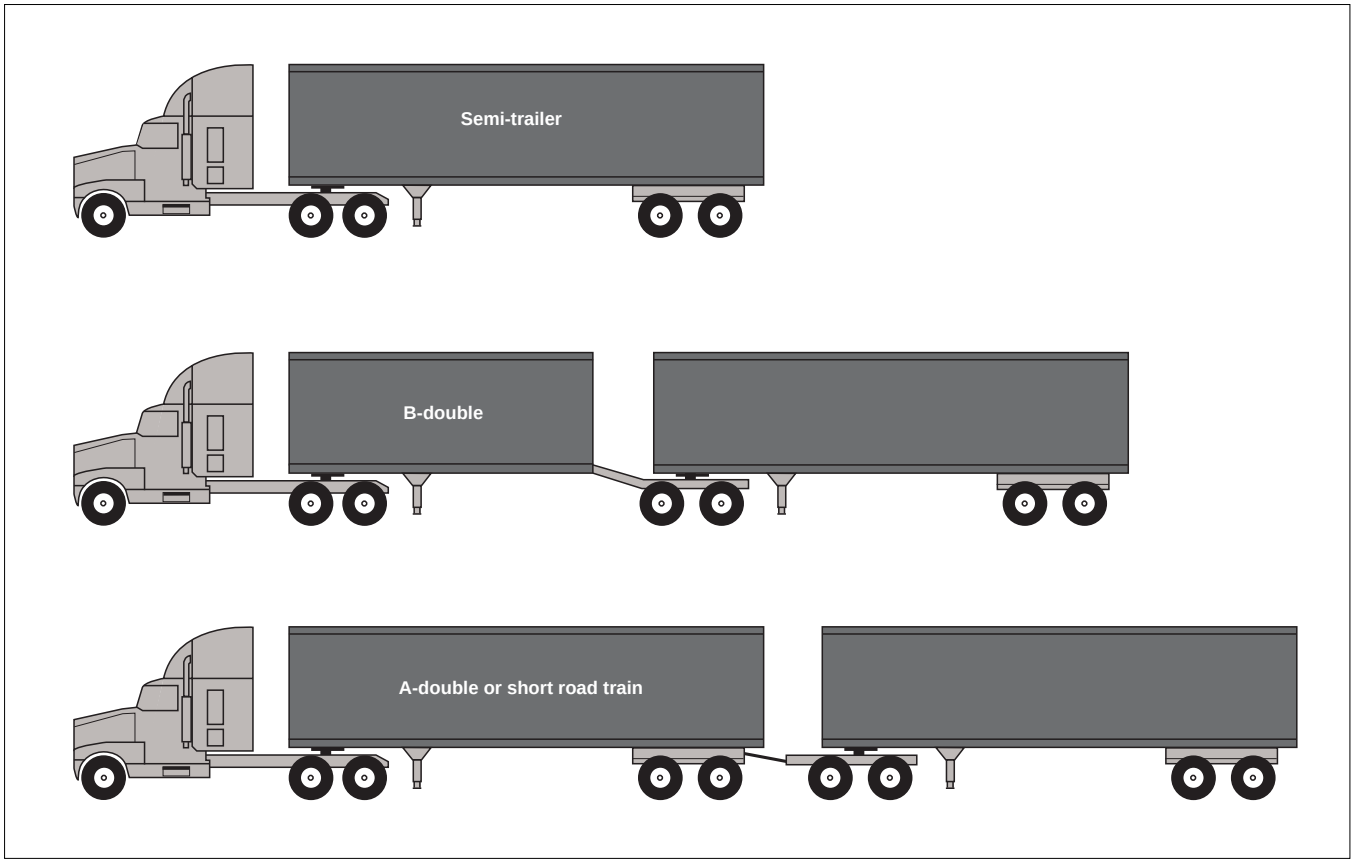

FIGURE 8 ILLUSTRATIVE DEPICTION OF VEHICLES BY SIZE AND TYPE

MANAGEMENT AND MITIGATION MEASURES

ROAD TRAFFIC AND TRANSPORT

Barges would be used at every opportunity rather than roads to transport bulky materials to Smith Bay.

KIPT would prefer, with the approval of the Kangaroo Island Council and the South Australian government, to implement three strategies to manage impacts associated with transport on public roads:

- the use of high-productivity A-double trucks to halve the number of vehicle movements (see Figure 8)
- a defined transport route to offer significant advantages in terms of traffic and road management and safety. (upgrades would be required to enable the preferred route to accommodate high-productivity vehicles)
- a set of road safety guidelines developed by the University of Adelaide's Centre for Automotive Safety Research for KIPT to improve the safety of the timber haulage operations, through safer roads and speeds, driver competency and training and in-vehicle technological aids.

MARINE TRAFFIC

A Marine Activity Zone (MAZ) would be prescribed for the Smith Bay site during construction to warn the public to avoid a clearly defined area to reduce navigational risks.

Temporary exclusion zones would also be established around offshore infrastructure when vessels were berthed at the KI Seaport. These would require third-party vessels to remain at least 50 metres from the wharf face and at least 25 metres from the vessel.

Signs on the wharf, causeway and onshore infrastructure would advise operators of third-party vessels of the exclusion zone requirements.

SOCIAL

KEY ISSUES

The key issues associated with the effects of the KI Seaport on the Kangaroo Island community are:

- the economic opportunities resulting from a sustainable forestry industry
- a potential rejuvenation of the western end of the Island, and Parndana in particular
- the projected population growth, particularly the arrival of skilled workers and their families
- concerns about the capacity of some community services and housing to cope with the projected population growth.

METHODOLOGY

A baseline profile of the existing social environment was prepared using a variety of sources, including data from the ABS and other government departments and agencies, other public sources of information about local services, and technical reports prepared for the Draft EIS. The assessment also draws on stakeholder feedback received during the preparation of the Draft EIS.

EXISTING ENVIRONMENT

DEMOGRAPHY

Kangaroo Island's population is expected to grow by 2031 to an estimated 5250 from the 2016 figure of 4700, excluding the projected influx from the KI Seaport development.

The Island has a relatively old and ageing population, which is forecast to become more pronounced over the coming decades, with the working age population (15 to 64 years) expected to fall by almost 9 per cent, and the number 65 years or older expected to grow by 123 per cent.

HOUSING AND ACCOMMODATION

Sixty two per cent of the 3150 private dwellings are occupied, compared with 87 per cent occupancy in South Australia overall. Housing on Kangaroo Island is more affordable than elsewhere in the state, but building and repair costs are greater.

COMMUNITY HEALTH AND WELLBEING

The Island has a network of established community service providers, including Kangaroo Island Community Education, the Kangaroo Island Health Service and the Kangaroo Island Community Health Centre at Kingscote.

ASSESSMENT OF POTENTIAL IMPACTS

EMPLOYMENT

The KI Seaport development is expected to create 234 full-time equivalent (FTE) jobs over the first five years of operations. The additional workforce would introduce a variety of new occupations and skills, which are likely to significantly benefit the Kangaroo Island community. Opportunities for Kangaroo Island residents are expected to include training and education opportunities leading to better paying jobs in a new industry, full-time stable employment and the option of finding Island-based employment, as well as the potential to reduce the under-employment rate.

POPULATION GROWTH

There are unlikely to be sufficient skilled workers on Kangaroo Island to fill the new positions. Consequently, at least 60 per cent of the workers (140 FTE jobs) would be recruited from the mainland, increasing the Island's population by an estimated 330.

The population growth generated by workers and their young families would help offset the aging population and the forecast decline in the working age population, benefitting the Island considerably by providing a critical mass, helping the island retain marginal private and public services.

HOUSING AND ACCOMMODATION

It is expected that the accommodation needs of the construction workforce, consisting of no more than 15 workers at any one time, would be met by existing short-term housing.

During the operational phase, however, there would be an increased demand for permanent housing to accommodate the new workforce employed directly on the plantation estates, and in flow-on sectors. It is estimated that an additional 100 homes may be needed.

Increased job security and wages is likely to improve access to finance opportunities, by improving the liquidity of the housing market (increased demand), whilst reducing the inherent risk associated with lending for housing on Kangaroo Island. Those employed in the new industry are likely to present as less risky borrowers, as the majority of jobs will be full-time and not seasonal in nature, injecting an additional $16 million per annum in household income, into the Kangaroo Island economy. Flow on effects of a robust economy include a stronger housing market, further reducing home finance risk for both borrowers and lenders alike.

COMMUNITY WELLBEING

The population growth should improve the viability of some essential community services such as the school system, which has seen a long-term decline in enrolments. However, some services (e.g. medical and early learning centres) would probably require the allocation of additional resources to meet demand.

The population growth is also likely to benefit a number of volunteer and community groups, such as the Country Fire Service and sporting and social clubs, all of which depend on volunteers, whose numbers have declined as the population ages.

MANAGEMENT AND MITIGATION MEASURES

SKILLS FORMATION

The State Government has committed to spending $100 million to create 20,000 new places in vocational education and training in South Australia over the next four years. A portion of these funds could be accessed to train the forestry workforce.

HOUSING

State government agencies and the Kangaroo Island Council recognise the long-term demand for housing as an important issue. The Office of the Commissioner for Kangaroo Island has developed a management plan to respond to housing demand, in consultation with the agencies.

KIPT would assist, where it could, and sees benefit to the company and the community in having a settled resident workforce, living and working permanently on Kangaroo Island.

VISUAL

KEY ISSUE

The key issue is how the proposed development would affect the existing visual amenity of Smith Bay, particularly for neighbours with views of the area.

METHODOLOGY

The assessment considered potential visual impacts during both the construction and operational phases of the KI Seaport. Two methods of assessment were used:

- an evaluation of landscape character and visual impact based on an independent Landscape Sensitivity Analysis (conducted by Scenic Solutions)
- three-dimensional (3D) renderings of scenery that would be seen from specific viewpoints for the 'before' and 'after' view of Smith Bay.

EXISTING ENVIRONMENT

LANDSCAPE QUALITY

The Smith Bay site is almost totally cleared of native vegetation and is now relatively degraded pasture.

The presence of Yumbah's abalone farm with sheds, vehicles, high fences and buildings, and the remnants of a previous land-based abalone farm, creates an industrial-like landscape, which will be extended with KIPT's proposed infrastructure.

SENSITIVE RECEIVERS

The receivers at Smith Bay who would be sensitive to changes in visual amenity within Smith Bay are:

- nearby residences, including Molly's Run, which also provides tourist accommodation
- Yumbah Aquaculture, which promotes an image of operating in a pristine coastal environment
- elevated locations within the local area with views of the site and associated coastline
- vehicles travelling on North Coast Road, particularly those that approach from the east, where there are views of Smith Bay from elevated locations
- small recreational vessels that use Smith Bay.

The Crown and KIPT own the vacant land (previously used for grazing) directly west of the study area.

ASSESSMENT OF POTENTIAL IMPACTS

LANDSCAPE CHARACTER IMPACTS

Although the study area is highly disturbed, the KI Seaport would change its visual amenity. The elevations and extent of structures would change significantly, and the proposed development would be visible throughout Smith Bay. The visual amenity would also change when ships were in port.

Scenic Solutions considered that the proposed development would extend the existing 'industrial-like' character of the land-based abalone farm along the foreshore landscape, which would further reduce landscape quality. Scenic Solutions considered that the visual impact to the foreshore area would be acceptable in a regional context, as:

- Smith Bay is a 5-km-wide, open, north-facing bay
- Smith Bay comprises less than two per cent of the north coast of Kangaroo Island
- the study area is on highly disturbed coastline between the higher-quality sections of the coast
- Smith Bay is largely inaccessible and would be seen by relatively few people.

VISUAL AMENITY IMPACTS

Figure 9 shows the before and after representation of the visual impact from the closest residential property, located on the northern side of North Coast Road, south-west of the site. The rendering shows the development would add to the existing visual impact of Yumbah Aquaculture's operations, which currently dominate the landscape.

MANAGEMENT AND MITIGATION MEASURES

Mitigation measures would be implemented to soften and minimise visual amenity impacts as much as practicable, including establishing buffer revegetation plantings to screen selected viewpoints, and selecting materials and colours to blend with the surroundings, be low in reflectivity, and complement the surrounding landscape.

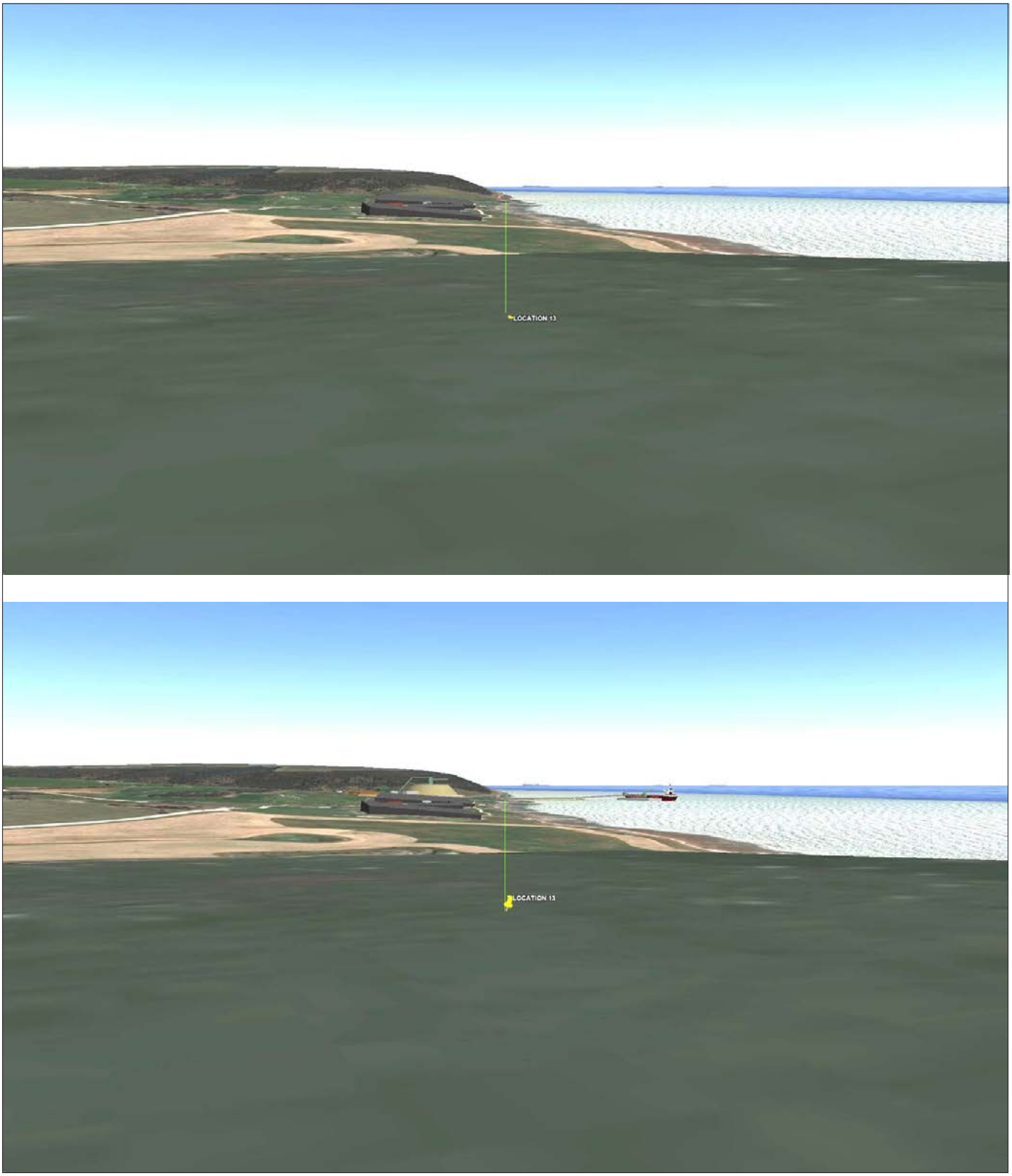

FIGURE 9 BEFORE AND AFTER REPRESENTATION OF THE OBSCURED VISUAL IMPACT OF THE PROPOSED KI SEAPORT FROM AN ELEVATED LOCATION TO THE EAST

HERITAGE

KEY ISSUES

Key issues associated with heritage are potential impacts on items of non-Aboriginal heritage value, such as shipwrecks, and Aboriginal artefacts and culturally significant sites.

METHODOLOGY

The assessment methodology included:

- a desktop assessment of relevant databases and literature
- reviewing the Kangaroo Island Council Development Plan
- consultation with a range of stakeholders
- desktop assessments by a marine archaeologist and cultural heritage consultants.

EXISTING ENVIRONMENT

There are no listed Aboriginal heritage sites, under the *Aboriginal Heritage Act 1988*, within the study area.

A search of the South Australian Heritage Places Database found no state or local heritage items listed within the study area.

The underwater cultural heritage assessment reported four shipwrecks (*Chum*, *Vectis*, *Ruby* and *Cookaburra*) in the vicinity of Smith Bay. None of the four sites is listed as 'found', indicating that the exact locations of the shipwrecks are unknown.

There are currently no active native title claims or Indigenous Land Use Agreements (ILUAs) held over Kangaroo Island.

ASSESSMENT OF POTENTIAL IMPACTS

The Smith Bay site is highly disturbed, having been cleared of virtually all native vegetation, cultivated and grazed for over 100 years. Parts of the site were used for land-based aquaculture. Any Aboriginal heritage sites or items would have been highly disturbed during cultivation by heavy machinery, however an Aboriginal heritage site still may exist at the site.

The proposal would have no impact on the heritage significance of listed heritage places as none are located on the Smith Bay site.

The review of historical shipwreck records indicated that the likelihood of material from any of the wrecks being within the study area is low. However, it is possible that heritage material, particularly associated with the *Chum*, may lie on the sea bed in Smith Bay.

MANAGEMENT AND MITIGATION MEASURES

A Heritage Management Plan would be developed and implemented during construction (including dredging) to ensure that workers remained on the lookout for heritage items, particularly during earthmoving and excavation activities. The Plan would prescribe the procedures to be followed in the event of potential heritage items being discovered.

PART 4: IMPACTS, RISKS AND COMMITMENTS

RISK MANAGEMENT

INTRODUCTION

A series of risk assessments were undertaken to identify risks associated with the proposed development and then assess the significance of each risk. Risk profiles were developed to separate minor risks from major risks, which facilitated the evaluation, and subsequent mitigation strategies and management methods recommended.

METHODOLOGY

KIPT has adopted a risk management framework aligned with AS/NZS ISO 31000:2009 to manage the risks associated with the project. The risk assessment was undertaken via a semi-quantitative risk workshop in two stages: before the impact assessment studies commenced, and after their completion.

The risk assessment methodology:

- identified the range of activities involved with the project
- identified potential hazards (environmental aspects) associated with each activity that may potentially result in environmental impacts
- assessed the most likely consequences of each potential impact and the likelihood of the impact occurring to provide an inherent (or potential) risk before studies were completed or controls implemented
- identified appropriate studies or management measures where inherent levels of risk were considered to be unacceptable
- assessed the level of residual risk after the completion of studies and/or implementation of management measures.

ASSESSMENT OUTCOMES

In total, 63 inherent risks were identified. Approximately one-third were identified as requiring additional information to clarify the risk and/or the implementation of appropriate management measures to mitigate the level of risk.

After consideration of the additional information acquired during the impact assessment process, and (if required) the implementation of appropriate management controls, all residual risks were reassessed as being acceptable and as low as reasonably practicable (ALARP).

These outcomes were achieved by considering the outcomes of the impact assessment process, design modifications, alterations to construction methods, and by KIPT committing to the implementation of appropriate environmental management and monitoring plans.

The process for implementing and tracking the management controls identified in the risk assessment is presented in the Chapter 26 – Environmental Management Framework.

ENVIRONMENTAL MANAGEMENT FRAMEWORK

IMPLEMENTATION OF MANAGEMENT MEASURES

The Environmental Management Framework (EMF) provides an overarching strategy for managing potential environmental impacts during the construction and operation of the KI Seaport.

All construction and operational activities at Smith Bay would ultimately be managed through the development and implementation of a CEMP and an OEMP, respectively. The overall goals of the CEMP and OEMP would be to avoid, mitigate, manage and/or control any potentially adverse impacts of the development on the physical, biological, socio-economic environment.

The EMF also outlines the procedures that would be followed when operations ceased. A detailed Rehabilitation and Decommissioning Plan would be developed before the port facilities were decommissioned and the site was shut down.

It was considered that all inherent environmental risks associated with the proposed development could be managed to acceptable levels by implementing appropriate management controls and/or program of offsets, or were proved to be low or non-existent through a rigorous impact assessment process.

KIPT'S COMMITMENTS

The KI Seaport would be subject to the EMF and associated CEMP, OEMP and specific management plans. Management measures may be further refined or amended as a result of continuous improvement, technological advances or changes to regulatory frameworks.

The explicit commitments associated with the KI Seaport, and to be delivered by KIPT, are provided in Chapter 27 – Commitments, of the Draft EIS main report. These commitments may be further refined as the assessment process concludes.

ABBREVIATIONS

Abbreviation	Definition
ALARP	as low as reasonably practical
ANZECC	Australian and New Zealand Environment and Conservation Council
AVG	abalone viral ganglioneuritis
BDSA	Biological Databases of South Australia
CASS	Coastal Acid Sulfate Soils
CAZ	Contractor Activity Zone
CEMP	Construction Environmental Management Plan
DAC	Development Assessment Commission
DAWR	Department of Agriculture and Water Resources, Australian Government
dB	decibel
DoE	Department of the Environment, Australian Government
DoEE	Department of the Environment and Energy, Australian Government
DPTI	Department of Planning, Transport and Infrastructure, Government of South Australia
Draft EIS	Environmental Impact Statement
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*, Australian Government
FTE	full-time equivalent
GRP	gross regional product
ILUA	Indigenous Land Use Agreement
KIDP	Kangaroo Island Development Plan
KIPT	Kangaroo Island Plantation Timbers
LAT	lowest astronomical tide
MAZ	Marine Activity Zone
m BGL	metres below ground level
MNES	matters of national environmental significance
NRM	Natural Resource Management
NTU	nephelometric turbidity units
OEMP	Operational Environmental Management Plan

Abbreviation	Definition
PBS	Performance Based Standard
RAM	range-dependent acoustic model
SARDI	South Australian Research and Development Institute
SWAN	Simulating Waves Nearshore
TDS	total dissolved solids
TSS	total suspended solids