ADDENDUM

TO THE SMITH BAY WHARF DRAFT EIS

PREPARED FOR KANGAROO ISLAND PLANTATION TIMBERS BY ENVIRONMENTAL PROJECTS

OCTOBER 2019

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ADDENDUM

TO THE SMITH BAY WHARF DRAFT EIS

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PREFACE

The major development assessment process in South Australia provides a framework for the orderly and systematic evaluation of proposed major developments that may have important environmental, social or economic impacts. The process has been designed to allow and encourage projects and developments to be modified in order to address comments and feedback received from government agencies and members of the public. It has always been KIPT's intention to respond constructively and comprehensively to feedback.

A number of the submissions received as a result of the public consultation period for the Smith Bay Wharf Draft Environmental Impact Statement (EIS) expressed concerns about the potential for the development to impact on the marine environment of Smith Bay during its construction and operation. Concerns focused on the solid causeway's impact on coastal processes, and the impact of dredging. New information not previously available to KIPT was also presented regarding the effects of Yumbah Aquaculture's discharge waters, which are up to 2.0ºC warmer than the marine waters of Smith Bay.

KIPT believes most of these concerns would be addressed by providing additional information to the EIS, and that the risks posed by these factors could be managed or eliminated by applying appropriate protocols, safeguards and engineering solutions. Nonetheless, KIPT commissioned an engineering review of the proposed design to determine whether there was an alternative that would eliminate these concerns altogether.

A number of re-design options were considered. KIPT has now agreed to vary the design by abandoning the dredge and causeway components in favour of an open-piled jetty, which would extend approximately 650 metres out to sea and create a berth face at the natural –13.8 metre depth contour.

In reaching this decision, the KIPT Board was particularly mindful that Yumbah Aquaculture wrote in its submission that "*[t]he causeway is the most concerning physical feature of the seaport for Yumbah.*"[1] because it would compromise the oceanic conditions [in Smith Bay] upon which Yumbah claims the abalone are so reliant. Yumbah also stated, clearly and unambiguously, that "*[t]he only option to protect coastal currents is an open-piled jetty with the berth pocket extended further offshore.*"[2]

The decision to abandon the solid causeway in favour of an open-piled jetty has addressed all of the concerns suggesting that the infrastructure would adversely affect coastal processes in Smith Bay.

Similarly, the decision to extend the jetty further out to sea, thereby avoiding dredging altogether, eliminates all of the risks to land-based aquaculture associated with elevated suspended sediment loads, the mobilisation of toxicants, pollutants or other contaminants, the risks of elevated pathogen levels and changes in the nutrient status of the waters of Smith Bay.

With these design changes, KIPT trusts all stakeholders will now agree there will be no harm to water quality in Smith Bay and no material risk to Yumbah, and therefore, no credible argument that both operations cannot co-exist.

Keith Lamb
Managing Director
Kangaroo Island Plantation Timbers

[1] Smith Bay Wharf Draft Environmental Impact Statement Response by Yumbah Aquaculture, p. 30.

[2] Ibid, p. 83.

01. INTRODUCTION

The Addendum to the Smith Bay Wharf Draft Environmental Impact Statement (the 'Addendum') summarises changes to the Smith Bay Wharf (now referred to as the 'KI Seaport') in response to feedback received during the public consultation period. The assessment of these design changes and their potential impacts are discussed against the relevant Development Assessment Commission (DAC) guidelines for the Environmental Impact Statement (EIS).

1.1 PROPOSAL OVERVIEW

Kangaroo Island Plantation Timbers Ltd (KIPT) have put forward a proposal to build and operate a deep-water port at Smith Bay. From this port KIPT would export logs and woodchips from Kangaroo Island to existing markets in Asia. KIPT's current standing timber assets on the Island exceed 3.6 million tonnes and are expected to grow to at least 5.4 million tonnes by the time of harvest.

The KI Seaport has been designed to accommodate Panamax-class vessels of up to 60,000 deadweight tonnes (DWT), which have a draft of up to 11.75 metres. Based on current plantation species and yields, KIPT estimates there would be between 10 and 20 shipments a year in perpetuity, which means the facility would be used between 30 and 75 days per year for timber exports.

The KI Seaport would be available, if the appropriate approvals are obtained, to third parties for other cargo.

An overview of KIPT's operations and details of the original proposed development are presented in the Draft EIS, which was published in March 2019 and is available on the Department for Planning, Transport and Infrastructure (DPTI) website <https://www.sa.gov.au/topics/planning-and-property/land-and-property-development/building-and-property-development-applications/major-development-applications-and-assessments/proposals-currently-being-assessed/kangaroo-island-plantation-timber-port-at-smith-bay>.

The guidelines for preparing the environmental impact assessment, which were published in June 2017, are also available on the DPTI website <https://www.sa.gov.au/__data/assets/pdf_file/0015/312207/Final-Guidelines-for-KI-Plantation-Timber-at-Smith-Bay>. See Appendix A for those guidelines relevant to the Addendum.

Additional information can be found on the Smith Bay EIS website <http://smithbayeis.com> and KIPT's website <https://kipt.com.au>.

1.2 PUBLIC CONSULTATION AND SUBMISSIONS

The South Australian Minister for Planning released the EIS for public consultation from 28 March 2019 to 28 May 2019. Submissions were collated by DPTI before being forwarded to KIPT for consideration.

Copies of the submissions are available on DPTI's website <https://www.sa.gov.au/topics/planning-and-property/land-and-property-development/building-and-property-development-applications/major-development-applications-and-assessments/proposals-currently-being-assessed/kangaroo-island-plantation-timber-port-at-smith-bay>.

KIPT and the EIS study team are currently reviewing, assessing and considering the submissions. A formal Response Document, which will summarise KIPT's responses, will be submitted to the Minister for Planning ('the Minister') in due course.

1.3 PURPOSE OF THE ADDENDUM

In response to concerns expressed by government agencies, Yumbah Aquaculture and others, KIPT commissioned an engineering review of the offshore components of the proposed seaport. The Addendum outlines the proposed design changes and presents the rationale and assessment of the impacts against the guidelines for the EIS.

1.4 STATUS OF THE ASSESSMENT PROCESS

The Minister has advised KIPT that the Addendum will be made available for public consultation. The consultation process, the details of which will be announced by the Minister and conducted by DPTI, will give interested parties the opportunity to comment on the proposed design changes to the KI Seaport.

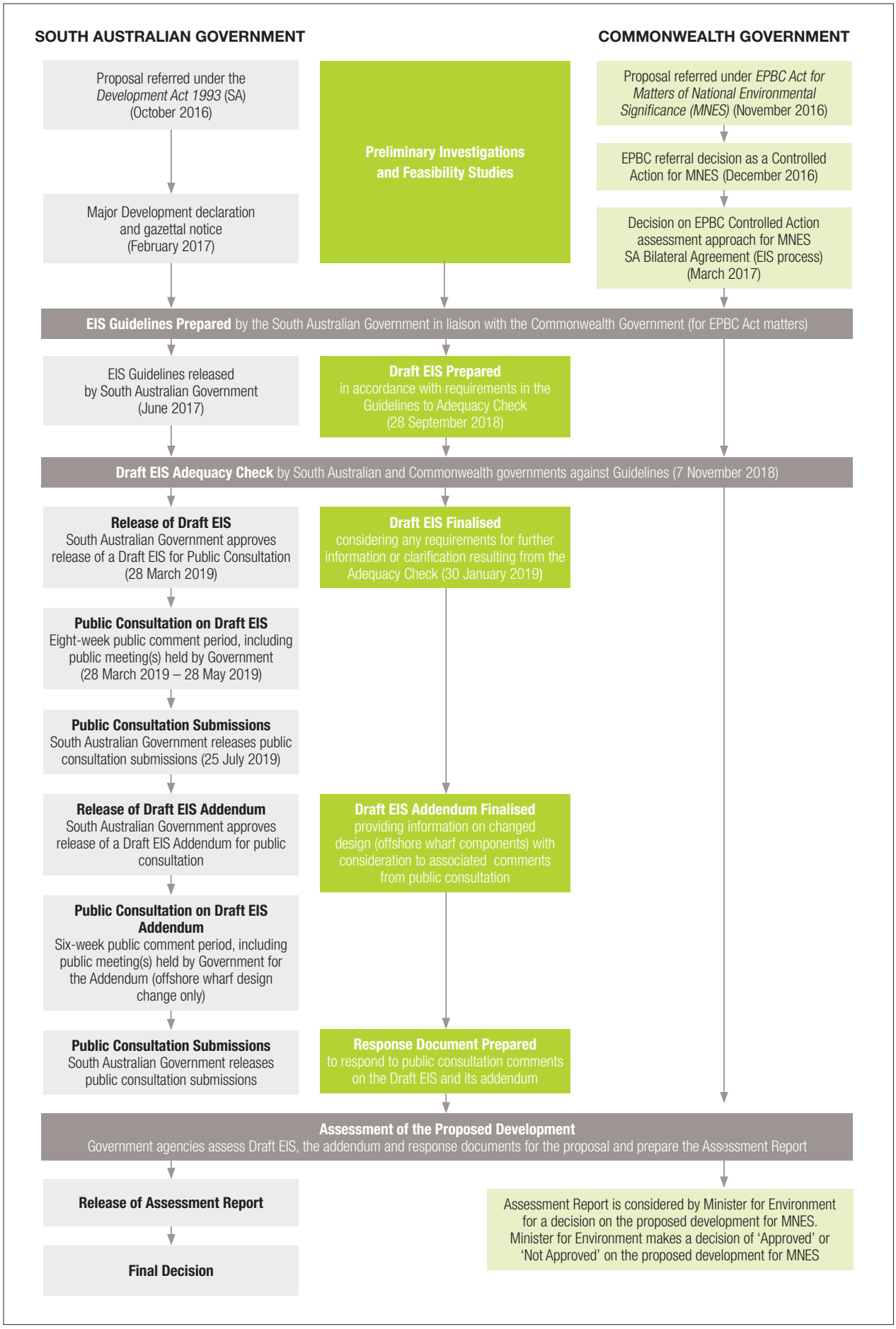

FIGURE 1-1 OVERVIEW OF THE ASSESSMENT PROCESS

DPTI officers have advised KIPT that no further comments will be accepted regarding other aspects of the proposed development at this time as these matters were fully canvassed in the public consultation period from March to May this year.

Figure 1-1 illustrates the assessment process and indicates the release of the Addendum document for public consultation before the Response Document is finalised.

1.5 PROGRESSION OF KI SEAPORT PROPOSAL

A summary of key milestones in the development of the proposed KI Seaport is presented in Table 1-1.

TABLE 1-1 KEY KIPT MILESTONES

Date	Milestone
December 2013	KIPT's site assessment and selection process is completed. Twelve separate sites evaluated, including three different options at two of the sites (Penneshaw and Kingscote); a total of 16 options evaluated. KIPT identifies an area at Smith Bay as the most suitable site on Kangaroo Island to develop a deep-water port.
February 2014	KIPT purchases 11.7 ha at Smith Bay.
2015	KIPT and New Forests Asset Management Pty Ltd (New Forests Asset Management), separately approach the SA Government with independent proposals to build a facility on Kangaroo Island to export their timber. Ongoing discussions occur throughout 2015.
19 December 2015	SA's Minister for Transport advises KIPT that the Government of South Australia will allow and assess only one port development proposal for Kangaroo Island.
October 2016	New Forests Asset Management agrees to sell its Forestry Investment Trust (FIT) estates and other assets on Kangaroo Island to KIPT including all its plantation land, standing timber and the Ballast Head site that New Forests proposed as an export facility.
21 October 2016	KIPT submits an initial concept plan to develop an export facility at Smith Bay to SA's Minister for Planning, requesting the proposal be declared a major development under s.46(1) of the *Development Act 1993*.
31 January 2017	KIPT and Mitsui Bussan Woodchip Oceania Pty Ltd (MWO) enter into a Memorandum of Understanding to create an exclusive marketing arrangement for timber products from Kangaroo Island.
14 December 2017	The Commonwealth Minister for the Environment and Energy declares the proposal a controlled action for the purposes of the *Environment Protection and Biodiversity Conservation Act 1999*.
16 February 2017	The Minister for Planning declares the Smith Bay proposal a major development.
12 April 2017	KIPT concludes the purchase of the Kangaroo Island FIT estate from New Forests.
6 July 2017	The Minister for Planning publishes guidelines for the EIS assessment, as defined by DAC.
19 September 2017	PF Olsen (Aus) Pty Ltd is engaged by KIPT to provide independent forestry management services to KIPT.
21 November 2017	KIPT and MWO enter into a binding five-year woodchip sale and purchase agreement, which provides that Mitsui will purchase up to 500,000 green tonnes per annum (tpa) of woodchip from KIPT on a free-on-board (FOB) basis or equivalent.
28 August 2018	Draft EIS submitted by KIPT to DPTI for Adequacy Check.
7 November 2018	DPTI (and referred agencies) completes adequacy check of the Draft EIS against the DAC guidelines.
30 January 2019	KIPT submits final Draft EIS to DPTI for public release. A number of printed books and electronic PDF copies of the documentation were delivered to DPTI for public distribution.
28 March 2019	Minister for Planning releases the Draft EIS for public comment.
28 March 2019 – 28 May 2019	Public consultation period (40 business days) including three public sessions at Kingscote and Parndana on Kangaroo Island and in the CBD of Adelaide.
25 July 2019	DPTI publishes all submissions received during the public consultation period on its website.
3 October 2019	Amended major development declaration published in the South Australian Government Gazette.
October 2019	SA Planning Commission confirms no variation to major development assessment guidelines.

02. DESIGN CHANGES

2.1 FEEDBACK ON THE SOLID CAUSEWAY AND DREDGING

The major development assessment process has been designed to allow and encourage proposed projects and developments to be modified in response to comments and feedback from government agencies and other interested parties. These comments are provided by way of formal submissions made to DPTI during a specified period of public consultation.

A number of the submissions expressed concerns regarding potential impacts of the proposed solid causeway on coastal processes and the potential impacts of dredging (initially proposed by KIPT to achieve a suitable basin depth at the pontoon berth face).

In its submission, Yumbah Aquaculture clearly expressed concerns that the indirect impact of dredging and the indirect impact of the proposed solid causeway would have an adverse impact on the marine environment of Smith Bay, and as a consequence, affect the viability of its on-land abalone aquaculture business.

The concerns expressed in submissions (regarding the solid causeway and dredging) are summarised in Table 2-1. The submissions that specifically deal with these two matters are presented in Appendix B.

TABLE 2-1 KI SEAPORT – CONCERNS RELATED TO SOLID CAUSEWAY AND DREDGING IN SUBMISSIONS RECEIVED

Solid causeway	Dredging
Interruption to natural coastal processes and the potential poor circulation/flushing of nearshore waters which may result in: • increased seawater temperatures • changes to currents and water flows • re-entrainment of Yumbah Aquaculture's outfall seawater into Yumbah Aquaculture's seawater intakes • escalation of water temperatures due to re-entrainment of heated aquaculture waste water • seagrass and seaweed wrack accumulation • impacts to water quality caused by wrack accumulation and decomposition • impacts to habitat connectivity • effects on longshore drift • turbidity, sedimentation plumes, resuspension of sediments • algal blooms • impacts to abalone health at Yumbah Aquaculture (from one or more issues listed). Direct loss of seagrass in causeway footprint. Indirect loss of seagrass through turbidity and sedimentation during placement of material during causeway construction. Potential impacts to native marine fauna associated with loss of seagrass. Suspended sediment from placing dredge material to construct causeway and resulting water quality impacts. Biosecurity risk creating an environment for pest species to colonise (rock armour).	Potential impact to abalone at Yumbah Aquaculture from suspended and re-suspended sediments in in-take waters. Direct loss of seagrass in dredge pocket footprint (clearance). Indirect loss of seagrass through turbidity effects (reducing light availability). Loss of seagrass, macro-algae and benthic fauna through sedimentation effects (smothering). Potential impacts to native marine fauna associated with loss of seagrass. Suspended sediment and resulting water quality impacts. Potential impacts to marine water quality from on-land dredge spoil dewatering (tailwater). Potential impacts to native marine fauna caused by impacts to water quality. Biosecurity risks (diseases, pathogens) with disturbance of sediment. Potential disturbance of undiscovered maritime heritage items.

2.2 KIPT'S RESPONSE

KIPT considered the concerns associated with dredging and the solid causeway could be managed and eliminated by applying appropriate controls, management measures, protocols and safeguards, as well as appropriate engineering solutions. Nonetheless, in response to the submissions, KIPT commissioned an engineering review of the proposed design to consider modifications that would reduce the impact of the dredge pocket and causeway. KIPT has now advised the Minister that the design of the in-water structures will be modified by:

- moving the berth face approximately 250 metres further offshore, to the approximate -13.8 metres (natural) seabed contour (see Figure 3-1), which will eliminate any need for dredging
- replacing the solid causeway with a suspended piled jetty so that the natural coastal processes will not be interrupted.

Section 3 of the Addendum details the revised design and assesses its potential impacts.

The changes have eliminated a number of the key issues that were identified in Chapter 8 of the Draft EIS. Specifically, the following matters are no longer relevant to the environmental impact assessment of the KI Seaport:

- dredging of the seafloor to deepen the berthing basin
- tailwater discharges
- mobilisation of sediments and creation of silt plumes during dredging operations and causeway construction
- the construction of a solid causeway approximately 250 metres into Smith Bay.

KIPT and the EIS study team have consulted the relevant State government agencies and the Department of the Environment and Energy (DoEE) regarding the design changes and any implications of these changes for the environmental impact assessment. These discussions are summarised in Table 2-2.

TABLE 2-2 GOVERNMENT AGENCY CONSULTATIONS ON THE DESIGN CHANGE

Department/Office	Agency	Specific discussions
Department of Planning, Transport and Infrastructure	Development Division – Planning and Development	Provision of design change detail in Section 4 of the Addendum for the no causeway, no dredging, piled jetty structure design.
Department of the Environment and Energy (Commonwealth)	Project Assessments West Section	Provision of design change detail in Section 4 of the Addendum for the no causeway, no dredging, piled jetty structure design. Whale strike predictions and impact assessment review in relation to the design change outlined in Section 4 of the Addendum. Underwater noise baseline data collection and predictive modelling assessment review in relation to the design change.
Primary Industry and Regions SA	Aquaculture	Review of predictive modelling and marine water quality impact assessment with consideration to the design change.
Primary Industry and Regions SA	Fishing	Review of predictive modelling and marine water quality impact assessment with consideration to the design change.
Primary Industry and Regions SA	Biosecurity	Discussion on biofouling aspects associated with the design change and the assessment outcome of 'no change' in risk profile of the proposal.
Environment Protection Authority	Science and Information – Environmental Science	Review of predictive modelling and marine water quality impact assessment with consideration to the design change.
Department for Environment and Water	Coastal Management Branch	Coastal processes predictive modelling assessment reviewed with consideration to the design change.
Department for Environment and Water	Native Vegetation Management Unit	Review of calculations of appropriate significant environmental benefit offsets for marine native vegetation clearances expected for the proposal with the design change.

03. REVISED DESIGN

3.1 CHANGES TO KEY PROJECT COMPONENTS

Chapter 4 – Project Description of the Draft EIS described the components of the proposed facility at Smith Bay. Changes to the offshore components are summarised in Table 3-1.

The revised design consists of a suspended deck (with no causeway), which is connected to a pontoon by a linkspan bridge. The pontoon would be held in place by restraint dolphins (i.e. piled steel structures that extend above the water level and are not connected to the shore) (see Figure 3-1).

The berth pocket would no longer require dredging. The berth face of the wharf would be positioned at a location where the natural depth of water safely accommodates Panamax-class vessels in a range of sea conditions.

In all other respects the KI Seaport design criteria remain unchanged.

TABLE 3-1 KI SEAPORT – CHANGES TO KEY OFFSHORE COMPONENTS

Description provided in Draft EIS	Change in response to public comments
Dredged berth pocket and dredged approach areas.	No dredged berth pocket or approach areas (and no on land dredge spoil management required).
Navigation aids.	No change to infrastructure, location varied.
Floating pontoon wharf with wharf furniture (fenders, bollards, kerbs, etc).	No change to infrastructure, location varied.
Restraint dolphins for restraint of pontoon.	No change to infrastructure, locations varied.
Mooring dolphin at either end of wharf for vessel head and stern lines.	No change to infrastructure, locations varied.
Linkspan bridge.	No change to infrastructure, location varied.
Approach (causeway and suspended deck).	Approach is a suspended deck (no causeway).
Tug mooring facility/pen.	No change to infrastructure, location varied.

FIGURE 3-1 REVISED DESIGN – 3D RENDER SHOWS THE SUSPENDED DECK, LINKSPAN BRIDGE, PONTOON AND SHIP

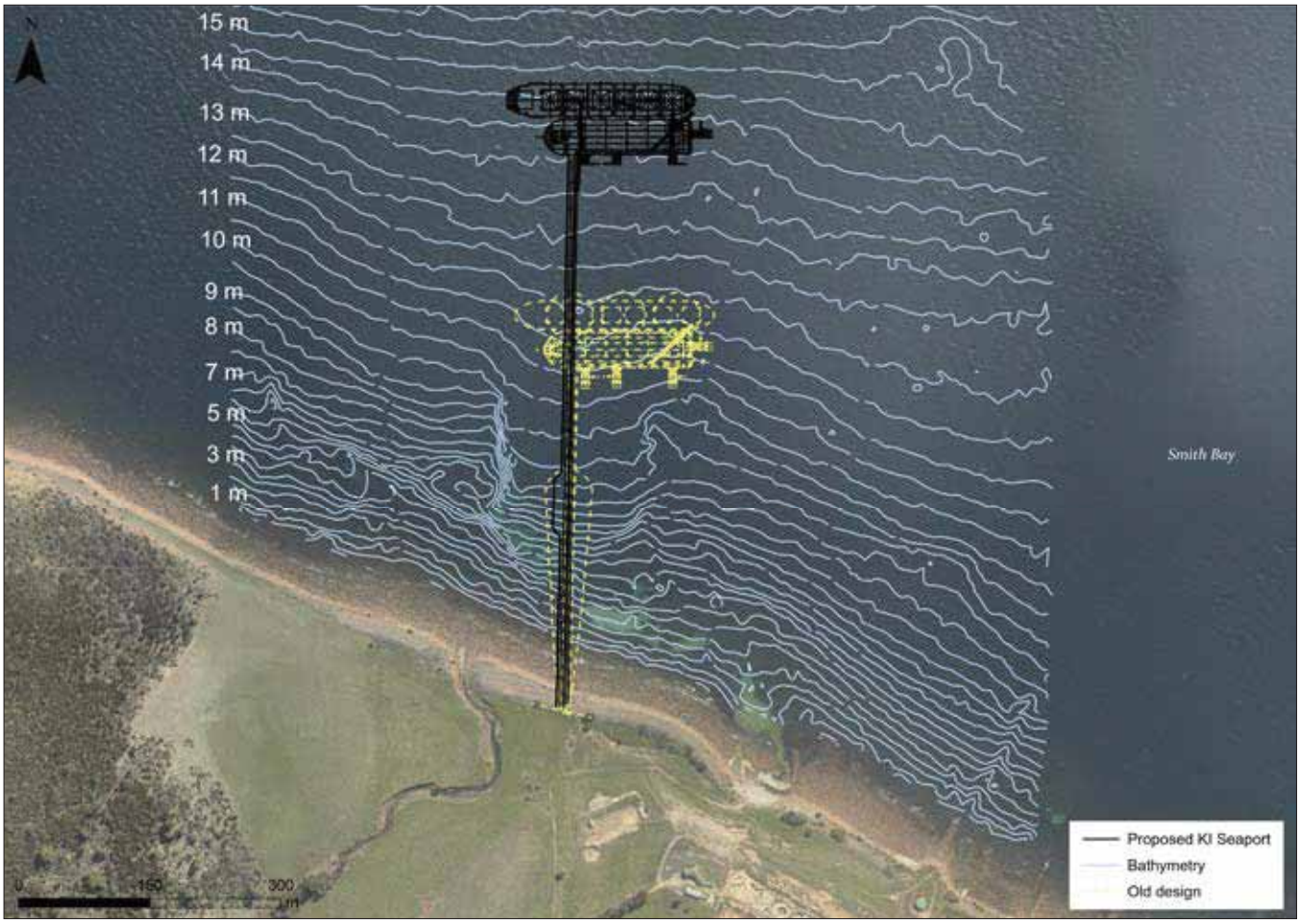

FIGURE 3-2 CONCEPTUAL LAYOUT OF THE KI SEAPORT INFRASTRUCTURE (OVERLAYING THE PREVIOUS DESIGN)

3.1.1 LAYOUT OF OFFSHORE INFRASTRUCTURE

The conceptual layout of the revised KI Seaport offshore infrastructure is shown in Figure 3-2.

3.1.2 BERTH POCKET

As mentioned above, the berth pocket associated with the wharf would not require dredging because the suspended piled jetty structure (approximately 650 metres in length) places the berth face of the pontoon where Panamax-class vessels could berth safely in a range of sea conditions. The factors which determine the depth of the berth pocket are summarised in Table 3-2.

3.1.3 APPROACH – SUSPENDED DECK STRUCTURE

The pontoon would be approached from land along a suspended deck (made of concrete and steel beams) on a suspended piled jetty substructure approximately 650 metres in length. A linkspan bridge would connect the pontoon to the suspended piled jetty. An indicative plan and elevation view of the concept design is shown in Figure 3-3.

TABLE 3-2 REVISED BERTH POCKET DEPTH CONSIDERATIONS (TO BE CONFIRMED DURING DETAILED DESIGN)

Parameter	Description
Maximum vessel draft	11.75 metres (Panamax – restricted draft)
Gross under-keel clearance	1.75 metres (Panamax – restricted draft)
Sea-bottom factors	0.3 metres
Minimum berth pocket water depth	13.8 metres

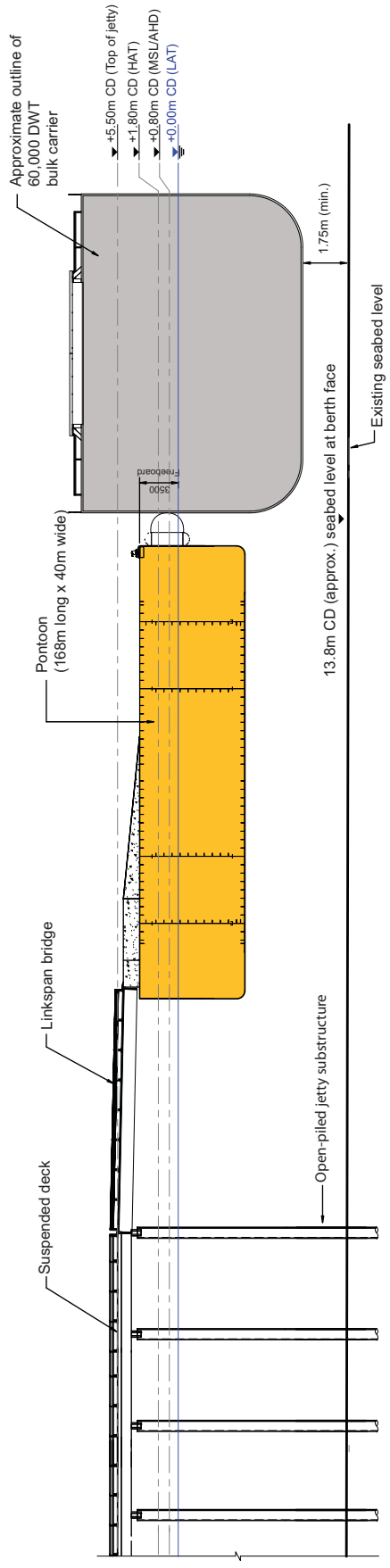

FIGURE 3-3 CONCEPTUAL DESIGN SHOWING SUSPENDED PILED JETTY AND LINKSPAN BRIDGE TO A PONTOON AND SHIP

The jetty would be formed using tubular steel piles approximately one metre in diameter, which would be driven into the seabed. Steel beams would be orientated perpendicular to the jetty alignment and be welded in place to connect pile groups. This structure would support longitudinal deck support members and a concrete roadway. The jetty piles would be placed approximately every 12 metres, and the finished deck level would nominally be five metres above sea level and five metres wide.

This conceptual design would be refined further during the detailed design phase (i.e. after planning approval).

3.1.4 PROJECT SCHEDULE

The KI Seaport schedule is being continuously revised as new information is considered by the project team. With the elimination of dredging (and the subsequent settling and dewatering that would have been required prior to causeway construction), it is expected that the projected construction timelines presented in the Draft EIS would be reduced.

Construction works would commence after all relevant primary and secondary approvals have been granted, with construction estimated to take 14 months, as shown in Table 3-3.

The use of a jack-up barge to undertake the marine piling works (mooring dolphins, barge restraint dolphins and the piled jetty substructure) would reduce the effects of bad weather on the in-water construction activities.

3.2 INFRASTRUCTURE CONSTRUCTION

3.2.1 CONSTRUCTION METHODOLOGY

Structural steelwork including the jetty, linkspan bridge, piles, mooring dolphins and barge restraint dolphins would be fabricated offsite and mobilised to Smith Bay by barge for assembly and installation. The construction sequence for the jetty would entail:

- driving steel tubular piles into the seabed
- installing steel headstocks over the driven piles and grouting the connection between the two components
- installing and grouting the precast concrete deck planks onto the steel headstocks.

All piling works would be performed from a jack-up (piling) barge fitted with a crawler crane and hydraulic hammer on the deck. This would be elevated above the water on four 1200 mm-diameter steel tubes so it would not be affected by the sea state during the piling process.

The use of a jack-up barge would eliminate the need for mooring anchor spread (anchors, heavy chain, etc.) which minimises the impact on seagrass. Other marine plant would use anchors appropriate to the seabed conditions.

The piles would be delivered to the jack-up barge by a transport barge (known as a ‘dumb barge’). Piles would be loaded onto the dumb barge, which would be towed to Smith Bay. The barge would be brought alongside the jack-up barge whenever a new pile was to be installed.

TABLE 3-3 INDICATIVE CONSTRUCTION TIMETABLE

Commencement day	Activity	Expected duration (approximate number of days)
Day 1	Construction of suspended piled jetty, including the deck and piling	309
Day 48	Onshore civil works (roads, pavements, services, offices, materials handling conveyors and commissioning)	364
Day 178	Marine construction works (i.e. installing restraint dolphins, mooring dolphins, etc.)	120
Day 298	Installation of pontoon and final pontoon finishing works including weather and/or interruption contingency	108
Day 406	Marine works completed	
Day 412	All construction completed	

An impact hammer would be used for the piling. Typically, piling would occur during daylight hours between 7 am and 7 pm, Monday to Saturday. The duration of hammering would be typically around 20 minutes per pile installed, with up to two piles installed per day. All piles installed beyond the low-water mark would be installed from marine plant (i.e. there would be no piling in-water from plant located onshore).

It is expected that piling work would begin at the middle of the suspended deck (approximately at the 300-metre chainage) so that work fronts could be established at both ends of the structure.

A portion of the suspended deck (comprised of approximately 50 to 60 piles) would be installed, and the steelwork and concrete planks would be assembled to provide a platform area for a crane to be lifted in position. The jack-up barge would then install more piles while the crane would continue to assemble the steelwork and concrete planks. This method ensures the crane, which would sit on the partially completed suspended deck, could perform work in both a northerly and southerly direction.

All piles would be prepared with an epoxy paint system (to prevent corrosion) before coming to site. Following installation, and as part of commissioning works, repairs to any paint damage would be undertaken manually using a paint brush (i.e. no blast or air paint methods would be used). To avoid the early onset of rust in the 'splash zone', it would be normal practice to clean the relevant area using hand tools and to apply a suitable industry-standard marine paint system.

The detailed design and refinement of the construction methodology would be completed after planning approval has been obtained.

3.2.2 MARINE ACTIVITY ZONE

The proposed Marine Activity Zone (MAZ), which is the footprint required for the on-water construction, is shown in Figure 3-4. The MAZ is a clearly defined area from which the public would be excluded, to reduce navigational risks during construction. Details of the activity zone would be provided to DPTI, and a Notice to Mariners would be issued advising other users of works that may affect the safe navigation of vessels.

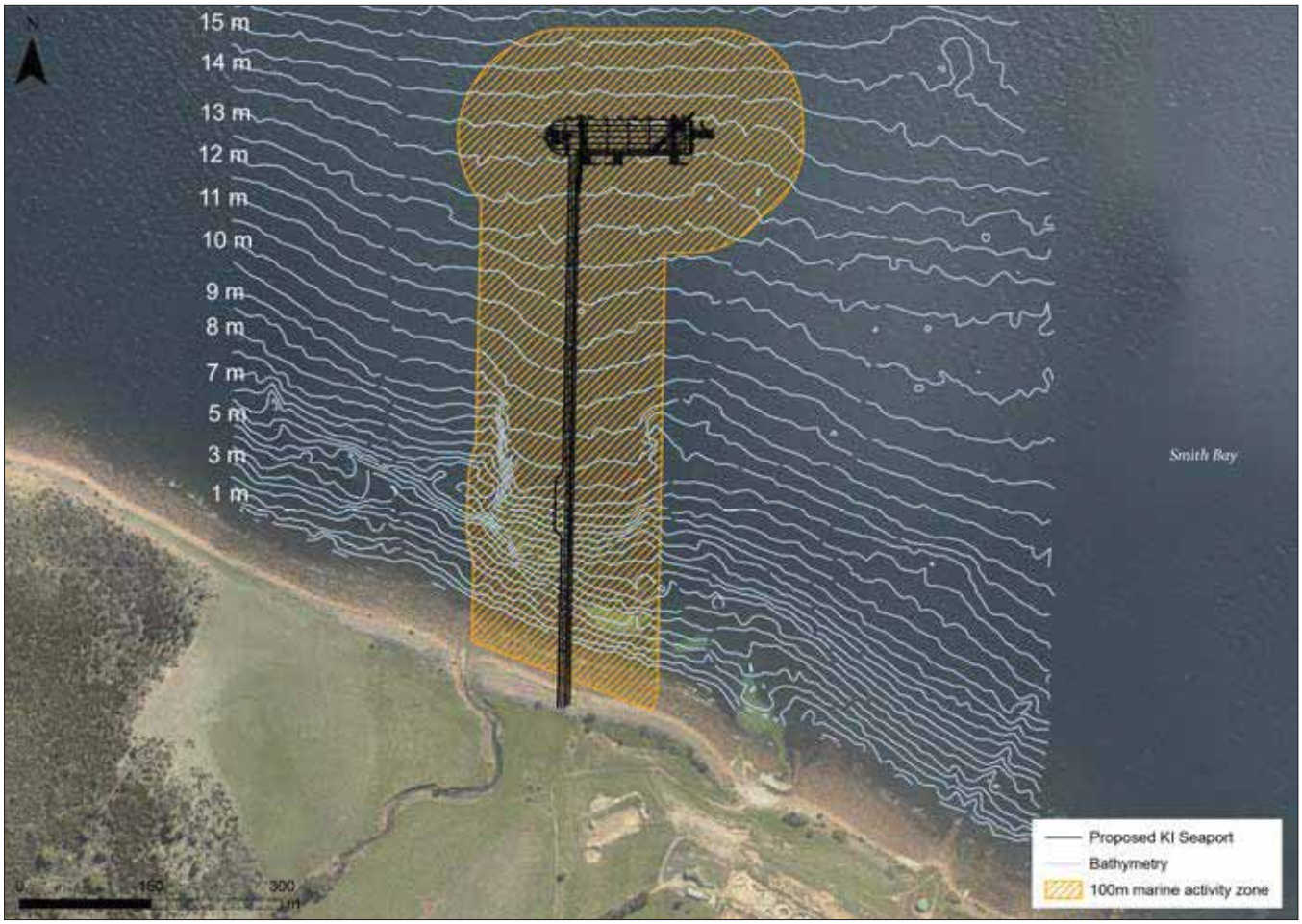

FIGURE 3-4 PROPOSED MARINE ACTIVITY ZONE

3.2.3 TIMING OF CONSTRUCTION

Construction would commence when all necessary primary and secondary approvals for construction have been obtained.

3.3 INFRASTRUCTURE OPERATIONS

3.3.1 CORROSION AND BIOFOULING MANAGEMENT

A marine paint system would be applied offsite to all steel elements of the jetty and other permanent piled structures (restraint dolphins, etc.) to maximise the life of the infrastructure. However, anti-fouling coatings would not be applied and, as a consequence, marine growth is expected on these structures. It is anticipated that the jetty would be periodically cleaned and re-painted to extend its life.

3.3.2 MATERIALS HANDLING – LOGS

The methods for transferring logs to the berth face and loading vessels remain unchanged (see Section 4.6.4 of the Draft EIS). However, the redesign means that trucks will need to travel further because the length of the approach to the pontoon will be increased.

3.3.3 MATERIALS HANDLING – CONVEYOR SYSTEMS

The materials handling systems for woodchips remain unchanged (see Section 4.6.4 of the Draft EIS). However, the conveyor system connecting the storage areas on land to the receiving vessel would be extended.

3.3.4 TEMPORARY EXCLUSION ZONE

Figure 3-5 shows the temporary exclusion zone that would be implemented when a vessel is berthed and during vessel loading. The extent of the exclusion zone has not changed.

3.4 INFRASTRUCTURE MAINTENANCE

The design life of the major elements of the proposed infrastructure was described in the Draft EIS (see Table 4-4 of Section 4.4. of the Draft EIS).

The jetty infrastructure maintenance program would focus on maintaining the painted surfaces of the marine structures in the tidal range to prevent corrosion. Serious degradation of the paint on the submerged steelwork is not expected as paint degradation is generally caused by exposure to the sun,

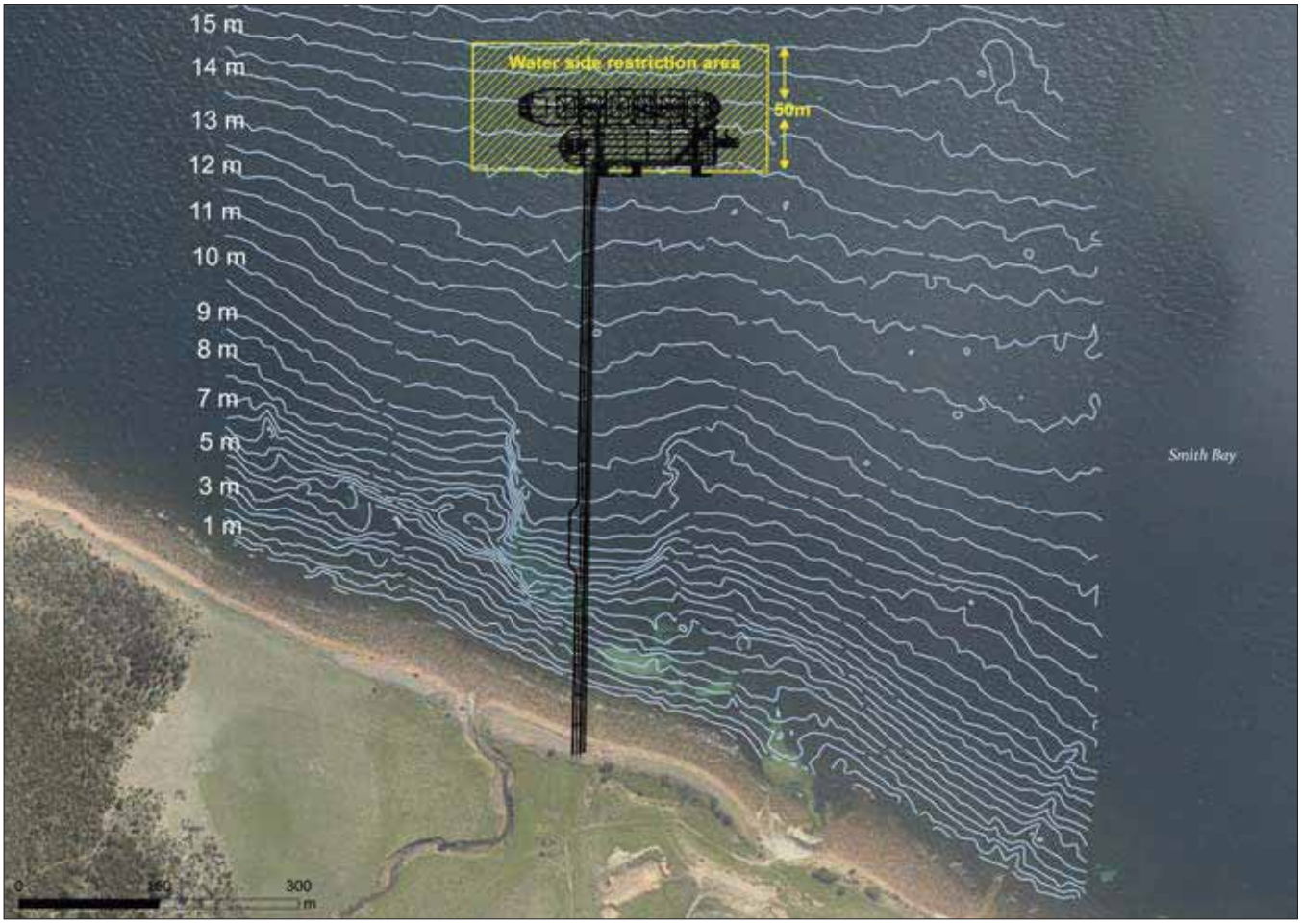

FIGURE 3-5 CONCEPTUAL TEMPORARY EXCLUSION ZONE LAYOUT

which is reduced below the water surface, especially if marine growth also cover the steelwork.

Before operations commence, KIPT's engineers would develop an Inspection and Maintenance Plan and specify:

- for each component, the expected time between first use and the first requirement for maintenance
- inspection requirements (i.e. at specific intervals, including requirements for regular inspection and maintenance, annual inspection and condition assessments)
- the expected planned and reactive maintenance tasks.

An Indicative Facility Inspection and Maintenance Plan was presented in the Draft EIS (see Section 4.7 of the Draft EIS). The indicative inspection and maintenance schedule for the jetty structure is confirmed in Table 3-4.

Detailed preventive maintenance procedures and schedules would be developed before operations commence to ensure potential environmental, health and safety risks would be mitigated and managed during these activities.

3.5 RESOURCES

3.5.1 ELECTRICITY DEMAND AND SUPPLY

The specification requirements for the conveyor system motors, site security and operational lighting demands, all of which influence electricity demand, would need to be reviewed. It is expected that there would be a marginal increase in electricity demand (compared to the figures in the Draft EIS) as a consequence of the decision to extend the wharf. The electricity supply strategy would not be affected (see Section 4.8.1 of the Draft EIS).

3.5.2 DIESEL DEMAND AND SUPPLY

The demand for diesel fuel (for trucks that transport logs from the log storage areas to the receiving vessel) would increase marginally with the increased travel distances along the jetty to the pontoon (see Section 4.8.3 of the Draft EIS).

3.5.3 WORKFORCE DEMAND AND SUPPLY

There would be no significant changes to workforce demand for construction or operation as a result of the design change (see Section 4.8.4 of the Draft EIS).

3.6 PROJECT CLOSURE

The objectives and strategies for project closure do not change with the design change (see Section 4.9 of the Draft EIS).

TABLE 3-4 INDICATIVE INSPECTION AND MAINTENANCE SCHEDULE

Facility component	Inspection tasks	Maintenance tasks	Frequency
Exposed wharf surfaces	• inspect paint for rust stains, damage to the paint system and vessel impact damage • measure wharf structure thickness	• touch-up painting • at end of paint design life, mechanical preparation of surfaces to be painted • painting to be done manually with brushes	Annual inspections of paint condition, 5-yearly inspections of wharf steel thickness
Concrete structures	• hammer tapping survey to identify delaminated or spalled concrete • identify impact-damaged concrete	• local repair to damaged concrete • apply spray-on concrete impregnant (silane) to exposed concrete surfaces	Inspections at annual intervals, reapplication of impregnant at 5-yearly intervals

04. REVISED IMPACT ASSESSMENT AND MANAGEMENT

4.1 OVERVIEW

As a consequence of the design change, impact assessments have been reviewed for:

- potential silt plumes resulting from piling activities, which would be extremely minor compared to dredging activities
- silt and sediment mobilisation from the berth pocket during ship movement and operation, which would be considerably less for a natural seafloor compared to one that has been dredged
- localised effects on coastal processes, which would be insignificant with a suspended piled jetty compared to a solid causeway
- underwater noise and vibration from pile-driving operations during construction, where the same noise source (and levels) and associated noise contours would exist over a greater distance (due to the increased jetty length)
- light spill during ship-loading operations which would occur much further out at sea with an extended jetty, and a pontoon berth face further offshore
- impacts on marine mammals from a longer jetty and berth face further offshore
- biosecurity risks with a longer jetty. These which would likely remain unchanged
- ongoing maintenance of a longer jetty structure
- sustainable use of materials and sea level rise considerations
- marine ecology and heritage with the deeper offshore footprint.

4.2 MARINE WATER QUALITY

4.2.1 INTRODUCTION

The key issues raised in responses to the Draft EIS were:

- the effects of dredging on water quality, particularly in relation to the mobilisation of sediments and increased turbidity
- the accuracy of the hydrodynamic modelling due to incomplete sediment characterisation and the possible grinding of rock during cutter suction dredging resulting in the production of a fine class of sediments
- the effects of re-mobilisation of sediments on water quality during storm events
- the effects of vessel propeller wash mobilising sediments and affecting water quality
- the potential effects on water quality at the seawater intakes of the adjacent on-land abalone farm.

The Draft EIS provided a detailed assessment of the effects of dredging and ship movements on marine water quality in Smith Bay (see Chapter 9 and Appendices F2 and F3 of the Draft EIS). The assessment included the development of a hydrodynamic model and the simulation of the production and movement of sediment plumes along the coast at Smith Bay as a result of dredging and ship movements.

The modelling showed that sediment plumes associated with dredging were capable of spreading several kilometres along the coast and could, if not managed appropriately, occasionally overlap the seawater intakes at Yumbah Aquaculture's facility. KIPT considered that the potential impacts would be effectively managed by suspending dredging if suspended sediment thresholds were exceeded at a location between the dredging operation and Yumbah's intakes. The effects on water quality associated with the winnowing of sediments by ship movements were shown to be minor and confined to the immediate wharf area. It was concluded that there would be no adverse effects on water quality at Yumbah's seawater intakes.

Nevertheless, in response to the concerns raised in the submission, KIPT considered modifications to the dredge pocket in tandem with modifications to the causeway.

Extending the length of approach to the berth face further out to deep water to avoid dredging is expected to significantly reduce concerns associated with potential adverse effects on marine water quality in Smith Bay during construction, as described in the submissions.

Construction of the suspended pile jetty with no dredging is expected to significantly reduce potential adverse effects on marine water quality in Smith Bay during construction. There

would be minor effects on marine water quality during piling operations to construct the jetty. However, it is expected that these effects would be minimal for the following reasons:

- negligible sediment is released into the water column with impact piling
- a jack-up barge would be used during piling, which would result in minimal use of anchors by construction vessels
- should drilling through rock be required, the drilling would be enclosed within the pile that is being installed, so that any sediment generated during drilling would be contained inside the pile and subsequently extracted and stored on the barge before being disposed on land in accordance with regulatory requirements at the time.

The effects on water quality associated with ship movements would be reduced to some degree as the wharf would be approximately 250 metres further from shore in an area of undisturbed seafloor.

4.2.2 ASSESSMENT METHODS

BMT was engaged to provide further advice on potential impacts to marine water quality in Smith Bay associated with the revised design. Their advice was based on the assumption that all drill cuttings would be retained on the construction barge for subsequent land disposal, should any rock drilling be required to install the piles. As there would be negligible sediment released into the water column during piling, BMT considered additional hydrodynamic modelling to be unnecessary.

4.2.3 RESULTS AND CONCLUSIONS

BMT's advice on the likely impact of the revised wharf design on marine water quality in Smith Bay is provided in Appendix C1.

The advice confirms that piling during construction would have significantly less impact on water quality in Smith Bay compared to the potential impact from dredging. It is likely that the effects on seawater quality at Yumbah's seawater intakes would be indistinguishable from natural variation. It is concluded that piling operations during construction of the jetty would have a negligible effect on marine water quality in Smith Bay and at Yumbah's seawater intakes. Concerns expressed about adverse effects on water quality during construction of the wharf have been effectively addressed by removing dredging from the design.

The results also confirm that ship movements would result in only very minor effects on water quality in Smith Bay that would be confined to the immediate vicinity of the pontoon. It is likely that the effects on water quality would be less than those associated with a dredged berth pocket as the revised no dredge design would not disturb the existing rubbly seafloor (see Figure 4-1). Furthermore, with the wharf positioned an additional 250 metres from shore, potential risks to water quality at Yumbah's seawater intakes as a result of sediment winnowing would be negligible.

4.3 COASTAL PROCESSES

4.3.1 INTRODUCTION

The key issues raised in responses to the Draft EIS were:

- the interruption of nearshore tidal flows by the causeway, potentially reducing current speeds, waves and mixing in the lee of the causeway, resulting in:
  - seawater temperatures increasing near Yumbah's seawater intakes, which could potentially adversely affect the health of abalone during heatwaves
  - possible re-entrainment of Yumbah's farm effluent into the seawater intakes, which could adversely affect abalone health
- the accumulation of wrack around the causeway, which could affect water quality near Yumbah's seawater intakes as it decomposed.

A detailed assessment of the effects of the causeway on coastal processes in Smith Bay was provided in the Draft EIS in Chapter 10 and Appendix G. The assessment included the development of a hydrodynamic model and the simulation of coastal processes along Smith Bay.

The assessment showed that the causeway and wharf would have relatively minor effects on coastal processes, including a small reduction in current speeds (0.1 m/s) and wave height (up to one metre) in the lee of the causeway and wharf, and a small increase in water temperature during summer heatwaves to the east of the causeway (<0.2ºC). Another issue associated with the causeway was the potential accumulation of wrack against the causeway in response to prevailing winds and currents.

One potential benefit of the causeway was identified as being an improvement in water quality at Yumbah's seawater intakes during sediment laden storm flows of Smith Creek that would be directed further offshore (and away from Yumbah's intakes) before being entrained by tidal flows.

In response to the concerns raised in the submissions, KIPT considered modifications to the causeway design including installation of culvert pipes and shortening the total length. The decision to abandon the causeway design was made in tandem with the decision to abandon the dredge pocket, in favour of an extended, suspended piled jetty design.

4.3.2 ASSESSMENT METHODS

BMT was engaged to provide further advice on potential impacts to coastal processes at Smith Bay associated with the revised design. In light of the removal of the causeway from the revised wharf design, BMT considered additional hydrodynamic modelling to be unnecessary.

4.3.3 RESULTS AND CONCLUSIONS

BMT's additional advice on the likely impact of the revised wharf design on coastal processes at Smith Bay is provided in Appendix C1.

An open-piled jetty substructure would have a negligible effect on coastal processes at Smith Bay. It would not impede currents or waves and would allow sand and wrack to move freely along the shore. It would have no effect on seawater temperatures.

Furthermore, an open-piled jetty substructure would result in negligible disturbance to the Smith Bay foreshore. The rocky shoreline would not be disturbed during construction and would therefore remain as resistant to coastal erosion as is currently the case.

The only residual effect would be a 30–50 per cent reduction in wave height in the immediate lee of the floating pontoon, and by less than five per cent at the nearest of Yumbah's seawater intakes. This could provide a slight benefit to Yumbah during north westerly storms as it could result in slightly less sediment being resuspended and entering Yumbah's seawater intakes.

It is concluded that removing the causeway from the design has addressed all of the concerns that the development would adversely affect coastal processes in Smith Bay.

4.4 LAND-BASED AQUACULTURE

4.4.1 EXPRESSED CONCERNS

The Draft EIS and a number of the submissions received during the consultation period identified concerns for the land-based Yumbah Aquaculture farm from the construction and operation of the in-sea infrastructure, including the establishment of the causeway and the associated construction activities, particularly dredging of the berth pocket and approach.

Concerns specific to abalone and Yumbah Aquaculture included:

- mobilisation of sediment loads from the capital dredging program, tailwater discharges from dewatering of sediments, causeway construction, maintenance dredging

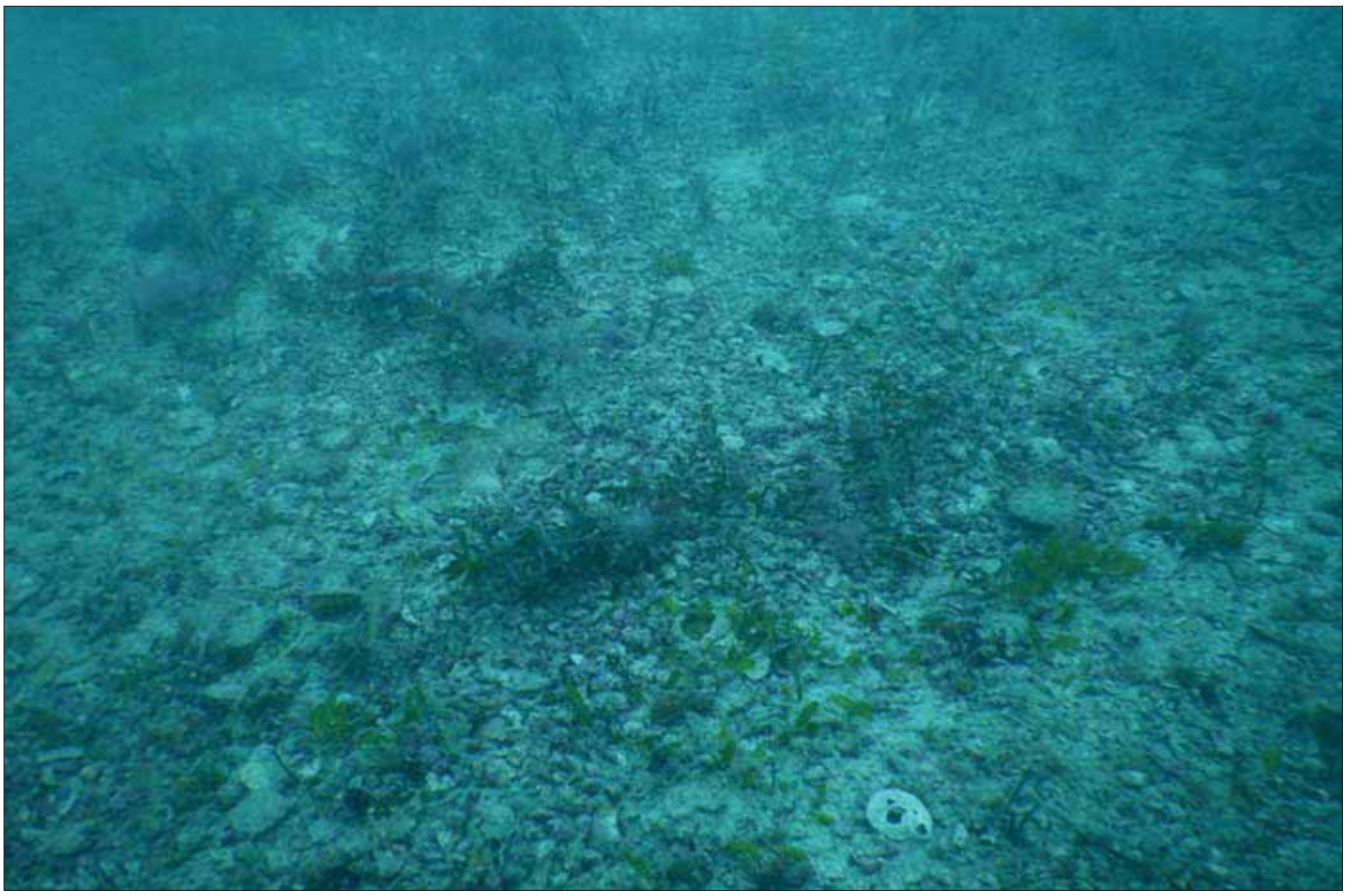

FIGURE 4-1 THE RUBBLY SEAFLOOR IN THE VICINITY OF THE PONTOON IS LIKELY TO BE RELATIVELY RESISTANT TO WINNOWING BY SHIP MOVEMENTS

and shipping operations all of which had the potential to impact on farming operations through effects on ambient water quality in Smith Bay by causing:

- increases in total suspended solids (TSS) loads (both organic and inorganic) with associated risks of gill clogging or smothering of abalone
- suspension of anoxic sediments causing reductions in ambient oxygen levels with the associated risk of oxygen stress for abalone
- increases in the numbers of pathogens in the water column due to microbial pathogens attaching to suspended sediment particles
- increases in the levels of toxicants and pollutants in the water column due to the mobilisation of such materials attached to suspended sediments
- increase in nutrient levels, due to the release of sediment bound material or re-entrainment of abalone farm discharges (see below) along with the associated risk of nutrient impacts on farming systems

- changes in coastal processes (primarily associated with the establishment of the causeway) but also associated with changes in the coastal bathymetry from dredging could variously impact on nearshore circulation with the potential to:
  - affect water temperature of the abalone farm intake due to reduced mixing in the vicinity of the causeway, thereby elevating the risk of summer mortalities
  - changes in sedimentation and resuspension processes, due to changes in benthic sheer stress in the vicinity of the causeway and in the dredged areas, with the concomitant risks of elevated suspended sediment loads
  - potential for the accumulation of seagrass wrack behind the causeway with associated impacts from the decomposition of this material which could lead to elevated levels of organic particulates in the intake waters, fouling of intake filters and impacts on the oxygen concentration and nutrient status of the intake waters
  - risks that changes in coastal processes would affect circulation patterns in the lee of the causeway such that wastewater discharges from Yumbah would be entrained back into the seawater intakes resulting in self-pollution of the facility
- concerns that the sediment particle size distribution in Smith Bay is dominated by a larger fraction of finer sediment classes which may present a greater risk to abalone from gill-clogging than similar loads of relatively coarser particles
- concerns that increases in the frequency of harmful algal blooms (specifically red tides) would occur due to changes in coastal circulation and the potential for wastewater discharges from the abalone farm to pool in the lee of the causeway creating elevated nutrient levels that would support growth of harmful algae
- concerns that increases in turbidity (associated with elevated suspended sediments from dredging and construction activities) could lead to reductions in diatom productivity in Smith Bay and thereby affect the availability of diatoms as a food source for abalone.

4.4.2 DESIGN CHANGE SOLUTION

KIPT's response was that the evident risk was relatively small and could be managed by the hierarchy of controls framework, including monitoring and control of management practices. Nevertheless, removing a risk through engineering solutions is considered preferable to implementing mitigation measures. The decision to redesign the in-sea infrastructure, to remove the necessity for any dredging activities and to remove the causeway, would address all of the concerns raised by Yumbah. Replacing the causeway with a piled jetty substructure that extends further out to sea, would avoid all of the associated risks (identified in Section 4.4.1).

Extending the jetty further offshore would eliminate the need for either a capital dredging program or for any ongoing maintenance dredging. As a consequence, the risks associated with elevated suspended sediment loads, the mobilisation of toxicants, pollutants or other contaminants, the risks of elevated pathogen levels and changes in the nutrient status of these waters would be addressed.

Similarly, the decision to remove the causeway would remove all risks associated with impacts on coastal processes. There would no longer be a risk of changes to the circulation patterns in the lee of the causeway or any concomitant effects on seawater temperature profiles or nutrient status at Yumbah's seawater intakes.

Diatom productivity would remain unaffected and there would be no increase in the risk of harmful algal blooms.

The changes would remove all risks to land-based aquaculture resulting from the capital dredging program, the maintenance dredging program and the causeway construction and operation of the causeway. Suspended sediment regimes, circulation patterns, temperature profiles, wave regimes, nutrient, toxicant and pathogen levels and algal productivity would all remain unchanged relative to the current (ambient) situation.

The increased distance from the berth face to the abalone farm intakes (an additional 250 metres) would have added benefits of decreasing the proximity between the shipping activities (manoeuvring, loading and unloading) and Yumbah's

seawater intake pipes relative to the original proposal, although such activities would not be expected to pose any threat to aquaculture.

4.5 MARINE ECOLOGY

4.5.1 INTRODUCTION

The key marine ecological issues raised in the responses to the Draft EIS relevant to the design change were:

- the direct loss of seagrass and other marine communities as a result of dredging and causeway construction
- the indirect effects on seagrass and other marine communities as a result of dredging and shipping operations mobilising sediments and causing turbidity and siltation effects
- the effects of underwater construction noise on marine fauna, particularly marine mammals (see Section 4.8 of the Addendum)
- the potential introduction of marine pests and diseases to Smith Bay (see Section 4.7 of the Addendum)
- the need for further information on the benthic community inhabiting the rocky intertidal shore.

A detailed assessment of the effects of the development on the marine ecology of Smith Bay was provided in the Draft EIS in Chapter 12 and Appendix I. The assessment included several diving trips to Smith Bay to identify the dominant marine communities and habitats and compile a list of flora and fauna inhabiting Smith Bay. The hydrodynamic model that was developed to simulate marine water quality during dredging was used to assess potential effects on seagrass and other benthic communities resulting from turbidity and sedimentation effects.

The studies showed that Smith Bay supports a mixture of reef and seagrass communities in the relatively shallow sections of Smith Bay (<7–8 metres), with the seagrass communities becoming more dominant in the deeper water (8–12 metres). As the water deepens the density of the seagrass progressively lessens until it becomes very sparse to non-existent in the deeper water (15–17 metres).

The most significant impact was the direct loss of 10.2 ha of mixed reef and seagrass communities as a result of construction of the causeway and dredging of the berth pocket and approaches. Approximately 2.5 ha of additional seagrass loss may have resulted from sediment fallout in the immediate vicinity of the dredge footprint (>50 mm within 130 metres of the dredge footprint). Sediment plumes during dredging were predicted to have a temporary adverse effect on seagrass health within approximately 1 km of the dredge footprint but would not have resulted in seagrass dieback. Recovery on completion of dredging would have been complete.

Sediment deposition may have had a more significant effect on reef communities where the recruitment of macroalgae within several hundred metres of the dredge footprint may have been affected.

The direct loss of seagrass communities would also have affected protected pipefish, which are known to inhabit the Smith Bay seagrass communities. KIPT took the view that the areas at risk were a very small proportion of the pipefish habitat along the north coast of Kangaroo Island and effects on the pipefish population would be insignificant. In addition, the company would have undertaken an offset program via the catchment management plan proposed in the Draft EIS, to reduce nutrient runoff into Nepean Bay and promote seagrass recovery.

The proposal to construct a jetty out to deep water, rather than dredge and construct a causeway, would result in a significantly smaller area of benthic communities being affected by the development of the KI Seaport.

However, with the extension of the jetty a further 250 metres from shore, other benthic communities may be potentially affected and therefore further assessment was required.

4.5.2 ASSESSMENT METHODS

A further survey of the revised location of the pontoon and approaches was undertaken by divers to provide a better understanding of the benthic communities that may be affected by the development (see Appendix C2). Five additional sites were surveyed by divers using the same methods as those used in previous surveys. A 30-metre tape was randomly laid out on the seafloor and the flora and fauna occurring within one metre of the tape were recorded. A remotely controlled underwater camera was also dropped to the seafloor to take photographs of the seafloor communities at five additional locations further out to sea.

The community of fauna inhabiting the rocky intertidal shore was also surveyed at three locations.

4.5.3 RESULTS AND CONCLUSIONS

The results of the additional marine ecological survey are presented in Appendix C2.

As expected, the seagrass communities that were present closer to shore were much sparser in the deeper water (i.e. 14–17 metres), with the cover ranging from zero to five per cent of mainly *Posidonia sinuosa*, with occasional patches of *Amphibolis* sp. and *Halophila australis*.

Two additional crab species (the smooth seagrass crab and the bristled sponge crab) were found during the subtidal survey, but neither is of particular conservation significance. Similarly, the intertidal survey revealed a typical assemblage of fauna, none of which is of particular conservation significance (see Appendix C2).

Much of the seafloor in the vicinity of the revised location for the pontoon and approach consisted mainly of rubble, shells and sand, which is unlikely to be particularly prone to mobilisation during ship and tug movements.

The only benthic communities that would be directly affected during construction of the jetty would be where piles would be driven into the seafloor. Assuming that 156 piles are required, and each pile would adversely impact one square metre of seafloor, approximately 0.02 ha of benthic communities (mostly seagrass) would be directly affected.

It is likely the shading effects of the pontoon in the revised design would be similar to the effects associated with the previous design. As discussed in the Draft EIS, shading effects associated with the pontoon could result in the loss of up to 0.5 ha of sparse seagrass. It is likely the maximum total loss of seagrass would be 0.52 ha, compared to 7.5 ha for the original design.

KIPT has proposed making a monetary payment to the Native Vegetation Council (NVC) to offset the seagrass loss. Using the NVC's formula for calculating significant environmental benefit (SEB) payments, the seagrass loss would result in a payment of approximately $5000 to the NVC. KIPT considers the seagrass loss to be too small to offset via the Catchment Management Plan proposed in the Draft EIS, which was intended to reduce nutrient loads entering into Nepean Bay, thereby promoting seagrass recovery.

4.6 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

4.6.1 INTRODUCTION

Section 156B of the *Environment Protection and Biodiversity Conservation 1999* (EPBC Act) requires the proponent to request a variation to the proposal (as described in the EPBC referral). The Minister, via the Department of the Environment and Energy (DoEE), has been notified of the proposed design changes.

The notification included an assessment of the revised design which concluded that:

- there was no significant change to the risk profile of the development
- the 'character' of the development, as a timber export facility incorporating storage, remains unchanged
- the development would not trigger any additional Matters of national environmental significance (MNES).

As the proposed changes would only affect the offshore components of the development, the impact assessment was reviewed and updated for the southern right whale (*Eubalaena australis*) only. The other three MNES that were subject to the impact assessment as detailed in the Draft EIS (i.e. the Kangaroo Island echidna, hooded plover (eastern) and the southern brown bandicoot (eastern)) are predominantly terrestrial and therefore would not be affected by changes made to the offshore component of the design. The removal of the causeway from the beach zone, however, will slightly reduce the already very low risk to the hooded plover (eastern) as there will now be no direct loss of potential nesting habitat on the beach.

4.6.2 ASSESSMENT OF LIKELY DIRECT AND INDIRECT IMPACTS

Table 14-2 of the Draft EIS identifies the development's potential impacts on the southern right whale. The impact assessments (direct and indirect) for the southern right whale have been reviewed (see Appendix D).

The increased length of jetty substructure and increased piling activity (number of piles to be installed, and the distance the activity would occur further out to sea) would have a negligible impact on southern right whales.

Noise modelling (Resonate 2018) undertaken on piling for the original design in the Draft EIS considered two scenarios which are consistent with the redesign: a duration of 30 minutes per day, assuming 60 blows per minute; and a duration of 15 minutes per day, assuming 120 blows per minute.

The revised impact assessment considers the revised construction program that plans for the installation of one pile at a time, but with the possibility of piling in two locations simultaneously. Piling in two places simultaneously would effectively double the number of blows per minute per day, which would have the effect of increasing the cumulative sound exposure level (SEL) by 3 dB, and increasing the 'threshold distances' for temporary threshold shift (TTS) and permanent threshold shift (PTS) onset by approximately 1.6 times the values in Table 18.11 of the Draft EIS, assuming the exposure time is the same. It is important to note that with the extended piled jetty substructure, the duration per day of the impact pilling is consistent with the assumptions used for the original modelling, and would occur for a total period of up to 20 minutes per pile installed, with up to two piles being installed per day.

As noted in the Draft EIS, damage to the hearing of marine fauna would be considered unlikely as the normal behavioural response to loud noise would be to move away. Behavioural changes in response to noise are expected to be temporary and ecologically inconsequential as Smith Bay is not known to provide important feeding or breeding habitat. The management and mitigation measures described in the Draft EIS include using a soft start, establishing a 1 km shutdown zone around the site (i.e. beyond the predicted PTS distance, see Table 21 of Resonate 2018 of the Draft EIS), and monitoring by marine mammal observers. The use of two piling rigs would reduce the total duration of piling, which would also be a consideration for planning the construction program.

Operationally, it is considered that the suspended piled jetty and reduced in-water footprint would have a negligible impact on whale behaviour. The design changes would remove the solid causeway from the design (which may be considered a potential barrier to movement) and any future maintenance dredging activity would no longer be required.

The proposed management measures for identified potential impacts to the southern right whale (see Appendix D Table 1-1), are consistent with the principles described in the EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales (DEWHA 2008) and are considered effective.

The assessment of the revised design against the 'significant impact criteria' is provided in Appendix D (Table 1-2).

4.6.3 ASSESSMENT OF RESIDUAL IMPACTS

Based on the above assessment, there would be no residual significant impacts on the southern right whale as a result of the revised design for the KI Seaport.

4.6.4 CONCLUSIONS

The changes to the design do not change the risk profile of the development as described in the Draft EIS. No additional MNES would be triggered by the changes to the proposal. Existing mitigation measures as described in the Draft EIS are considered effective to manage any direct or indirect impacts to the southern right whale. The revised proposal would not generate any residual significant impacts on the southern right whale.

4.7 BIOSECURITY

4.7.1 POTENTIAL RISKS

The design change would remove the potential construction risks (as described in Section 15.5.1 of the Draft EIS) associated with:

- importing rock material for the causeway
- dredging activity.

As stated in Section 15.5.4 of the Draft EIS, construction of the causeway would have formed an additional reef habitat colonised by a range of macroalgae and reef fauna and this may have resulted in a more diverse and abundant reef community than that currently at Smith Bay.

Conversely, the causeway could also potentially be colonised by exotic marine fauna. Introduced marine species can rapidly increase in numbers after a disturbance, the removal of competitive indigenous species or the provision of unoccupied hard surfaces (wharf structures). Dredging can create essentially barren sites for colonisation that are free from competition by native species. KIPT considered the mitigation or management strategies (see Table 4-1) were sufficient to manage risk.

As the causeway is no longer part of the wharf design, the available substratum on which invasive species could attach is reduced. Eliminating dredging also reduces the available substratum for any exotic species to colonise.

The design change, which increases the separation distance of the wharf's berth face from the shore, and from Yumbah's seawater intake pipes, would also reduce the potential operational risks (as described in Section 15.5.1 of the Draft EIS) associated with marine vessels.

4.7.2 MANAGEMENT AND MITIGATION MEASURES

Measures to reduce the biosecurity risk from the proposed development are described in Table 15-1 and Table 15-2 of the Draft EIS. Table 4-1 identifies the management measures that are no longer relevant with the revised design.

The Commonwealth Anti-fouling and In-water Cleaning Guidelines (DAWR 2015) apply to vessels and other moveable structures in aquatic environments, and reflect international conventions intended to protect the environment from invasive pest species and contaminants introduced by shipping. Section 4.6.3 of the Draft EIS addressed the application of anti-fouling coatings and stated that anti-fouling coatings would not be applied to the jetty substructure and other permanent piled structures.

The revised design would increase the number of piles required for the jetty. However, the management measures would be the same as described in the Draft EIS. The steel piles would be painted with anti-corrosion paint offsite, to remove the need to paint the piles at Smith Bay. Anti-fouling coating would not be applied to the steel piles and therefore marine growth is expected on the jetty pylons. Regular inspection of structures, including the jetty, would be managed in accordance with the Marine Pest Management Plan and Biosecurity Management Plan.

4.7.3 CONCLUSIONS

The revised design removes the risks associated with importing rock material and dredging, and would not introduce any additional risks to the biosecurity status of Kangaroo Island.

TABLE 4-1 OBSOLETE ENVIRONMENTAL MANAGEMENT MEASURES FOR BIOSECURITY RISK – TERRESTRIAL AND MARINE

Environmental aspect	Phase (construction, decommissioning or operation)	Potential impact to terrestrial environment	Mitigation or management measure	Monitoring measure	Responsibility	Relevant plan
Importation of rock material	Construction	Spread of pest plants, pest animals and/or pathogens onto Kangaroo Island from interstate as well as other parts of the Island	Quarry certificates to be provided for all materials imported onto the study area	Auditing of quarry records	Construction Manager	CEMP (Appendix U1 of the Draft EIS)
Dredging	Construction	Spread or introduction of pest plants, pest animals and/or aquatic diseases into Smith Bay	Dredging activity would require an EPA licence Implementation of the Marine Pest Management Plan Implementation of the Dredge Management Plan	Any conditions as required by the EPA licence	EPA Construction Manager	CEMP (Appendix U1 of the Draft EIS) Dredge Management Plan Marine Pest Management Plan
Construction of the causeway	Construction	Increase in population of exotic marine species via colonisation of hard surfaces	Investigation (during detailed design) of potential surface treatments or alternative structures to minimise the impact from exotic species		KIPT	

4.8 NOISE AND LIGHT

4.8.1 ASSESSMENT OF POTENTIAL IMPACTS

The Draft EIS assessed potential noise and vibration impacts which may have resulted from constructing a shorter section of suspended piled jetty. (This was incorporated into the original design). The approach would now be a full length suspended piled jetty and the impact assessments have been reviewed in that context. The onshore components of the KI Seaport have not changed.

Underwater Noise – Construction

The suspended piled jetty requires the installation of approximately 156 tubular steel piles using a jack-up (piling) barge and impact hammer (refer Section 3.2.1). Increasing the number of pile installations to construct a longer jetty would also potentially extend the duration of the impact (noise source). The baseline underwater noise environment at Smith Bay was described in Section 18.4.2 of the Draft EIS, and the effects of piling activities on the underwater noise environment were described in Section 18.4.4 of the Draft EIS. The revised design uses the same construction methodology described in the Draft EIS, which is summarised in Section 3.2 of the Addendum.

Underwater environmental impacts were assessed based on the:

- existing conditions (such as ambient noise environment, local bathymetry, wave and wind climate)
- significant marine species in the study area
- significance of the area as a habitat for marine species
- species' sensitivity to sound
- characteristics of the identified noise sources in terms of duration, source level and frequency
- sound propagation characteristics of the marine study area.

The potential impacts that were considered in the assessment are, in increasing order of severity:

- behavioural change
- temporary threshold shift (TSS) in marine species' hearing
- permanent threshold shift (PTS) in hearing
- organ damage (possibly leading to death).

To assess the impacts of the construction and operational sources, noise criteria were established for each of the considered impact levels. The underwater noise criteria adopted are based on National Oceanic and Atmospheric Administration (NOAA) Marine Mammal Acoustic Technical Guidance and the Sound Exposure Guidelines for Fishes and Sea Turtles. These represent the most up-to-date research and approach for the species considered in this assessment and are generally more stringent than the DPTI Underwater Piling Noise Guidelines.

The Draft EIS assessment concluded that without mitigation, the overall risk of adverse noise effects on the relevant marine species is low, except for a medium level of risk associated with impact piling potentially resulting in a PTS in southern right whales.

This assessment remains valid with the revised design, as the assessment considered the noise impacts associated with a given piling activity.

Extending the jetty by 250 metres will result in the noise contours described in the Draft EIS (see Figure 18-10 of the Draft EIS) extending a further 250 metres out to sea. The results of the piling noise impact assessment presented in Table 18.11 of the Draft EIS remain relevant as they relate to distances from the actual piling operation and are therefore independent of the nature of the jetty structure itself.

Should piling operations be undertaken in two locations simultaneously, it would effectively double the number of blows per minute/day, which has the effect of increasing the cumulative sound exposure level (SEL) by 3 dB, and increases the 'threshold distances' for TTS and PTS onset by approximately 1.6 times the values in Table 18.11 of the Draft EIS, assuming the exposure time is the same.

The expected duration of deck construction including piling is 309 days (see Table 3-3). The use of two piling rigs would reduce the total duration of piling, and therefore increase the possibility of undertaking the piling outside the winter whale migration season, which would be KIPT's aim. However, if this is not possible for logistical reasons, KIPT is confident that it would be possible to effectively mitigate potential impacts on whales, due to the short duration of actual piling driving each day (i.e. up to two periods of approximately 20 minutes each day), and through by implementing widely accepted and conservative measures to protect whales during piling driving activities.

As discussed in the Draft EIS, the following measures would be adopted to mitigate the potential impact of pile driving on marine mammals:

- using a 'soft start' in which the piling impact energy would be gradually increased over 10 minutes to deter fauna from remaining close enough to risk injury after operations reached normal levels
- establishing a 1 km shutdown zone around the site, equivalent to the most conservative distance threshold to prevent permanent hearing damage
- using marine mammal observers to monitor this zone, with an additional perhaps complemented by acoustic equipment to detect mammals; pile driving would stop if a marine mammal was sighted in the zone
- no pile driving at night, when it might be difficult to detect marine mammals.

Terrestrial Noise – Construction

The onshore components of the proposed KI Seaport were described in the Draft EIS and have not been altered, and therefore the construction noise is predicted to be as described in Section 18.3.4 of the Draft EIS.

The onshore effects of piling noise during construction are considered in the Draft EIS in Section 18.3.4. If piling activities occurred between 7 am and 7 pm Monday to Saturday, there would be no regulatory restrictions on the noise levels from offshore piling. If activities occurred outside of these hours, the Environment Protection (Noise) Policy 2007 and associated criteria for the different receptors would be met.

Terrestrial Noise – Operation

Increasing the distance between the ship loading activities and the shore-based receivers has the potential to change the terrestrial noise assessment presented in Section 18.3 of the Draft EIS and a revised assessment of terrestrial noise was undertaken to reflect these changes.

The revised predicted noise levels are shown in Figure 4-2. The changes resulted in a minor decrease in predicted noise levels over those presented in the Draft EIS, generally less than 1 dB at most locations, including at Yumbah.

The regulatory criteria for the different receptors at Smith Bay were provided in Table 18-6 of the Draft EIS (read in conjunction with Table 18-1 of the same).

Lighting – Operation

Section 18.5 of the Draft EIS considered the proposed lighting design for the KI Seaport. Since the Draft EIS was submitted, and concurrently with the development of the revised project configuration, a lighting assessment has been undertaken to confirm compliance with AS4282-1997: Control of the obtrusive effects of outdoor lighting (see Appendix E). This standard sets the requirements and the relevant light technical parameters to control the obtrusive effects of light. As the obtrusive effects of outdoor lighting are best controlled by appropriate design, the standard is primarily applicable to new

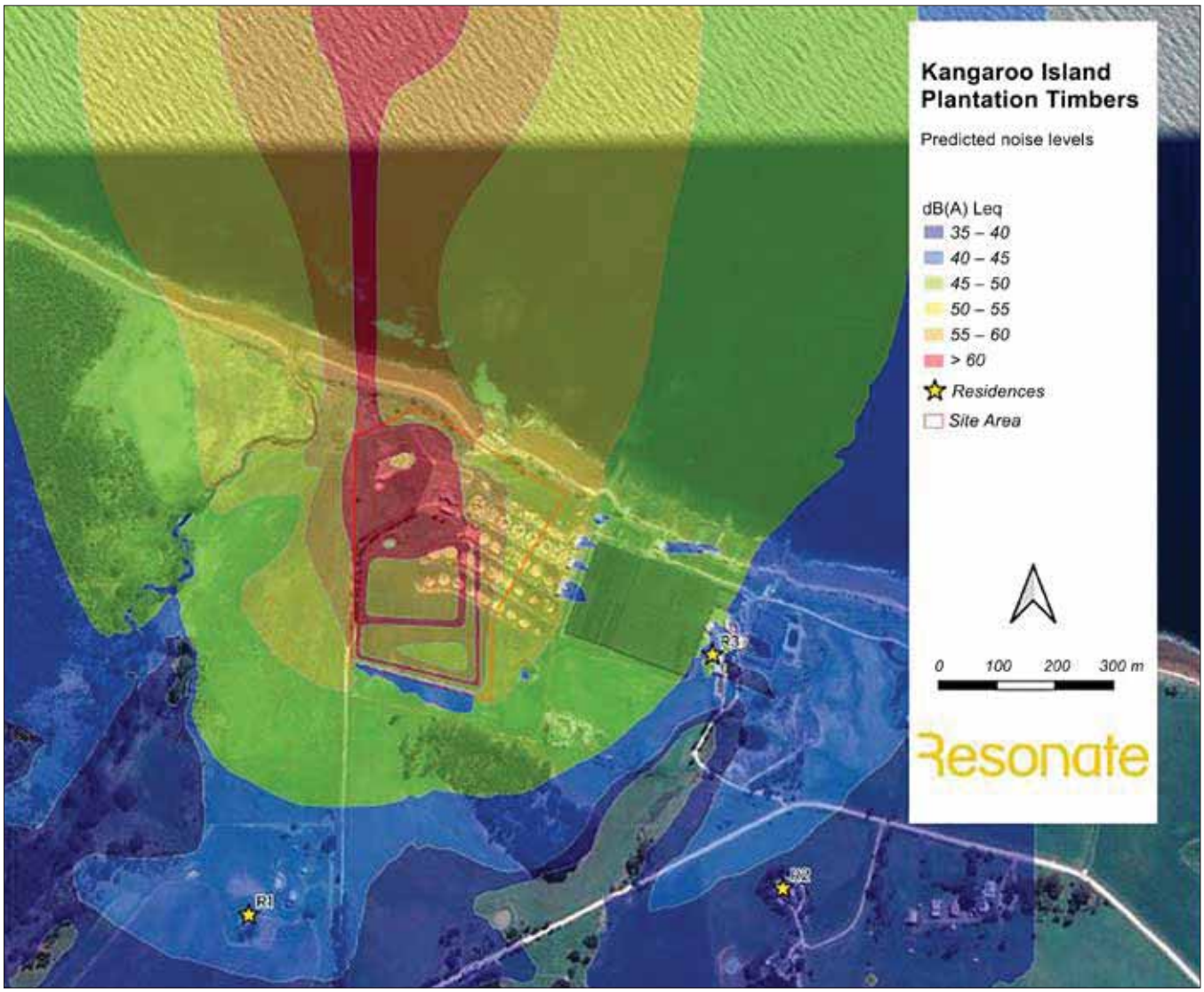

FIGURE 4-2 PREDICTED NOISE LEVELS (TERRESTRIAL) DURING OPERATIONS

installations. The standard specifically refers to the potentially adverse effects of outdoor lighting on nearby residents, users of adjacent roads and transport signalling systems and on astronomical observations. The standard is intended to be referenced by planning bodies reviewing the potential obtrusiveness of new outdoor lighting installations and by designers to aid in producing lighting systems that control the obtrusive effects to an acceptable degree.

Based on the current lighting design, the proposed lighting will comply with the requirements of the standard. This indicates there would be no adverse effects from light spill on the amenity of surrounding residences. While the standard is written to account for the potential impact on residences and not commercial entities, it is noted that the light levels calculated to reach the neighbouring Yumbah Aquaculture facility would be below the limits designated for a residence.

4.8.2 CONCLUSIONS

The noise and lighting assessments presented in the Draft EIS have been revised following the proposed redesign of the in-water structures. The revised assessments indicate that the noise and lighting impacts described in the Draft EIS remain valid and present a realistic picture of the impacts associated with the revised configuration. Underwater piling noise would not be expected to increase although impact thresholds could extend a further 250 metres into Smith Bay, in keeping with the extended jetty structure. Terrestrial noise impacts would decrease slightly as a result of moving noise-generating ship-loading activities further offshore, and lighting would comply with the requirements of the relevant Australian standards at all sensitive receptor locations.

4.9 CLIMATE CHANGE AND SUSTAINABILITY

The Draft EIS identified measures for greenhouse gas mitigation and management measures for KI Seaport (see Section 19.4.4 of the Draft EIS). Design and management measures to minimise the potential impacts to KI Seaport infrastructure and operations as a result of climate change are also identified (see Section 19.4.4 of the Draft EIS). These proposed measures would be applied to the revised design.

4.10 VISUAL AMENITY

4.10.1 ASSESSMENT OF POTENTIAL IMPACTS

The impact assessment of the change in visual amenity at Smith Bay was undertaken and presented in Section 23.5.2 of the Draft EIS. The assessment used a conceptual 3D model to show the major components of the onshore and offshore infrastructure of KI Seaport.

The conceptual 3D model has been updated to assess the visual impact of a piled jetty extending approximately 650 metres out to sea from the shoreline, see Appendix F.

The comparative assessment of the visual amenity for each location, shown in Figure 4-3, shows that:

- ships would be more visible at locations 5a and 5b
- those locations expected to have only a partial view of the onshore facility (locations 6, 7, 11a, 11b and 11c) and locations 8, 12 and 13 remain predominantly unchanged, although it should be noted that:
  - the impact at location 6 is expected to be reduced as ships at berth will be further offshore
  - locations 11a, 11b and 11c are expected to have a slightly clearer view of the ships at berth
  - ships at berth would be more visible at locations 9a and 9b, although the ships would be less imposing because they would be located further offshore.

4.10.2 CONCLUSIONS

As discussed in Section 23.7 of the Draft EIS, the KI Seaport would intensify the relatively disturbed, semi-industrial-like character of this particular section of Smith Bay and the visual amenity impacts would be noticeable and considered significant for the local residents who are on elevated land with views to Smith Bay.

The visual amenity assessment undertaken using the original sensitive receiver locations and the updated conceptual 3D model shows slight changes in visual amenity expected for some locations with the revised design. The pontoon and berthed vessel would be more visible from some locations because they would not be hidden by Yumbah Aquaculture's facility. Other locations would have a clearer view of a berthed vessel because it would be located further offshore.

Locations at either end of Smith Bay would have a clearer view of the offshore infrastructure (jetty and pontoon) and berthed vessel as these extend past the background landscape. However, the overall design of the offshore infrastructure could be considered to be less imposing than the original design given key elements of the structure would be further out to sea.

In conclusion, although there would be slight variations in the visual amenity for many locations, the overall change seen in the line of sight views presented in the Draft EIS is considered insignificant. The design change could be considered an improvement to the overall visual amenity impact that the KI Seaport would be expected to bring to Smith Bay because the jetty and pontoon infrastructure would be less conspicuous in the coastal environment than a rock armoured causeway closer to the shore. The increased length of the jetty would mean the sight of the infrastructure and berthed vessel would be less imposing visually.

4.11 HERITAGE

Appendix S3 of the Draft EIS presents the underwater cultural heritage assessment. State and Commonwealth databases were searched for historic shipwrecks based on a theoretical development footprint.

The assessment looked at direct and indirect impacts to maritime heritage from the proposed activities associated with the development which included dredging, piling and building of a causeway. The assessment reported four shipwrecks (*Chum*, *Vectis*, *Ruby* and *Cookaburra*) are recorded in the vicinity of Smith Bay (see Figure 24-3 of the Draft EIS), however, their precise locations are unknown.

The revised design removes the requirement for dredging and building the causeway, however, impacts from piling remain part of the proposed development. The revised design would also relocate the pontoon further offshore, as shown in Figure 3-1. The likelihood of material from any of these wrecks being located within the study area, which includes the extended development area offshore, is still considered to be low.

The recommended management measure of establishing and implementing a discovery protocol for construction works remains applicable and is considered adequate to manage the potential risk to underwater cultural heritage.

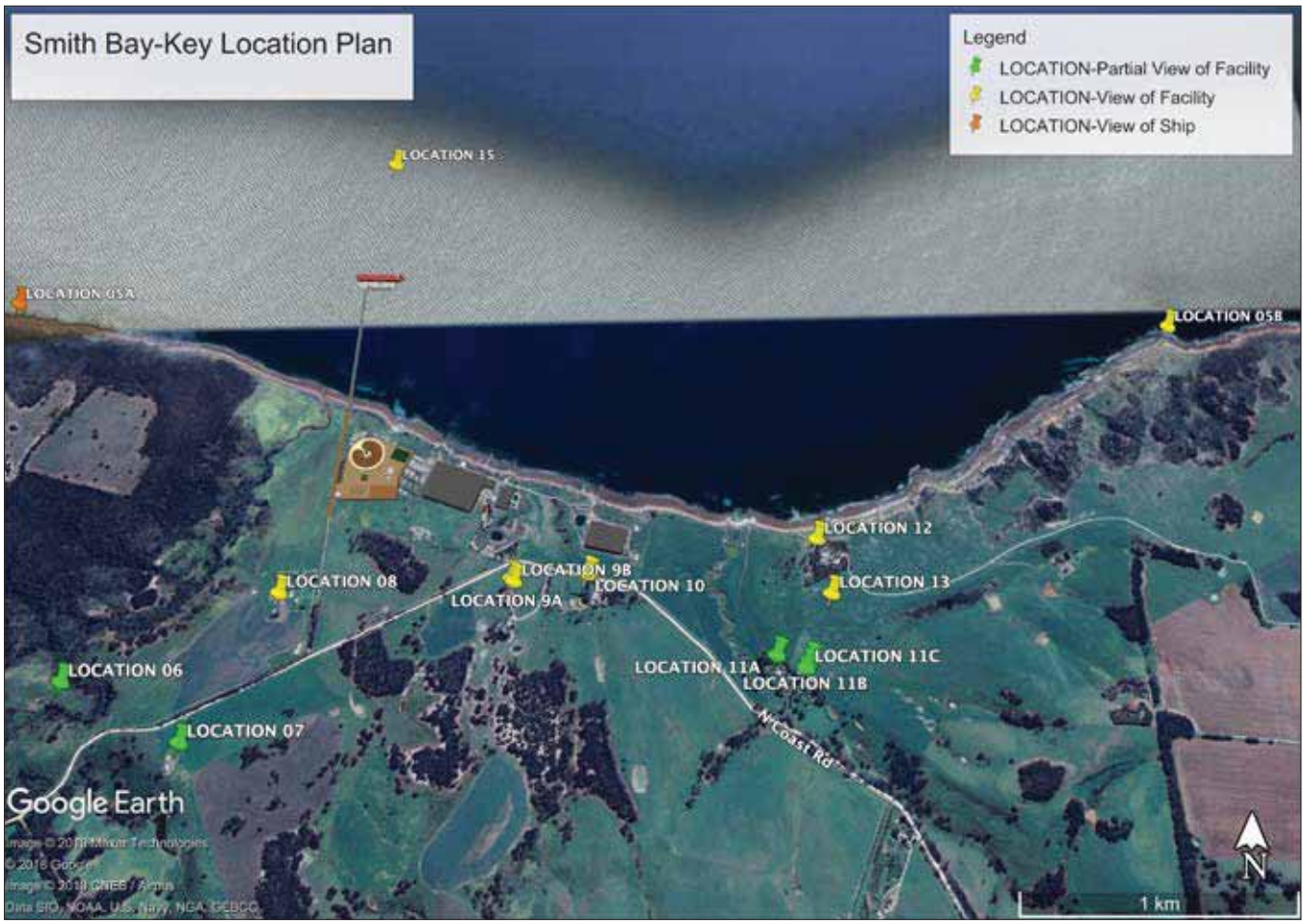

FIGURE 4-3 SMITH BAY-KEY SENSITIVE RECEIVER LOCATIONS

05. MANAGEMENT OF HAZARD AND RISK

KIPT has adopted a risk management framework aligned with AS/NZS ISO 31000:2009 to manage environmental risks associated with the proposed KI Seaport, which was presented in Chapter 25 of the Draft EIS – Management of Hazard and Risk.

Appendix T of the Draft EIS presented the risk assessment and risk register for KI Seaport and the original design.

The following construction activities would be removed as a result of the revised design:

- construction of the berth pocket and approaches (items 1 through 10 of Appendix T)
- causeway construction (items 16 through 20 of Appendix T).

The decision to extend the jetty further out to sea to avoid the need for dredging would eliminate the following potential impacts that were nevertheless considered manageable in the Draft EIS:

- loss of seagrass communities from dredging of seafloor (item 1)
- impacts on marine heritage items (shipwrecks) from dredging of seafloor (item 2)
- loss of local seagrass and other benthic communities due to light reduction and smothering by silt plumes generated by dredging (item 3)
- poor water quality (for abalone health) at Yumbah's seawater intakes caused by silt plumes (item 4)
- visible silt plume around the construction site at Smith Bay (item 5)
- impacts on marine communities including seagrass caused by mobilisation of potentially contaminated material in sediments (including naturally occurring contaminants such as ammonia, hydrogen sulphide, chemical oxygen demand (COD) and biological oxygen demand (BOD) (item 6)
- poor water quality (for abalone health) at Yumbah's seawater intakes caused by mobilisation of potentially contaminated material in sediments (including naturally occurring contaminants such as ammonia, hydrogen sulphide, COD and BOD) (item 7)
- contamination of site (such that contaminated soil guidelines are breached) caused by dewatering (and return water losses) of potentially contaminated dredge spoil on land (item 9)
- poor water quality (contaminants) at Yumbah's seawater intake caused by dewatering (and return water losses) of potentially contaminated dredge spoil on land (item 10).

The potential impacts that would be removed as a result of the decision to replace the solid causeway with an open-piled jetty substructure include:

- loss of local seagrass and other benthic communities due to placement of the causeway on the seafloor, light reduction and smothering by silt plumes (item 16)
- interruption of movement of seawater, sand and seagrass wrack (shed leaf material) along the coast; potential pooling of seawater and temperature effects caused by the interruption of coastal processes (item 17)
- poor water quality (for abalone health) at Yumbah's seawater intakes caused by silt plumes (item 18)
- impacts on adjacent marine communities (exceed marine disposal guidelines for protection of marine communities) caused by the use of potentially contaminated dredge spoil to construct causeway (item 19)
- poor water quality (contaminants) at Yumbah's seawater intake caused by the use of potentially contaminated dredge spoil to construct causeway (item 20).

An updated risk assessment has been completed for spillage of fuel or hydraulic fluids during construction (item 8), piling (item 11) and operation of the wharf facility (item 40), which are relevant to the revised design (see Appendix G). The level of residual risk associated with each of the potential impacts was identified as 'low' or 'as low as reasonably practicable', and therefore 'acceptable'.

No new risks have been identified as a result of the revised design.

Chapter 26 – Environmental Management Framework of the Draft EIS provided the basis for implementing and tracking the effectiveness of all control measures.

06. ENVIRONMENTAL MANAGEMENT FRAMEWORK

The Draft Construction Environmental Management Plan (CEMP) and Draft Operational Environmental Management Plan (OEMP) would be updated to reflect the revised impact assessments. Any conditions set as part of planning consent would also need to be considered in future revisions of the plans.

The revised design removes the following environmental aspects associated with marine disturbance:

- dredging (previously required for the berth pocket)
- seagrass clearance (from dredging and construction of the causeway)
- interruption of coastal processes (caused by a solid causeway).

The revised design removes the following activities:

- construction of the berth pocket (dredging)
- causeway construction.

Section 26.2.3 of the Draft EIS identified the detailed, stand-alone management plans that would be required to address specific activities of the development. The revised design removes the requirement for a Dredge Management Plan.

Contingency planning is an important component of a robust management system. The environmental management framework for the KI Seaport would also consider extraordinary events, such as unexpected weather events or the need to use specialised plant or equipment, as part of continuous risk assessment protocols implemented during planning, construction and operation.

07. COMMITMENTS

The Draft EIS presented a list of explicit commitments associated with the KI Seaport (see Table 27-1 of the Draft EIS). These commitments have been reviewed for relevance to the revised design and as the understanding of construction methodology has improved. The commitments that no longer apply are shown in Table 7-1.

TABLE 7-1 COMMITMENTS NO LONGER APPLICABLE FOR KI SEAPORT

Identifier	Draft EIS Chapter/Section	Commitment
Design and infrastructure based		
GSW6	16.5.2	The dredge spoil dewatering system has been designed to discharge water with acceptable sediment levels. No untreated dredge water would be discharged directly into the marine environment or into the adjoining Smith Creek.
CCS9	19.4.4	Designing the causeway structure for a 1-in-500-year storm event (that is, a 10 per cent encounter probability over the 50-year life of the structure) on the basis that the wave modelling undertaken demonstrates that the additional engineering required to meet this standard is not significantly greater than for lesser storm event frequencies. Causeway maintenance (for example, replacement of a small percentage of armour rocks) would be required after major storm events.
AC9	11.5.8	If considered necessary, an open bypass system could be installed in the near-shore section of the causeway to minimise the interruption to tidal currents. This could comprise either large culverts or a pier, the size of which would be determined by hydrodynamic modelling. Given the small predicted maximum increase in temperature such a measure is not considered essential and it needs to be recognised that the benefit of such a bypass system may be offset by compromising the protective barrier formed by the causeway in relation to effluent from the degraded Smith Creek during rainfall events.
AC10	11.5.8	It may be possible to engineer a gated culvert through the causeway that could fulfil a dual function by allowing through-flows during summer (thereby managing the risk of small temperature increases). The gate could then be closed during other months and thereby facilitate the redirection of Smith Creek discharges further offshore during major flow events (particularly during autumn and winter) thus improving nearshore water quality.
MWQ5	9.5.2	The fines content of material used in the causeway core construction will be minimised in order to minimise the impact of plume due to causeway construction.
MWQ6	9.5.2 10.5.1	The length of exposed causeway core before geotextile fabric and armour placement will be minimised in order to minimise the impact of plume due to adverse sea states, and erosion prior to rock armouring, during causeway construction.
Equipment based		
NVL34	18.4.5	Low-noise-impact techniques such as suction piling or vibro-piling should be used in preference to impact piling where possible.
Process methodology		
MNES4	14.4.3	Evaluating alternative piling methodologies that have lower noise emissions.
NVL34	18.4.5	Low-noise-impact techniques such as suction piling or vibro-piling should be used in preference to impact piling where possible.

The design change has resulted in no new commitments. Modified commitments, due to changes in design, are included in Table 7-2.

TABLE 7-2 COMMITMENTS MODIFIED FOR KI SEAPORT'S CHANGED DESIGN

Identifier	Draft EIS Chapter/Section; (Addendum Chapter/Section)	Commitment
Schedule based		
NVL39	18.4.5 (4.6)	Strict protocols will be adopted during construction to mitigate the potential impact of pile driving on marine mammals. Protocols will include: • risk assessments on likelihood of observing marine mammals in the development area • using a 'soft start' in which the piling impact energy would be gradually increased over 10 minutes to deter fauna from remaining close enough to risk injury after operations reached normal levels • establishing a 1 km shutdown zone around the site, equivalent to the most conservative distance threshold to prevent permanent hearing damage • monitoring of this zone, with an additional buffer area, by marine mammal observers, perhaps complemented by acoustic equipment to detect mammals; pile driving would stop if a marine mammal was sighted in the zone • avoid pile driving at night, when it might be difficult to detect marine mammals.
Process methodology		
MWQ4	9.5.1 (4.5)	Real-time monitoring and reactive management will provide protection against acute plume impacts at key sensitive receptors including: • monitoring water quality at the Yumbah seawater intakes and at an appropriate location between construction activities and the seawater intakes • water quality monitoring sensors that provide 'real time' data on water quality via telemetry • assessing monitoring data in 'real time' against threshold triggers • providing the monitoring data in 'real time' to the construction contractors, KIPT environmental management personnel and EPA • triggering audible stop work alarms on construction activities if thresholds are exceeded • construction activities cease until turbidity levels return to acceptable levels and have stabilised. Turbidity trigger exceedances would be closely monitored and the timescale for management response actions would be short (~30 minutes) in order to be of practical benefit in mitigating acute plume impacts.

08. CONCLUSIONS

By extending the jetty further offshore there is no longer a requirement for either a capital dredging program or ongoing maintenance dredging. As a consequence, the potential risks associated with elevated suspended sediment loads to land-based aquaculture, the mobilisation of toxicants, pollutants or other contaminants, elevated pathogen levels and changes in the nutrient status of the waters of Smith Bay have all been addressed.

Removing the causeway from the design addresses all of the concerns raised that the KI Seaport could adversely affect coastal processes at Smith Bay. The suspended piled jetty would not impede currents or waves; it would have no effect on seawater temperatures and would allow any sand and wrack to move freely along the shore; diatom productivity would remain unaffected and the risk of harmful algal blooms would not change.

The increased distance from the berth face to Yumbah's seawater intakes (an additional 250 metres) is likely to have added benefits by decreasing the proximity between the shipping activities (manoeuvring, loading and unloading) to Yumbah's seawater intake pipes.

The only benthic communities that would be directly affected during construction of the jetty would be located where the piles would be driven into the seafloor. Approximately 0.02 ha of benthic communities (mostly seagrass) would be directly affected by the placement of the piles, and an additional 0.5 ha from shading seagrass. The previous design of dredge and causeway would have affected approximately 7.5 ha.

There would be no significant impacts on the southern right whale as a result of the revised design.

The revised design removes the potential risks associated with importing rock material and dredging, and does not introduce any additional risks to the biosecurity status of Kangaroo Island.

Underwater piling noise would not be expected to increase, but impact thresholds may extend a further 250 metres into Smith Bay in keeping with the extended jetty. Terrestrial noise impacts would decrease slightly as a result of moving noise-generating ship-loading activities further offshore. Lighting would remain compliant with the requirements of the relevant Australian standards at all sensitive receptor locations.

The revised change would reduce the overall visual amenity impact that the KI Seaport is expected to bring to Smith Bay because the jetty and pontoon infrastructure would be less conspicuous in the coastal environment than a rock armoured causeway closer to the shore. The increased length of the offshore infrastructure (jetty) would mean that the infrastructure and berthed vessel would be less visually imposing.

The revised design significantly reduces the potential impacts of the KI Seaport on the environment at Smith Bay and resolves many of the significant concerns raised in submissions from government agencies, Yumbah Aquaculture and members of the public.

09. REFERENCES AND FURTHER INFORMATION

REFERENCES

Department of Agriculture and Water Resources (DAWR) 2015, *Anti-fouling and in-Water Cleaning Guidelines*, DAWR, Canberra.

Department of the Environment, Water, Heritage and the Arts (DEWHA) 2008, EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales, DEWHA 2008, viewed 17 September 2019, <https://www.environment.gov.au/resource/epbc-act-policy-statement-21-interaction-between-offshore-seismic-exploration-and-whales>.

Resonate 2018, *Kangaroo Island Plantation Timbers EIS – Environmental Noise Impact Assessment*, report A17557RP1, rev. A, Resonate Consultants, Adelaide.

WEBSITES

The Smith Bay Wharf Draft EIS and copies of all submissions are available on the Department for Planning, Transport and Infrstructure's (DPTI's) website

<https://www.sa.gov.au/topics/planning-and-property/land-and-property-development/building-and-property-development-applications/major-development-applications-and-assessments/proposals-currently-being-assessed/kangaroo-island-plantation-timber-port-at-smith-bay>.

DPTI guidelines for preparing the environmental impact assessment, June 2017

<https://www.sa.gov.au/__data/assets/pdf_file/0015/312207/Final-Guidelines-for-KI-Plantation-Timber-at-Smith-Bay>.

Additional information can be found at:

<http://smithbayeis.com>.

<https://kipt.com.au>.

10. ABBREVIATIONS AND GLOSSARY

ABBREVIATIONS

Abbreviation	Definition
BOD	Biological oxygen demand
CEMP	Construction Environmental Management Plan
COD	Chemical oxygen demand
DAC	Development Assessment Commission
DoEE	Department of the Environment and Energy (Clth)
DPTI	Department of Planning, Transport and Infrastructure (SA)
DWT	deadweight tonnage
EIS	Environmental Impact Statement
EMP	Environment Management Plan or Environmental Management Plan
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Clth)
FIT	Forestry Investment Trust
FOB	free-on-board
KIPT	Kangaroo Island Plantation Timbers Ltd
MAZ	Marine Activity Zone
MNES	Matters of national environmental significance
MWO	Mitsui Bussan Woodchip Oceania
NOAA	National Oceanic and Atmospheric Administration
NVC	Native Vegetation Council
OEMP	Operational Environmental Management Plan
PTS	permanent threshold shift
SEL	sound exposure level
TSS	temporary threshold shift
tpa	tonnes per annum

GLOSSARY

Term	Definition
Amenity (visual)	The pleasantness of a place taken in by sight.
Anoxic	Lacking in oxygen.
Aquaculture	The cultivation of aquatic organisms (including fish, shellfish and crustaceans) for the purposes of human use or to replenish wild stocks.
Baseline	A basic standard, level or initial known value usually regarded as a reference point for comparison.
Bathymetry	Measurement of depth of water in oceans, seas, or lakes.
Benthic community	Animals and plants that live on the bottom of the ocean floor.
Benthic sheer stress	The force necessary to transport sediments along the sea floor or into the water column.
Berthing basin	A designated location in a wharf structure used for mooring vessels when they are not at sea.
Biofouling	Growth of marine organisms on the surfaces of underwater structures such as ship hulls.
Biosecurity	Security measures taken against the transmission of disease to the plants or animals of a particular region.
Buffer area	A designated area of land within or around the Project area used to identify and study matters of national environmental significance.
Catchment	An area of land, usually surrounded by mountains or hills, over which water flows and is collected.
Causeway	A raised road, path or railway on top of an embankment usually across a broad body of water, low or wet ground.
Cutter suction dredging	A stationary dredger equipped with a cutter device that excavates the soil before it is sucked up by the flow of the dredge pump(s).
Deadweight tonnage (DWT)	DWT is a measurement of the total contents of a ship including cargo, fuel, fresh water, ballast water, provisions, passengers and crew. Often used to specify a ship's maximum permissible weight.
Deep-water port	A port which has the capability to accommodate a fully laden Panamax and/or Handymax ship, the size of which ship is determined principally by the dimensions of the Panama Canal's lock chambers.
Delaminated (concrete)	A splitting apart into layers.
Dewater	Remove or drain groundwater or surface water from a riverbed, construction site, caisson, or mine shaft, by pumping or evaporation.
Diatom	A single celled alga that has a cell wall of silica.

Term	Definition
Diatoms	Single-celled algae.
Dolphin (mooring)	A man-made marine structure that extends above the water level and is not connected to shore. Usually installed to provide a fixed structure for berthing and mooring of vessels when it would be impractical to provide a dry-access facility. See also Guide/restraint dolphins and mooring dolphin.
Dredge spoil	The sediment, rock, sand and soil removed from the ocean floor during the excavation process.
Dredging	An excavation activity using heavy machinery to remove earth from the bottom of the ocean or river.
Dumb barge	A barge without an engine that needs to be towed.
Entrained/re-entrainment	When something is drawn in and transported by the flow of a gas or liquid.
Exotic organisms	Plants or animals, which are introduced by human intervention to a non-native region or ecosystem.
Free-on-board (FOB)	This term indicates whether the seller or the buyer is liable for goods that are damaged or destroyed during shipping.
FSC Mix Credit	An FSC Mix Credit claim contains 100% FSC credit material. When this claim is used, somewhere in the supply chain (Chain of Custody, COC) there has been a mix with FSC controlled wood (CW).
Geotextile	A strong synthetic fabric that stabilises loose soil and prevents erosion.
Guide/restraint dolphins	Guide dolphins are dolphins used to guide ships to dock. Restraint dolphins are dolphins used to keep a floating structure at its station.
Handymax vessel	A naval architecture term for bulk cargo ships in the Handysize class which typically have a capacity between 40,000 to 50,000 deadweight tonnage.
Hydrodynamic modelling	The study of fluids in motion by simulating currents, water levels, sediment transport and salinity.
Intertidal shore	The shore between the high and low tide marks.
Jack-up barge (piling)	A barge that has the capacity to hydraulically lift itself to its operational height above sea level using three or four legs that are lowered to the sea floor.
Lee side	The sheltered side of something; the side away from the wind, currents or waves.
Linkspan	A type of drawbridge used mainly in the operation of moving vehicles on and off a roll-on/roll-off vessel or ferry, which particularly allows for changes in water levels.
Longshore drift	Various coastal processes such as wind, climate, waves, currents and tides create landforms along the coast.
Low frequency cetaceans	A hearing group which has a generalised hearing range of 7 Hz to 35 kHz.
Macroalgae	Refers to several species of macroscopic, multicellular marine algae which form a plant.
Marine ecology	The scientific study of living things in the ocean and how they interact with each other and their surrounding environment including abiotic (non-living) factors.
Marine pests	Marine plants or animals which are introduced by human intervention to a non-native marine environment and have a harmful effect on that environment.
Matters of National Environmental Significance (MNES)	Matters of national environmental significance are defined in the *Environmental Protection and Conservation Biodiversity Act 1999*, which provides a legal framework for the protection of important features in the environment.
Mooring dolphin	An isolated marine structure for mooring of vessels.
Native Vegetation Council (NVC)	An independent statutory body charged with monitoring the overall condition of South Australia's vegetation and making decisions on wide ranging matters concerning native vegetation in the state.

Term	Definition
Offsets	Actions taken outside a development area to 'compensate' for environmental impacts created within the development area that relate directly to the conservation values affected by the development.
Particulate	Also referred to as particulate matter (PM), aerosols or fine particles. Particulates are tiny particles of solid (smoke) or liquid (aerosol) suspended in a gas. They range in size from less than 10 nanometres to more than 100 micrometres in diameter.
Pathogen	A bacterium, virus, or other microorganism that can cause disease.
Plume	Refers to a column of one fluid moving through another. The term may be used in the context of air or water.
Pontoon	An air-filled structure providing buoyancy.
Red tide	A harmful algal bloom with a higher-than-normal concentration of a microscopic alga (plantlike organism). They become so numerous that they discolour coastal waters.
Risk	A concept that denotes a potential negative impact to an asset or some characteristic of value, including objectives that may arise from some present process or future event. Risk is measured in terms of 'consequence' and 'likelihood'.
Risk management	The process of measuring, or assessing, risk and developing strategies to manage it. The culture, processes and structures that are directed towards effective management of potential opportunities and adverse effects.
Rock armouring	The piling of rocks to provide the causeway with appropriate stability and to protect it from damage through water erosion.
Seagrass wrack	Marine vegetation that is floating in the sea or has been cast ashore.
Seismic	Relating to earthquakes or other vibrations of the earth and its crust.
Sensitive receptor/receiver	People or other organisms that may have a significantly increased sensitivity or exposure to contaminants by virtue of their health, age, proximity to the contamination or the facilities they use.
Silane	One of a group of silicon hydrides which, applied to concrete, will protect it from surface damage. They either impregnate the pores in the concrete to reduce absorption of water and salts or form an impregnable layer that prevents materials from passing.
Silt plumes	A flow of silt through water.
Spalled (concrete)	Spalled concrete is caused by moisture in the concrete pushing outward from the inside and forcing the surface to peel.
Splash zone	The area above the high tide level that is regularly splashed but not submerged by ocean water.
Subtidal	Below the low-tide mark to a shallow depth of water.
Suspended jetty	A jetty extending over water, anchored and supported only at the shore.
Tailwater	Water below a dam or waterpower development; or excess surface water draining.
Telemetry	Automated process by which measurements and other data are collected at remote or inaccessible points and transmitted to receiving equipment for monitoring.
Toxicants	Any toxic (or poisonous) substance.
Turbidity	The amount of fine, solid particles, such as clay and organic matter, that are suspended in water and that prevent light from being transmitted. This results in a loss of transparency, or 'cloudiness'.
Vegetation	A general term for all plant life.
Vessel	Any kind of vessel used in navigation by water and includes 'an installation' and 'any floating structure'.

Term	Definition
Winnowing (sediments)	The removal of fine sediment from coarser sediment by wind or flowing water.
Wrack	Material such as seaweed or seagrass that is cast up onto the seashore by waves.

APPENDICES

LIST OF APPENDICES

Appendix A – Relevant Guidelines

4. REVISED DESIGN

Guideline		Draft EIS	Addendum to the Draft EIS
2.4	Describe coastal engineering requirements for the location, orientation and type of causeway and wharf structures.	See Section 4.4	No causeway See Section 3
2.5	Outline the materials that will be used to construct the causeway, including any treatment that the materials may have been subject to, prior to immersion in the water.	See Sections 4.4.4 and 4.4.5	No causeway See Sections 3.1.3 and 3.3
2.7	Describe any dredging activity that will be undertaken during the construction phase.	See Sections 4.4.4 and 4.5.2	No dredging
3.9	Outline strategies to monitor, control and manage biofouling of wetted surfaces.	See Sections 4.6.3 and 4.7	See Section 3.3.1
13.2	Identify strategies to protect the causeway and wharf structures from extreme weather events, including a 1-in-50-year event.	See Section 19.4.4	See Section 3.4
14.13	Describe strategies to ensure public safety during construction and operation.	See Sections 4.6.8 and 21.3	See Section 3.2.2
18.3	Describe the rationale for the major design elements of the proposed development and measures to mitigate their visual impact.	See Sections 4.4 and 23.6	See Section 3
19.3	Outline the timing of construction and the time of year it is likely to occur.	See Section 4.1.4	See Sections 3.1.4 and 3.2.3
19.5	Assess the requirement for any hazardous exclusion zones around the proposed causeway and wharf during ship loading activities, including the tug harbour.	See Sections 4.5.1 and 4.6.8	See Section 3.3.4
19.10	Where possible, identify the source and origin of construction materials for buildings and infrastructure (including roads) and the opportunity for the use of recycled materials.	See Sections 4.5 and 4.6.1	See Section 3.2
19.11	Provide information about the transport and storage of construction materials to minimise effects on the local environment.	See Sections 4.5 and 4.6.1	See Section 3.2
19.16	Detail long-term management/maintenance arrangements for the operation and decommissioning of the facility, including the ownership of land and infrastructure, sand management and any coastal protection measures.	See Sections 4.7 and 4.9	See Sections 3.4 and 3.6
19.17	Describe the rehabilitation strategy to be adopted if the development ceases prior to completion, during any stage of the development or during its operational phase. Include details on funding for any rehabilitation that may be required.	See Sections 4.9.2, 4.9.3 and 4.9.5	See Section 3.6

5. REVISED IMPACT ASSESSMENT AND MANAGEMENT

5.2 Marine Water Quality

Guideline		Draft EIS	Addendum to the Draft EIS
2.07	Describe any dredging activity that will be undertaken during the construction phase. Outline impacts that dredging may have on sediment loads and the neighbouring commercial aquaculture operation. Detail measures for managing these impacts, including management of dredge spoil, noting that all dredging should be undertaken in accordance with the Environment Protection Authority's Dredging and Earthworks Drainage Guideline – June 2010.	See Sections 4.4.4, 4.5.2, 9.5.1, 9.5.3, 9.5.4, 9.5.5, 11.5.1, 12.5.4, 16.5.2 and Appendices F2, F3, H1, H2 and U1	No dredging
2.16	Outline measures to protect water quality and the marine environment from shipping activities, especially turbulence during docking and manoeuvring. Include turbidity impacts on any identified shellfish or other filter feeders and on macro algal habitats in the region.	See Sections 9.5.6, 9.5.7, 9.5.8 and 12.5.4	See Section 4.3 and Appendix C
2.20	Identify the risks from the exposure of fine sediments or clays that would impact adversely on water quality (turbidity and light penetration) and contribute to the production of sediment plumes in the region during both construction and operation phases. Outline the impacts this may have on commercial aquaculture activities in the region.	See Sections 9.5.1, 9.5.2, 9.5.3, 9.5.4, 10.5.6, 11.5.1, 11.5.2, 11.5.3 and Appendices F2, F3, H1 and H2	See Sections 4.2.3 and 4.4 Appendix C
2.21	Describe, and provide baseline information on, the level of oceanic connectivity between the proposed development site and the intake areas used by commercial aquaculture ventures in the region (include observed information from hydrodynamic and coastal process modelling undertaken for a minimum of 6 months) and identify the impacts that the construction and use (including ship movements) of the proposed in-sea components of the proposal will have on this connectivity.	See Sections 9.5.1, 9.5.2, 9.5.8, 11.5.1, 11.5.2, 11.5.3 and Appendices F2 and F3	See Section 4.2.3 and Appendix C

5.3 Coastal Processes

Guideline		Draft EIS	Addendum to the Draft EIS
2.17	Detail measures to protect foreshore areas during and after construction, including potential marine and terrestrial protection areas and associated buffers.	See Chapter 11, Sections 10.5.1, 10.5.6, 10.5.7 and Appendix G	See Section 4.3.3
2.18	Describe, and provide baseline information on, the existing seabed profile, bathymetry, sedimentary profiles (including particle sizes), sand movement, water flow and tidal movement patterns through and around the proposed causeway, rock wall and wharf structure area.	See Sections 10.4.1, 10.4.2, 10.4.3, 10.4.6, 10.5.1 and Appendices F1 and G	No causeway See Appendix C
2.19	Identify any possible changes to the seabed, bathymetry, sedimentary profiles (including particle sizes), and sand movement water flow and tidal movement patterns as a result of the development during both the construction and operational phases (include information on potential pooling of water upstream from the proposed causeway). Identify the impacts this may have on sensitive marine flora and fauna (including seagrasses, macro algae and other reef habitat), and commercial aquaculture activities in the region, and outline mitigation strategies.	See Sections 10.5.2, 10.5.3, 10.5.4, 10.5.5, 10.5.6, 10.5.7, 11.5.1, 11.5.2, 11.5.4, 11.5.5, 12.5.4 and Appendix G	No causeway See Appendix C

Guideline		Draft EIS	Addendum to the Draft EIS
2.20	Identify the risks from the exposure of fine sediments or clays that would impact adversely on water quality (turbidity and light penetration) and contribute to the production of sediment plumes in the region during both construction and operation phases. Outline the impacts this may have on commercial aquaculture activities in the region.	See Sections 9.5.1, 9.5.2, 9.5.3, 9.5.4, 10.5.6, 11.5.1, 11.5.2, 11.5.3 and Appendices F2, F3, H1 and H2	See Sections 4.2, 4.3, 4.4, 6.0 and Appendix C
17.5	Identify geological, seabed and substrate impacts that may occur as a result of any dredging activity that will be undertaken during the construction phase. Detail measures for managing these impacts.	See Sections 9.1, 9.5.1, 9.5.3, 9.5.5, 9.6, 10.5.6, 10.5.7, 10.6 and Appendices F1, F2, F3 and G	No dredging

5.4 Land-Based Aquaculture

Guideline		Draft EIS	Addendum to the Draft EIS
2.7	Outline impacts that dredging may have on sediment loads and the neighbouring commercial land-based aquaculture operation. Detail measures for managing these impacts, including management of dredge spoil.	See Sections 4.4.4, 4.5.2, 9.5.1, 9.5.3, 9.5.4, 9.5.5, 11.5.1, 11.5.2, 11.5.3 and Appendices F2, F3, H1, H2 and U1	No dredging
2.14	Describe the potential impacts of increased shipping traffic and activities in Smith Bay from offshore anchoring, transhipment or pilotage (especially on marine fauna, water quality, recreational activities and amenity), including effects on commercial aquaculture activities in the region.	See Chapter 14, Sections 9.5.6, 9.5.7, 9.5.8, 9.6, 11.5.1, 12.5.2, 12.5.4 and Appendices F3 and I2	See Sections 4.2.3 and 4.4
2.19	Identify any possible changes to the seabed, bathymetry, sedimentary profiles (including particle sizes), and sand movement water flow and tidal movement patterns as a result of the development during both the construction and operational phases (include information on potential pooling of water upstream from the proposed causeway). Identify the impacts this may have on sensitive marine flora and fauna (including seagrasses, macro algae and other reef habitat), and commercial aquaculture activities in the region, and outline mitigation strategies.	See Sections 10.5.1, 10.5.2, 10.5.3, 10.5.4, 10.5.5, 10.5.6, 11.5.1, 11.5.2, 11.5.4, 11.5.5, 12.5.4 and Appendices G, H1 and H2	No causeway See Appendix C
2.20	Identify the risks from the exposure of fine sediments or clays that would impact adversely on water quality (turbidity and light penetration) and contribute to the production of sediment plumes in the region during both construction and operation phases. Outline the impacts this may have on commercial aquaculture activities in the region.	See Sections 9.5.1, 9.5.2, 9.5.3, 9.5.4, 10.5.6, 11.5.1, 11.5.2, 11.5.3 and Appendices F2, F3, H1 and H2	See Sections 4.2, 4.3, 4.4, 6.0 and Appendix C

Guideline		Draft EIS	Addendum to the Draft EIS
2.21	Describe, and provide baseline information on, the level of oceanic connectivity between the proposed development site and the intake areas used by commercial aquaculture ventures in the region (include observed information from hydrodynamic and coastal process modelling undertaken for a minimum of 6 months) and identify the impacts that the construction and use (including ship movements) of the proposed in-sea components of the proposal will have on this connectivity.	See Sections 9.5.1, 9.5.2, 9.5.8, 11.5.1, 11.5.2, 11.5.3 and Appendix F2	See Section 4.2.3 and Appendix C
2.22	In addition to the above, outline all other potential impacts on the nearby commercial aquaculture ventures, their likelihood and severity, and identify mitigation measures that will be used and their effectiveness (include efficiency reports on silt curtains and sand filters if proposed).	See Section 11.5 and Appendix H	See Section 4.4

5.5 Marine Ecology

Guideline		Draft EIS	Addendum to the Draft EIS
2.1	Provide baseline information on, and undertake a comprehensive risk analysis that identifies, the key ecological assets of the site (including, but not limited to, any communities and species of conservation significance, migratory species, seagrasses, macro algae and other reef habitat).	See Sections 12.4.1, 12.4.2, 12.4.3, 12.5.5 and Appendix I1	See Section 4.2 and Appendix C
2.2	Identify how the major aspects of construction and operation might impact upon the identified ecological assets (as identified from 2.1 above). Outline mitigation strategies associated with the process and identify any residual risks that will need to be managed.	See Chapter 14, Section 12.5 and Appendices I2, I4 and I5	See Section 4.5
2.3	Describe the impacts of the port and wharf construction (including causeway, associated berthing pocket, rock wall, retaining structures and mooring dolphins) on the foreshore, intertidal, seabed and benthic communities (especially any nursery/spawning areas) Describe measures that will be undertaken to mitigate these impacts.	See Section 12.5 and Appendices I4 and I5	See Section 4.5.3
2.6	Describe the impacts of drilling or screw piling activities on marine communities, in particular turbidity, disturbance (including of any harmful soil types or contaminants), vibration and underwater noise on vulnerable or sensitive receptors and any mitigating measures that may be used.	See Sections 12.5.4, 12.5.5, 12.5.6, 18.4 and Appendices I2, I4 and N	See Sections 4.2.3, 4.5.3 and 4.8
2.7	Describe any dredging activity that will be undertaken during the construction phase. Outline impacts that dredging may have on sediment loads and the neighbouring commercial aquaculture operation. Detail measures for managing these impacts, including management of dredge spoil, noting that all dredging should be undertaken in accordance with the Environment Protection Authority's Dredging and Earthworks Drainage Guideline – June 2010.	See Sections 4.4.4, 4.5.2, 9.5.1, 9.5.3, 9.5.4, 9.5.5, 9.6, 11.5.1, 12.5.4 and Appendices F2, F3, H1, H2 (Part C) and U1	No dredging
2.14	Describe the potential impacts of increased shipping traffic and activities in Smith Bay from offshore anchoring, transhipment or pilotage (especially on marine fauna, water quality, recreational activities and amenity), including effects on commercial aquaculture activities in the region.	See Chapter 14, Sections 9.5.6, 9.5.7, 9.5.8, 9.6, 11.5.1, 12.5.2, 12.5.4 and Appendices F3 and I2	See Sections 4.2.3 and 4.4

Guideline		Draft EIS	Addendum to the Draft EIS
2.16	Outline measures to protect water quality and the marine environment from shipping activities, especially turbulence during docking and manoeuvring. Include turbidity impacts on any identified shellfish or other filter feeders and on macro algal habitats in the region.	See Sections 9.5.6, 9.5.7, 9.5.8 and 12.5.4	
2.19	Identify any possible changes to the seabed, bathymetry, sedimentary profiles (including particle sizes), and sand movement water flow and tidal movement patterns as a result of the development during both the construction and operational phases (include information on potential pooling of water upstream from the proposed causeway). Identify the impacts this may have on sensitive marine flora and fauna (including seagrasses, macro algae and other reef habitat), and commercial aquaculture activities in the region, and outline mitigation strategies.	See Sections 10.5.1, 10.5.2, 10.5.3, 10.5.4, 10.5.5, 10.5.6, 11.5.1, 11.5.2, 11.5.4, 11.5.5, 12.5.4 and Appendices G and H1	No causeway See Sections 4.2, 4.3, 4.5 and Appendix C
9.1	Quantify and detail the extent, condition and significance of native vegetation (individual species and communities) that currently exist on site, and within the immediately adjacent sites, including the coastal and marine environment (in particular seagrasses, macro algae and other reef habitat).	See Sections 12.4.1, 12.4.2, 12.5.4 and Appendix I1	See Section 4.5 and Appendix C
9.3	Quantify and detail the extent, condition and significance of native vegetation (individual species and communities) that may need to be cleared or disturbed during construction and the ability of communities or individual species to recover, regenerate or be rehabilitated.	See Section 12.5.4	See Section 4.5.3
9.4	Describe measures to deliver any significant environmental benefit that is required by the *Native Vegetation Act 1991*. Identify measures to minimise and mitigate vegetation clearance, including incorporating any remnant stands in the layout design, and to compensate for any loss of native vegetation and habitat.	See Section 12.5.4	See Section 4.5.3
9.5	Identify impact avoidance, minimisation and mitigation measures and detail their effectiveness.	See Chapter 15, Sections 12.5.4, 13.5.2 and Appendices I4 and I5	See Section 4.5
9.7	Quantify and detail the extent, condition and significance of native fauna (individual species and communities) that currently exist on site, and within the immediately adjacent sites, including the coastal and marine environment.	See Chapter 14, Sections 12.4.1, 12.4.2, 12.4.3, 13.4.2 and Appendices I1, I2, I3, J2 and K2	See Sections 4.5, 4.6.1 and Appendix C
9.8	Quantify and detail the extent, condition and significance of potential native fauna habitat loss or disturbance during the construction and operation phases (both on and around the site) and the ability of communities and individual species to recover, especially for resident or migratory shore birds and threatened or significant species (including those listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the South Australian *National Parks and Wildlife Act 1972*).	See Chapters 14, 15, 18, Sections 12.1, 12.5, 12.6, 13.5.3, 18.5.5 and Appendices I2, I5 and N	See Section 4.5 and Appendix C
9.10	Detail the potential impact, including cumulative impacts, on marine fauna, both during construction and operation, including ecologically and economically important species (e.g. fisheries).	See Sections 12.1, 12.5, 12.5.11, 12.6 and Appendices I2, I4 and I5	See Sections 4.5 and 4.6
9.12	Identify all potential sources of noise emissions, vibration and light pollution from the construction and operation of the proposed development. Describe their impacts on native fauna, including nocturnal species, and how these impacts will be managed.	See Chapter 18, Sections 12.5.6, 13.5.3, 13.6.2 and Appendix N	See Section 4.8

Guideline		Draft EIS	Addendum to the Draft EIS
9.13	Identify impact avoidance, minimisation and mitigation measures and detail their effectiveness.	See Chapter 15, Sections 9.5,10.5, 11.5, 12.5, 13.5.3, 18.5.5 and Appendices I2, I5 and N	

5.6 MNES

Guideline		Draft EIS	Addendum EIS
1.5	Describe in detail all components of the proposal (including the background to the proposal, construction, operation and, if relevant, the decommissioning). Include the precise location of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the proposal that may have impacts in the above listed MNES. Include details on how the works are to be undertaken and design parameters for those aspects of the structures or elements the proposal that may have relevant impacts.	See Chapters 1, 4 and Section 14.4	See Sections 1.1, 3.1 and 4.6.2
1.6	Describe all the relevant impacts the proposal may have on the above listed MNES, include impacts during the construction (e.g. noise, habitat clearing or modification), operation (e.g. potential vehicle/vessel strike during road/shipping transport of timber product) and (if relevant) decommissioning phases of the project. Include information on: • the nature and extent of the likely direct, indirect and consequential impacts (short-term and long-term) (refer to the Significant Impact Guidelines 1.1 – Matters of National Environmental Significance, Commonwealth of Australia, 2013) • whether any relevant impacts are likely to be unknown, unpredictable or irreversible • technical data and/or other information used to make a detailed assessment of the relevant impacts • how Indigenous stakeholders' views of the proposal's impacts to biodiversity and cultural heritage have been sought and considered.	See Sections 12.5.2, 14.4 and Appendix J3 See Sections 12.5.2, 14.4 and Appendix J3 See Tables 14-2, 14-3, 14-4, 14-5, 14-6, 14-7, 14-8, 14-9 and 14-10 See Chapters 12, 13, 21, Appendices I2, I4, J2, J3, K1, K2, K3 and K6 See Section 7.3	See Section 4.6.2
1.7	Identify and address cumulative impacts, where potential impacts are in addition to existing impacts of other activities (including known potential future expansions or developments by the proponent and other proponents in the region and vicinity).	See Section 14.4.1 and Appendix K3	See Section 4.6.2
1.8	Provide information (substantiated, specific and detailed descriptions) on proposed avoidance and mitigation measures, based upon best available practices, to avoid and manage the relevant impacts of the proposal on the above listed MNES. Include a description of the outcomes that the avoidance and mitigation measures will achieve and an assessment of the expected or predicted effectiveness of the avoidance and mitigation measures (including the scale and intensity of impacts of the proposal and the on-ground benefits to be gained through each of these measures).	See Section 14.4 and Appendix K3	See Section 4.6.2 and 4.6.4

Guideline		Draft EIS	Addendum EIS
1.9	Provide a consolidated list of mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action, including mitigation measures proposed to be undertaken by State governments, local governments or the proponent.	See Appendices K5, U1 and U2	See Sections 4.6.2 and 4.6.4
1.10	Provide information of any statutory or policy basis for, the mitigation measures.	See Appendix K3	See Sections 4.6.2 and 4.6.4
1.11	Provide a detailed outline of a plan for the continuing management, mitigation and monitoring of the impacts on the above listed MNES. Include provisions for any independent environmental auditing. Include the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program.	See Appendices K5, U1 and U2	
1.12	Provide details of the likely residual impacts on the above listed MNES that are likely to occur after the proposed measures to avoid and mitigate all impacts are taken into account. Include reasons as to why the avoidance or mitigation of impacts is not reasonably achieved and identify the significant residual impacts on the above listed MNES. If residual impacts are likely, include details of the proposed offset package to be implemented and an analysis of how the proposed offset meets the requirements of the EPBC Act Environmental Offsets Policy (2012).	See Sections 14.4.3, 14.4.4, 14.4.5 and 14.4.6 See Section 14.5 and Appendix K6	See Section 4.6.3
1.13	Describe how the proposal is consistent with any relevant EPBC Act guidelines, recovery plans, management plans, threat abatement plans, Marine Bioregional Plans and conservation advice for the above listed MNES (species and communities).	See Sections 14.4.3, 14.4.4, 14.4.5, 14.4.6 and Appendix K3	See Section 4.6.2
1.17	Provide an overall conclusion as to the environmental acceptability of the proposal on each of the above listed MNES, including: • discussion on the considerations with the requirements of the EPBC Act (including the objectives of the Act, the principles of ecological sustainable development and the precautionary principle) • reasons justifying undertaking the proposal in the manner proposed, including the acceptability of the avoidance and mitigation measures • if relevant, a discussion of residual impacts and any offsets and compensatory measures proposed or required, and the relative degree of acceptability. Include the reasons why residual impacts are not avoidable.	See Section 14.7 See Section 14.6 See Section 14.4 and Appendix K3 See Section 14.5 and Appendix K6	See Sections 4.6.2, 4.6.3 and 4.6.4

5.7 Biosecurity

Guideline		Draft EIS	Addendum EIS
3.3	Outline strategies to monitor for the early detection of marine exotic organisms at or near the site, especially on and around the causeway and wharf.	See Section 15.5.5 and Appendix U2	See Section 4.7.2
3.9	Outline strategies to monitor, control and manage biofouling of wetted surfaces.	See Sections 15.5.3, 15.5.4 and Appendix U2	See Section 4.7.2

5.8 Noise and Light

Guideline		Draft EIS	Addendum EIS
2.6	Describe the impacts of drilling or screw piling activities on marine communities, in particular … vibration and underwater noise on vulnerable or sensitive receivers and any mitigating measures that may be used.	See Section 18.4	See Section 4.8.1
12.1	Detail the expected levels of environmental noise associated with the construction and operation of the development, identifying all potential noise sources, and describe the impact upon the immediate and wider locality (include sensitive receivers).	See Sections 18.2 and 18.3	See Section 4.8.1
12.2	Identify if the predicted noise from ongoing operational sources associated with the project will meet the noise goals in the Environment Protection (Noise) Policy 2007 (Noise Policy) at the nearest noise sensitive receivers.	See Section 18.3.4	See Section 4.8.1
12.4	Detail how construction noise will meet the mandatory construction noise requirements of Part 6, Division 1 of the Noise Policy.	See Section 18.3.4	See Section 4.8.1
12.5	Detail what reasonable and practicable measures will be taken pursuant to Clause 23(1)(c) of the Noise Policy to minimise construction noise.	See Section 18.3.4	See Section 4.8.1
12.6	Identify the sources and expected levels of light pollution associated with the construction and operation of the development. Describe the impact upon the immediate and wider locality (including sensitive receivers), and outline mitigation measures.	See Section 18.5	See Section 4.8.1

5.9 Climate Change and Sustainability

Guideline		Draft EIS	Addendum EIS
13.1	Outline the potential effects of climate change on the proposed development (including predicted sea level rise in line with Coast Protection Board allowances) from a risk management perspective, including adaptive management strategies.	See Sections 19.3 and 19.4.4	See Section 4.9
13.2	Identify strategies to protect the causeway and wharf structures from extreme weather events, including a 1-in-50-year event, and to include mitigation strategies should the structure not withstand such an event.	See Section 19.4.4	See Section 4.9

5.10 Visual Amenity

Guideline		Draft EIS	Addendum EIS
18.2	Describe and illustrate the visual effect of the proposed development on the locality when viewed from important viewing points, including from the land and sea.	See Section 23.5.2 and Appendix R2	See Section 4.10 and Appendix F

5.11 Heritage

Guideline		Draft EIS	Addendum EIS
16.6	Identify measures to protect any historic shipwrecks within the port and coastal area during construction, in accordance with the *Historic Shipwrecks Act 1981*.	See Chapter 26, Sections 24.5.3, 24.5.4 and Appendix U1	See Section 4.11

6. EM FRAMEWORK

Guideline		Draft EIS	Addendum EIS
1.9	Provide a consolidated list of mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action, including mitigation measures proposed to be undertaken by state governments, local governments or the proponent.	See Draft CEMP (Appendix U1) and Draft OEMP (Appendix U2)	See Section 6
2.16	Outline measures to protect water quality and the marine environment from shipping activities, especially turbulence during docking and manoeuvring. Include turbidity impacts on any identified shellfish or other filter feeders and on macro algal habitats in the region.	See Draft OEMP (Appendix U2)	See Section 6
2.17	Detail measures to protect foreshore areas during and after construction, including potential marine and terrestrial protection areas and associated buffers.	See Draft CEMP (Appendix U1) and Draft OEPM (Appendix U2)	See Section 6
3.5	Detail the response procedure that will be followed in the event of a new exotic organism being detected.	See Biosecurity Response Procedure in Draft OEMP (Appendix U2)	See Section 6
3.9	Outline strategies to monitor, control and manage biofouling of wetted surfaces.	See Draft OEMP (Appendix U2)	See Section 4.7.2
19.6	Identify all sources of waste during construction and operation and describe how the State Waste Strategy will be implemented.	See Draft Waste Management and Minimisation Plan (Appendix U5)	See Section 6

Appendix B – Submissions

ID	Submission name	In-document reference (if applicable)	Source comment	Draft EIS chapter
1376	DEW		‘A significant and unjustified increase in construction cost would be unjustifiable’ p. 44. A cost/benefit analysis did not appear to be provided to support this statement.	3 – PROJECT ALTERNATIVES
1372	Yumbah	p. 77	Proponent summarily eliminates all other options.	3 – PROJECT ALTERNATIVES
1372	Yumbah	p. 77	Acknowledges environmental impact could be reduced, but refuses to pay to do so.	3 – PROJECT ALTERNATIVES
1372	Yumbah	p. 77	DEIS does not consider revised proposal and circumstances.	3 – PROJECT ALTERNATIVES
1372	Yumbah	p. 82	CHEAPEST ISN'T BEST. The DEIS presents findings from an evaluation of alternative structures (in water). The preference for the solid causeway combined with a suspended deck is described as: '… the most cost-effective option for the causeway to approximately 8 metre depth, after which a suspended deck in deeper water would be more cost-effective.' The DEIS main report (p. 43) discusses the evaluation of: '...twelve possible combinations of approach structure (three alternatives) and berth face (four alternatives), and a wide range of approach lengths, giving rise to considerable variation in the resulting dredge volume. The main considerations in the evaluation were the anticipated environmental impact and the expected construction cost. It considers environmental and economic factors as relevant, yet ignores the existence of Yumbah's abalone farm immediately adjacent.	3 – PROJECT ALTERNATIVES
1372	Yumbah	p. 83	The DEIS (p. 44) states: The most favoured structure (a combined approach with a causeway leading to a suspended deck jetty and floating pontoon) would also be the least expensive to construct and would have relatively low environmental impact. A significant and unjustified increase in construction cost would be required to reduce the environmental impact any further. It is Yumbah's view that KIPT could reduce the impact to the environment, it just doesn’t want to pay the bill.	3 – PROJECT ALTERNATIVES
1372	Yumbah	p. 77	Minimising cost is the primary determinant driving KIPT to choose a solid causeway in Smith Bay.	3 – PROJECT ALTERNATIVES
1372	Yumbah	p. 81	THE EVER-CHANGING CAUSEWAY. The proposed in-water infrastructure involves construction of a 250m long solid causeway - not 200 metres as in the Guidelines. This increased length has not been accounted for in modelling and dredging tests.	3 – PROJECT ALTERNATIVES
1372	Yumbah	p. 81	The causeway is extended with a linkspan bridge to a floating pontoon for vessel mooring and timber loading. It is Yumbah's view that this scale and intrusion is clearly at odds with the coastal landscape of Smith Bay.	3 – PROJECT ALTERNATIVES
1372	Yumbah	p. 83	BETTER THAN A CAUSEWAY. The suggestion of open culverts or bridge sections with the causeway provides little advantage. The only option to protect coastal currents is an open-piled jetty with the berth pocket extended further offshore.	3 – PROJECT ALTERNATIVES

The ID numbers are from an index of the public submissions received on the Draft EIS. All public submissions (and the index) are located on DPTI’s website: <https://www.sa.gov.au/topics/planning-and-property/land-and-property-development/building-and-property-development-applications/major-development-applications-and-assessments/proposals-currently-being-assessed/kangaroo-island-plantation-timber-port-at-smith-bay>

ID	Submission name	In-document reference (if applicable)	Source comment	Draft EIS chapter
1372	Yumbah	p. 83	Reducing the solid nature of the seaport will assist also with reducing the incidence of marine biofouling of invasive marine species and concentration of disease agents such as toxic dinoflagellates within the nearshore environment.	3 – PROJECT ALTERNATIVES
635	Graham Walkom		If Smith Bay is approved, why not run the link-span type structure another 50m out and only use Handy and Handymax class vessels avoiding completely the need for dredging? Approval should not be given for such large vessels (Panamax) in such a shallow bay.	3 – PROJECT ALTERNATIVES
822*	Deborah Sleeman		Ballast Head for many years was the site of a large scale gypsum export facility which required sufficient depth for large ships to enter and exit. There would be no dredging requirements if this facility were to be used.	3 – PROJECT ALTERNATIVES
1056	Ian Turner		Smith Bay, as most who have ever had any meaningful contact with it would realise is not a deep bay. For it to even remotely cater for the vessels suggested in this proposal, it would need a huge amount of dredging which would have a devastating effect on the Bay's delicate and fragile ecology. Our family, and others in the immediate district would export their produce from Smiths Bay in the early days via the SS Karatta from an area known as 'The Landing'. Wool and grain (bagged) would be stacked at that area (well to the east) and when the ship arrived, it would anchor in the Bay; the produce loaded on drays pulled by horses that would then wade out into the Bay as far as they could go past the rocky shoreline, while bigger barge boats would be rowed in from the Karatta; the produce loaded onto them from the drays, then they would row back out to the Karatta and loaded on board – very inefficient multiple handling, but the best available at the time. The relevance being that if the Karatta, a small ship compared with the vessels proposed by KIPT could not get any closer, whereas it could dock at the Kingscote & Penneshaw jetties, it highlights the shallowness of Smiths Bay and the lunacy of such a proposal.	3 – PROJECT ALTERNATIVES
1374	EPA		p. 49 of Appendix F2 states that the modelling undertaken for the EIS is based on two scenarios – expected-case (wharf 450m offshore, dredge volume 100,000m3) and worst-case (wharf 370m offshore, dredge volume 200,000m3). In addition, based on Figures 5-11 and 5-12, it is difficult to determine if the modelled scenarios take into account the distance of the dredge footprint from the shoreline. If the worst-case scenario is required, the EIS predicts that the Yumbah Aquaculture intakes will be located within the zone of low to moderate impact (potential adverse impacts to aquaculture). It is unknown what factors may result in KIPT requiring to dredge under the worst-case scenario where potential impacts to the abalone farm are predicted. However it is noted that even under the expected scenario, it is predicted that suspended sediments at the intake pipes will still be potentially elevated between 4 - 6 times that of ambient conditions.	4 – PROJECT DESCRIPTION

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ID	Submission name	In-document reference (if applicable)	Source comment	Draft EIS chapter
1374	EPA		The predicted small increase in water temperature around the Yumbah water intakes may be a real issue of concern to the abalone farm. The EIS states that land based abalone farms are subject to pressure from water temperatures particularly when the temperature exceeds 21 degrees. A slight increase in water temperature associated with the proposed wharf has the potential to exacerbate the impact of heatwaves and the likely pressure from rising sea temperatures caused by climate change. Having said this, it may be true that the farm's water intakes are not climate change proof and will be subject to warmer waters in the future regardless of the proposed wharf. However, this should still be viewed as a high risk to continued operation of the abalone farm. The EIS (p. 226) offers the option of an open bypass system to be installed in the near-shore section of the causeway to minimise the interruption to tidal currents and reduce the risk of increased water temperatures at the abalone farm's water intakes. In light of the high risk that the EPA considers increased water temperature poses to the abalone farm, it is recommended that the bypass system in the near-shore section of the causeway should be properly investigated.	4 – PROJECT DESCRIPTION
1374	EPA		It is stated that up to 200,000m3 of material would be dredged whereas in other parts of the Executive Summary it is stated that 100,000m3 of material would be dredged.	4 – PROJECT DESCRIPTION
1374	EPA		Further details of the proposed dredge spoil dewatering process should be provided. The model used an input TSS from the dewatering system of 50 mg/L. It is considered that best practice dewatering should be able to achieve lower TSS than this and this will be expected in the EPA's dredging licensing process. The spoil material placement area has not been defined or proposed for maintenance dredging campaigns given the settlement ponds will no longer be an option in the future. It should be noted that sea based disposal will not be viewed favourably.	4 – PROJECT DESCRIPTION
1376	DEW		There is limited detail as to causeway construction, only a broad description. Of particular interest is the management of fill so that it cannot be re-suspended into the water column and transported from the site, including under larger wave and/or storm scenarios. It is not known whether the proposed source rock for the breakwater (a quarry on KI) suitable in terms of size and type.	4 – PROJECT DESCRIPTION
1376	DEW		As stated above the mitigation or management strategies proposed for sand and wrack management are vague and require clarification. This includes who is responsible for its management should it be required, the trigger for taking management action, the methodology for wrack management (machinery, use of foreshore etc.), potential impacts on the area/s where the wrack is to be placed, environmental impacts if sand and wrack is not adequately managed.	4 – PROJECT DESCRIPTION

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ID	Submission name	In-document reference (if applicable)	Source comment	Draft EIS chapter
1372	Yumbah	p. 128	ARE DREDGE VOLUMES ADEQUATE FOR THE CAUSEWAY? Estimated dredge volumes are from 100 000m3 to 200 000m3, but the actual minimum volume of spoil required to construct a causeway 250 metres long and five metres high is not quantified. There is risk that volumes of dredged spoil may not be enough to construct the causeway. Alternatively, surplus spoil may be dredged in excess of causeway construction requirements. What is the intention if either of these scenarios is encountered? This weakness in the draft EIS demands further exploration and requires an adequate understanding of the sediment characteristics, which is yet to be achieved.	4 – PROJECT DESCRIPTION
1372	Yumbah	p. 77	Causeway in new design 50m longer than stipulated in DAC Guidelines.	4 – PROJECT DESCRIPTION
1372	Yumbah	p. 121	ERRORS AND OMISSIONS The causeway crest would be wide enough for one-way vehicular access, with two passing areas along the causeway length. Causeway road to be 5m wide, but it's to have two passing areas alongside it. The two areas cannot be seen on the current plans.	4 – PROJECT DESCRIPTION
1372	Yumbah	p. 129	KIPT has not presented plans to dredge to the required three metres with the assumed presence of 1.6 m of the seabed being hard sea floor. Its 2017 drilling rig sediment sampling survey conducted for core acquisition via 10 tonnes of drilling hydraulic pressure yielded low penetrations prior to core refusal consistently below one metre for all samples except for site SB7.2 (Appendix F) which was sampled to 1.4 metres below the seabed. The interpretation of the geotechnical/borehole data cannot be confirmed for >1-3 metres of marine sediments due to core refusal by the hard sea floor. Irrespective of these significant limitations to sampling and analysis in this draft EIS KIPT is attempting to build an argument on inaccurate, flawed data. For Yumbah – and, we expect, for regulators and the science they should be able to rely on - this is a serious breach of corporate and ethical responsibility.	4 – PROJECT DESCRIPTION
1372	Yumbah	p. 129	The presence of a very hard substrate (possibly consolidated material) underlying a veneer of unconsolidated sediments that may require Cutter Suction Dredge (CSD) grinding, and subsequently a better understanding of this third class (Class 3) of dredge material. The CSD has the potential to generate very fine particles from the dredge-header grinding the hard substrate into material and small particle diameters. This will lead to a greater dispersion of fine sediment beyond the current Impact Zones reported throughout the draft EIS.	4 – PROJECT DESCRIPTION

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1372	Yumbah	p. 128	WHAT IF THE SEAFLOOR IS HARD? The draft EIS has not addressed the likelihood or consequences of encountering the hard sea floor, otherwise referred to as Class 3 unconsolidated sediment elsewhere in this document. It does not account for the risk of not achieving the desired dredge depth of three metres.	4 – PROJECT DESCRIPTION
679	Michael Fooks (Marine Fishers Association)		2a Causeway construction two questions what stops the spoil /fill washing away before it is armoured. at Emu bay during the ramp upgrade they were unable to contain mal fill in shallow water in an area less than 100 x100 metres no there are traces of limestone over 2k away on the eastern end of the beach.	4 – PROJECT DESCRIPTION
825(3)	Kirsty Buick		Firstly, with the construction of the Seaport, up to 200000m3 of seafloor will have to be dredged, causing a massive increase in the Total suspended Solids (TSS) within Smith Bay that will ultimately get sucked into the abalone farm from there intakes. It is mentioned that this 'Dredging' process will only take a few months, however, as KPT state they will be using a Cutter Suction Dredger, this particular Dredger can only be used in calm conditions. It can be safely said that Smith Bay is not a calm bay. Does this mean that the dredging process could in fact take a whole lot longer than a few months?	4 – PROJECT DESCRIPTION
679	Michael Fooks (Marine Fishers Association)		2b material for the armouring when the breakwater at Penneshaw was reinforced all the stone was sourced from the mainland and trucked a few rocks at a time via Sealink. Does KIPT understand the logistics of acquiring the quantity of material needed and getting it to sight.	4 – PROJECT DESCRIPTION
821	Rosalie Chirgwin		KIPT claim that they will be able to source primary rock armour for the causeway from a quarry at Chapman River (p.78, 459), but where is that quarry? In contradiction to the "Chapman River" quarry claim, KIPT say that they will source it from two nearby quarries (p. 445). However only one nearby quarry has the capacity to produce some armour rock and it appears that they have not been approached.	4. PROJECT DESCRIPTION
679	Michael Fooks (Marine Fishers Association)		1a It is noted that the dredging footprint extends to sea with little angle east and west this doesn't seem consistent with a practical approach angle from a panamax vessel so we believe that area of damage from propeller wash will extend outside of the proposed dredged area.	4 – PROJECT DESCRIPTION

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1054	Kate Welz		What measures will be taken regarding toxicity and marine pests, turbidity during dredging and monitoring where ballast water is collected/dumped? Is this all self regulated or are there independent bodies responsible for all of the above?	5 – LEGISLATIVE FRAMEWORK
1374	EPA		It is noted based on p. 157 of the main document, that the assumptions concerning the sediment composition used in the sediment plume modelling is based on the geotechnical investigation described in Appendix F1, Table 1. However, this table appears to only consider sediments sampled to a depth of 140 cm whereas Appendix C describes sediment characteristics from samples taken at depths of up to 17.5 m. Many of the borehole logs describe the sediment as fine sand, silt, clay at depths greater than the 140 cm reported in Appendix F1 which has been used to inform the plume model. Considering that dredging will occur to a depth of greater than 2m, many of the sediments described in the borehole logs will be disturbed and are likely to contribute to the turbidity plume. The EPA has concerns that this has not been reflected in the sediment plume modelling. In addition, based on Figure 6 and Table 1, the core samples used to assess sediment composition (SB) do not appear to adequately cover the proposed dredge footprint.	9 – MARINE WATER QUALITY
1374	EPA		Modelling has recommended that the dredging window occurs between October and May, as during winter plumes are more likely to travel in an easterly direction towards the abalone farm intakes. However water temperature during this time ranges from 18^{o}C to 20^{o}C. Increased water temperature coupled with increased turbidity may increase the risk of abalone mortalities particularly considering it is estimated that pumping water elevates the temperature by ~2^{o}C. Note: farms have recorded mortalities at 22-23^{o}C and the eco-toxicity study was conducted at a temperature of 18^{o}C for a period of 24 hours which may not reflect the actual conditions experienced during the dredging campaign.	9 – MARINE WATER QUALITY
1374	EPA		It is noted that suspended sediment loads experienced at Yumbah Narrawong in their Nyamat application, which are considered good for abalone farming, are higher than the ambient suspended sediment loads experienced at Smith Bay or potentially during the dredging campaign. However, it needs to be recognised that sediment composition may vary between locations as suspended sediment at Narrawong is the result of natural conditions whereas suspended sediment at Smith Bay will be the result of construction works therefore may vary in composition and will result in an increase in suspended loads above ambient conditions. Differences in duration of sediment plumes and water temperatures may also need to be considered.	9 – MARINE WATER QUALITY
1374	EPA		It is unclear why the 99th percentile has been used in triggers instead of the 95th percentile which is standard in other projects. The values used to delineate the zones of impact need to the clearly outlined in a table including what the total TSS/NTU will be taking into account the ambient conditions.	9 – MARINE WATER QUALITY

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1374	EPA		The modelling of benthic photosynthetically active radiation (PAR) revealed that PAR under ambient conditions ranged from: • 8–18 per cent surface irradiance over dense seagrass and macro-algae communities at 6 metres depth • 3–10 per cent over dense seagrass communities at 10 metres depth • 3–8 per cent over sparse seagrass communities at 14 metres depth. It can therefore be inferred that a drop in PAR to below 10 per cent could result in a reduction of seagrass vigour. Modelling presented in Appendix F2 of the 30-day average benthic PAR shows that only a small proportion of seagrass within Smith Bay would be likely to undergo such a reduction in PAR. This does not take into account a reduction in PAR from areas that are already below 10% PAR, whereby a further reduction will have significant effects. This section is vague and unclear. It is a very coarse assessment using only a 10 % boundary. It then automatically does not consider sparse seagrass communities in waters greater than 10 m deep as they already receive less than 10% SI. If these communities are present (as they are) this infers that there is enough light currently that allows growth and survival but these have not been included in the assessment. This would suggest that any seagrass in the area outlined in Figure 5-16 in Appendix F2 that will be exposed to a reduction in SI in waters deeper than 10 m may be impacted. There is a large area that appears to have a 5% reduction in SI which might be significant, particularly in deeper waters. It also infers habitat extent and condition without the data to support it. The benthic mapping is inadequate to support the assessment.	9 – MARINE WATER QUALITY
1372	Yumbah	p. 29	Further, removal of Class 3 sediment will result in dredging far exceeding the estimated worst case of 75 days.	9 – MARINE WATER QUALITY
1372	Yumbah	pp. 34, 35	Current field impacts are addressed in section 4.3 the draft of EIS sub appendix F2 to assess predicted changes in the proximal location to Yumbah KI inlets and outlets. The close-up figures of the differences in current velocities in the region of the aquaculture facility are not adequate. Finer current velocity intervals of 1-2cm/s rather than 10cm/s intervals (bottom panels of Appendix G Figures 6-8 and 6-9) are more representative and so should be applied. The use of incorrect current field data further discounts any of the conclusions outlined in the draft EIS on water quality impacts and effects on Yumbah KI	9 – MARINE WATER QUALITY
1372	Yumbah	p. 9	The causeway will be built from dredge spoil. Or not. KIPT's inadequate, outdated dredging tests leave another unknown: just what materials are in Smith Bay to actually dredge? And with what impact on the marine environment, and Yumbah's water quality?	9 – MARINE WATER QUALITY

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1372	Yumbah	p. 29	To further raise doubt in the results in Appendix F, total organic carbon (TOC) was reported at significantly higher concentrations in the one deeper sample of SB7.2	9 – MARINE WATER QUALITY
1372	Yumbah	p. 23	The claim of equivalence of core samples made with a drilling rig and those obtained by a solitary Scuba diver with a hammer and tube are farcical.	9 – MARINE WATER QUALITY
1372	Yumbah	p. 30	An understanding of the settleability of the dredge material is of paramount importance to understand the fate of disturbed sediment. Settleability needs to consider the deeper unconsolidated and consolidated (noting that small particle sizes are likely to be generated during CSD grinding) sediment horizons. The draft EIS cannot rely on settleability based on a small subset of samples that comprise only 25 per cent of the proposed maximum dredge depth.	9 – MARINE WATER QUALITY
1372	Yumbah	p. 24	A 250m solid impermeable causeway is proposed to be constructed, extending perpendicular to the coast. As a consequence, oceanic currents have been estimated to reduce by at least 30%, changing the hydrodynamic conditions of Smith Bay forever.	9 – MARINE WATER QUALITY
1372	Yumbah	p. 24	The construction of a 250m causeway in this location, a capital dredging program of an unconfirmed volume of spoil, tailwater discharges from dewatering of sediments on land, maintenance dredging and shipping operations will create turbid plumes that will extend for kilometres.	9 – MARINE WATER QUALITY
1372	Yumbah	p. 23	Even the data revealed by the incomplete sampling is flawed. The discovery of the hard substrate of Smith Bay as evidenced by core refusal suggests that Cutter Suction dredge (CSd) grinding may have to be used to excavate the seabed. The fine material (Class 3) produced by the grinding is not even contemplated or modelled by the proponent. Its volume is unknown and particle size distribution (PSd) is unknown. Likewise, the propensity of this class 3 material to remain suspended in the water column for a longer duration than the settling velocities measured for the shallower, unconsolidated sediment has been completely ignored by the proponent. Furthermore, the sand component of sediment estimated cannot be validated as sediment in the deeper profile has not been assessed; in essence, less than 30 per cent of the sediment has been profiled.	9 – MARINE WATER QUALITY
1372	Yumbah	p. 31	Romero (2019) states the use of 10 x (Zone of High Impact) and 5 x (Zone of Low to Moderate Impact) standard deviations above the 50th and 80th percentile means to define ecological impact thresholds from turbidity are unjustified. Romero deems there to be no ecological basis for these criteria. The suggested thresholds do not address seasonality in biotic receptors.	9 – MARINE WATER QUALITY

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1372	Yumbah	p. 31	The suggested turbidity thresholds do not address seasonality in biotic receptors. Ambient turbidity is highly correlated to wave climate in Smith Bay (Figure 2-10 in Sub-Appendix F2). The approach to define the impact thresholds does not seem to account for this sensitive period (mid-spring to mid-autumn), which from a benthic primary producer perspective is the worst-case timing to carry out the dredge program.	9 – MARINE WATER QUALITY
1372	Yumbah	p. 116	• Suspended solids – the zone of influence (i.e. extent of detectable plumes with no predicted ecological impact) is predicted to extend east and west along the coastline for approximately 5–6km for the expected case and approximately 8km for the worst case.	9 – MARINE WATER QUALITY
1372	Yumbah	p. 69	The risks to the farm will be exacerbated during summer when cumulative environmental impacts from the dredging and increased sediment loads are forecast, and following construction when wrack (seagrass and macroalgae) will accumulate, temperatures will be elevated and water will be poorly circulated.	9 – MARINE WATER QUALITY
1372	Yumbah	p. 127	there are gaps in the information KIPT relies upon in its geotechnical assessment of the dredge material. These gaps preclude an adequate understanding of the geotechnical properties of the dredge spoil and confirmation of whether the material will even support the causeway, the proposed rock armouring and be able to withstand constant oceanic impacts the causeway will be exposed to. It is unknown if the sediment sampling previously conducted attempted to characterise the dredge material to ascertain the suitability of dredge spoil for use as onshore fill and/or material for the causeway's core.	9 – MARINE WATER QUALITY
1372	Yumbah	p. 23	Yumbah does not have issue with the methodology of the modelling performed rather we question each and every piece of input to the models. Widely attributed to an IBM programmer, George Fuechsel, "Garbage in – Garbage out" is an apt metaphor for what happens when flawed data is fed into a system producing, unsurprisingly, nonsense output or garbage.	9 – MARINE WATER QUALITY
1372	Yumbah	p. 23	Locals know that the seabed is hard and composed of what is referred to as "ironstone". The unsurprising failure to drill into this hard floor is described in the proponents reports as "core refusal" which indicates unconsolidated material, possibly rock that may need to be ground to achieve the desired approach and berth depth.	9 – MARINE WATER QUALITY
1372	Yumbah	p. 23	Sediment sampling depths are not adequate as they do not extend to the depth of dredging. This is contrary to the National Assessment Guidelines for Dredging (NAGD) (2009) which require that the full depth be characterised.	9 – MARINE WATER QUALITY

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1372	Yumbah	p. 23	KIPT have failed to determine exactly the composition of the seabed that they plan to excavate. Because of this every conclusion that the draft EIS makes relating to dredging is suspect and invalid. Sampling results are presented where the majority of samples are outside of the dredge area and therefore cannot be claimed to be representative.	9 – MARINE WATER QUALITY
956	Grant Flanagan		Much is made of the benefits of the construction of the rock causeway to protect Yumbah from silt and nutrient discharges from Smith creek. It should be noted in the 15 years I have been here there has only been one occasion where this has been an issue. I have worked with Yumbah in a professional capacity on this issue and it can be resolved permanently and much more sustainably by revegetating the lower part of the creek and flood plain and some minor instream works at the mouth.	9 – MARINE WATER QUALITY
1095	Jeanette Gellard		The use of dredging plant and equipment may potentially result in spills of fuel, oil and other contaminants. Shipping contaminants could be discharged to the marine environment at Smith Bay. Leachate from woodchips and logs is likely to contain tannins and phenols and could enter groundwater or stormwater runoff. In all the above situations inadequate plans to deal with the risks have not been outlined in the EIS.	9 – MARINE WATER QUALITY
819	Charmaine Zealand (Mollys Run)		Proposed dredging activities to gouge over 100,000 cubic metres of the floor of Smith Bay, and the ongoing port operations and inevitable continued dredging requirements will significantly impact on the marine environment and specifically visiting ritual of the highly endangered Southern Right Whales, and Dolphins.	9 – MARINE WATER QUALITY
819	Charmaine Zealand (Mollys Run)		Sediment plumes and colloidal suspension from construction dredging and ongoing maintenance dredging, chemical and fuel spill risk will not only destroy the viability of the Abalone Farm, and the marine environment generally.	9 – MARINE WATER QUALITY
1366	Trent D'Antignana		The proposed dredging is anticipated to impact an area of approx. 9ha beginning at the 11.5m contour line with the area dredged to a depth of 13.5m (Appendix H, p. 11). However, reviewing the sediment characterisation data (Appendix F, pg. 8) it appears the sampling regime is inadequate to accurately assess the sediment profile of the area. Not only are most of the sampling sites outside of the dredge area, the sediment cores were not taken to the depth of the proposed dredging. Whilst this may have been due to the presence of rock below the sampling area, which presents a whole new problem which remains un-addressed in the EIS, it is clear, that the sediment profiling does not accurately depict the potential sediments to be dredged. Thus, significant questions arise as to the validity of the modelling and its ability to accurately predict the distribution of sediment, the extent of the sediment plumes, settleability, concentration and ultimately the amount and type of sediment likely to be pumped on to the abalone farm. Consequently, all the modelling can be viewed as inaccurate.	9 – MARINE WATER QUALITY

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1366	Trent D'Antignana		The proposed seaport is less than 500m from the Smith Bay, Yumbah Aquaculture site hence the dredging program and associated sedimentation poses a significant risk to the welfare of the farmed stock. It is recognised within the EIS that the capital dredging program has the potential to raise the TSS at the Yumbah Aquaculture seawater intakes (Appendix H, pg. 9) however the impacts of the sedimentation on abalone health are understated by Cheshire (2018). Specific issues related to the EIS and sedimentation on abalone welfare are raised below: - The modelling as a result of incomplete sediment characterisation cannot accurately predict the extent dredging may impact the amount of sediment which is pumped into the farm.	9 – MARINE WATER QUALITY
867	John Hodgson (Kangaroo Island Eco Action)		The Draft EIS identifies that 100,000 to 200,000 cubic metres of material will be removed from the proposed berthing area during construction. This material will be de-watered in a series of ponds, the resultant water will be returned to the bay, and the 'spoil' will be selectively used to build a causeway. This part of the construction will take 30-75 days. It cannot be guaranteed that all dredged sediment will be removed from the site, and during this phase Smith Bay's benthic communities will be exposed to elevated levels of turbidity and sediment, above background levels, and in addition to that disturbed by natural storm events. There is a risk that the dredged sediment, that remains in Smith Bay will have elevated nutrient levels due to rain and storm events causing the Smith Bay creek to break out after eroding its banks. It is a reasonable assumption that sediments from this creek and from nearby farming activity have released nutrients into Smith Bay over many years. These nutrients may have accumulated and been 'locked' in the sediments that become disturbed during dredging.	9 – MARINE WATER QUALITY
707	Nicholas Savva (Australian Abalone Growers Assoc)		The KPT EIS report neglects to properly describe the impacts of elevated TSS and sediment resuspension that would be created during construction, maintenance dredging and operation of the seaport. The report attempts equate sand particles with silt. Whereas abalone are well adapted to the rigors of high energy marine environments and the sand present there they are much less tolerant of fine silts and clays and the high bacteria loads typically associated with such sediments. (McShane 2019)	9 – MARINE WATER QUALITY
1066	Ken Rowe (KI Shellfish)		3. As oyster farmers in the Kangaroo Island Aquaculture Industry we would also not want to see any increased turbidity or sediment levels affecting the water quality in ports around Kangaroo Island. There is a risk that any significant disturbance of the benthic environment may stir up potentially toxic phytoplankton cysts, known to cause issues with oyster health and human consumption issues.	9 – MARINE WATER QUALITY

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1366	Trent D'Antignana		Considering it is well established that seagrasses stabilise marine sediments preventing coastal erosion and minimising the resuspension of sediments during storm events, their removal from the region is likely to create turbidity issues that will be exacerbated at the Yumbah Smith Bay farm. Further, it is recognised within nearshore farming operations that seagrass photosynthesis plays an important role in the diurnal fluctuations is dissolved oxygen (DO), increasing during the day and decreasing during the night. Given the increase in DO during the day facilitates abalone food metabolism, higher carrying capacities and improved oxygen availability during summer, any reduction in seagrass is likely to have a negative impact on abalone production. It remains unclear as to what extend the reduction in seagrass habitats both directly and indirectly has been factored in to the hydrodynamic, sediment transport and wave models. This should be further assessed by KIPT.	9 – MARINE WATER QUALITY
1366	Trent D'Antignana		A reduction in nearshore circulation combined with dredge spoils, and the anticipated reduction in seagrass communities would ultimately result in increased TSS during and after storm events.	9 – MARINE WATER QUALITY
1098	Alan Noble (AusOcean)	p. 15	The tidal currents will transport dredged-up materials back and forth along the coast over a 7.2 km total range, twice a day, throughout the spring portion of the tide cycle. On top of that, the subtidal currents during winter could carry it an additional 4.3 km. The prevailing Stokes Drift would push the material onshore and to the east.	9 – MARINE WATER QUALITY
1098	Alan Noble (AusOcean)		Due to not separating the two time and two frequency domains of variability, an important connotation is ignored, which is that the negative impact of the dredging could be minimised by dredging only during summer, and only during neap tidal periods.	9 – MARINE WATER QUALITY
867	John Hodgson (Kangaroo Island Eco Action)		Dredging will have a direct effect on many of the algal and seagrass species in the direct path of dredging operations and local species will be severally impacted. The effects of disturbed and suspended sediments will negatively affect other flora some distance from the areas actually dredged. Should the KIPT port proposal proceed much of this ecological damage will be permanent, because the dredged area(s) will accumulate sediments, as will the 'lee' or eastern side of the proposed causeway which will require periodic dredging. During both construction and operational phases vessel operations in Smith Bay are most likely to disturb sediments.	9 – MARINE WATER QUALITY
956	Grant Flanagan		The EIS does not address the on-going impact of storm surges on the seabed disturbed by dredging. These winter storms in particular are significant and are likely to continue to increase base level silt and turbidity in the bay increase. As an indication of the strength of these storms last year the breakwater of the new Emu Bay Boat ramp was washed away last winter and this is a much more sheltered site than the Smith Bay port.	9 – MARINE WATER QUALITY

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ID	Submission name	In-document reference (if applicable)	Source comment	Draft EIS chapter
1372	Yumbah	p. 30	The causeway will significantly reduce ocean currents by up to an estimated 40 per cent, which in turn will result in elevated water temperatures, reduced mixing and supply of fresh water, accumulation of seagrass wrack and overall compromise the oceanic conditions abalone are so reliant on. Oceanic currents are vital to abalone farming. Circulation and mixing of marine waters guarantee the high-quality seawater that sustains the abalone. Reduced seawater quality will significantly impact Yumbah's ability to continue its business.	10 – COASTAL PROCESSES
1376	DEW		The extent of assessment of alternate structures to minimise impacts (mainly environmental) is unclear. From a coastal impact perspective, an open jetty structure in lieu of a solid breakwater would likely minimise impacts on coastal processes and the coastal and marine environment. Table 3-9 (p. 43) includes an assessment of the environmental/cost impact of each structure with the table identifying the suspended deck/piled suspended deck structure having the second least impact but this does not appear to be quantified or discussed in detail. The assessment data should be made available, with supporting analysis, to support the chosen design. There may also have been omissions in the base data, for example: "Design life, maintenance cost and construction duration were excluded for the sake of simplicity" p. 44.	10 – COASTAL PROCESSES
1376	DEW		CMB notes the report's advice that modelling concluded that wrack accumulation against the breakwater would not be a significant issue. However, given that this is a major development on the coastline with the potential for widespread environmental impacts, a detailed and transparent assessment of wrack accumulation for alternative designs would seem warranted. Further, factors such as ongoing operational and maintenance costs of alternative structures are not included – this may be substantial if different structures significantly impact sand and wrack accumulation. Details as to how wrack may be moved (equipment, and how it accesses the foreshore etc.) are also not provided.	10 – COASTAL PROCESSES
1376	DEW		Modelling predicts that local processes will be altered as a consequence of the causeway, with impacts likely to be present in the lee of the structure (to the east). Impacts are expected to be reduced wave energy, reduction in current velocity, increased temperature (p. 203-204). These impacts are not considered to be significant in terms of nearshore processes, however they are discussed in isolation and the cumulative effects may be more environmentally significant than assumed.	10 – COASTAL PROCESSES

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1376	DEW		It is stated in Appendix G that dense benthic flora assemblages will act to stabilise the seabed and limit active sediment transport. However, an area of these assemblages will no longer be present after the works, and this may impact on effectiveness of the adjacent assemblages in stabilizing the seabed, in terms of ability to maintain the density of the assemblages, combined with an increase in turbidity, increased water temperatures etc. These cumulative impacts may destabilise the seabed and increase sediment transport. The modelling appears to have only been undertaken for current conditions.	10 – COASTAL PROCESSES
1376	DEW		Whilst modelling indicates that seagrass wrack accumulation will not be a significant issue, the mitigation strategies proposed for sand and wrack management are vague and require further consideration in the context of an operational wharf.	10 – COASTAL PROCESSES
1376	DEW		The risk assessment should consider 'cumulative' impacts for each activity as this may increase the consequence.	10 – COASTAL PROCESSES
1372	Yumbah	p. 24	Changes to the light environment, reduced circulation of nearshore waters and elevated water temperatures increase the risk of harmful algal blooms at Smith Bay with potential catastrophic impacts on Yumbah's farmed abalone.	10 – COASTAL PROCESSES
1372	Yumbah	p. 32	The statement 'Coastal circulation impacts are not expected to result in reduced flushing of Smith Bay waters' in Appendix G must be demonstrated.	10 – COASTAL PROCESSES
1372	Yumbah	p. 31	The placement of a solid causeway to the east has the potential to alter the typical flushing patterns with a potential to increase the recirculation of the facility's outlet waters to the inlets. The potential for changes to the very nearshore flushing of Yumbah KI's outlet waters due to the presence of the proposed causeway and any impacts/risks in terms of recirculation of the outlet waters into the Yumbah KI facility's intakes has not been addressed.	10 – COASTAL PROCESSES
1372	Yumbah	pp. 33, 35	• Though risk reference Item 8 in Table 4-1 of EIS Appendix G identifies the hazard, modification to seagrass wrack accumulation, the basis for a consequence of "minor" and likelihood of "possible" is not supported • Further, mitigation measures only change the residual likelihood and not the residual consequence (note this comment also applies to reference Item 6 in Table 4-1, and it is uncertain why changes in residual likelihoods to references 2 and 3 are included with no [nil] mitigation measures noted) • The inherent and residual risk for seagrass wrack accumulation is not supported.	10 – COASTAL PROCESSES
1372	Yumbah	p. 27	Construction of the causeway would affect nearshore circulation with potential to change sedimentation and resuspension processes due to changes in benthic sheer stress in the vicinity of the causeway and in the dredged areas.	10 – COASTAL PROCESSES

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1372	Yumbah	p. 26	Construction of the causeway would affect nearshore circulation with potential to increase the temperature of Yumbah's intake water due to reduced mixing in the vicinity of the causeway with potential lethal impact on farmed abalone.	10 – COASTAL PROCESSES
1372	Yumbah	33	Romero (2019) has highlighted the need for additional information, including: A description of the seagrass wrack dynamics of Smith Bay; Predictions of the effect of the proposed development on the seagrass wrack dynamics of Smith Bay.	10 – COASTAL PROCESSES
1372	Yumbah	9	The causeway is an impermeable barrier that will block and modify oceanic currents, reducing tidal flow by 30-40 per cent and increasing water temperature not more than 300 metres from Yumbah's intake pipes. While the draft EIS says causeway gates or culverts will help alleviate issues for Yumbah, KIPT also argues such mitigation is "unnecessary".	10 – COASTAL PROCESSES
1372	Yumbah	p. 109	The proposed solid causeway will produce a "Climate Change" event for Yumbah KI.	10 – COASTAL PROCESSES
1372	Yumbah	p. 118	Causeway incompatible with Yumbah KI operation. Seaport proposal includes a rock-armoured solid causeway extending 250m offshore - longer than that originally proposed to the DAC. Causeway construction proposes materials derived from dredging. DEIS fails to understand what materials are in Smith Bay to dredge. Causeway impact will be perpetual, not just a construction issue.	10 – COASTAL PROCESSES
1372	Yumbah	p. 118	Impermeable barrier will block, change oceanic currents. Current directions periodically alternate between the dominant directions of easterly during flood tides and westerly during ebb tides. DEIS says currents will reduce by 30-40%. Changed ocean mixing and flushing increase water temperature.	10 – COASTAL PROCESSES
1372	Yumbah	p. 118	DEIS proposes ineffective mitigation, says it's 'unnecessary'. DEIS indicates causeway gates or culverts will help water exchange. Proponent doesn't provide detail - but further indicates it doesn't support this.	10 – COASTAL PROCESSES
1372	Yumbah	p. 126	Causeway impact on coastal processes. The causeway will reduce ocean currents by an estimated 30-40 per cent, which, in turn, will bring elevated water temperatures, reduced mixing of oceanic water, accumulation of drift seaweed (wrack) and compromised oceanic conditions.	10 – COASTAL PROCESSES

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1372	Yumbah	p. 79	WRACK ISSUES. The DEIS reports that accumulated drift seagrass and macroalgae (wrack) will occur as a consequence of the construction of the causeway. This potential accumulation is absolutely unacceptable as it has the potential to significantly impact Yumbah's KI intakes and abalone health.	10 – COASTAL PROCESSES
1372	Yumbah	p. 80	Accumulation of drift seagrass and other macroalgae will clog intake pipes and degrade water quality. The extent of the degradation and potential impacts on Yumbah KI and Smith Bay are lacking in the EIS, and Romero (2019) has highlighted the need for additional information, including: a description of the seagrass wrack dynamics of Smith Bay; predictions of the effect of the proposed development on the seagrass wrack dynamics of Smith Bay; impacts of the predicted changes of seagrass wrack dynamics on the source waters to Yumbah KI's abalone farm.	10 – COASTAL PROCESSES
1372	Yumbah	p. 79	Amendments to the risk assessment. Though the risk reference item 8 in Table 4-1 of EIS Appendix G identifies the hazard, modification of seagrass wrack accumulation, the basis for the consequence of 'minor' and likelihood of 'possible' is not supported. Further, mitigation measures only change the residual likelihood and not the residual consequence (Note this comments also applies to reference item 6 in Table 4-1, and it is uncertain why changes in residual likelihoods to references 2 and 3 are included with no (nil) mitigation measures noted.) The inherent and residual risk for seagrass wrack accumulation is not supported.	10 – COASTAL PROCESSES
1372	Yumbah	p. 79	The DEIS admits issues will be prevalent around the causeway Drift seagrass and macroalgae (wrack) may sometimes accumulate against the causeway in response to prevailing winds and currents, but is likely to disperse naturally. The situation would be monitored and managed if and when required. Where will it disperse if a big solid eyesore of a causeway is blocking its natural passage? Will it dissolve or simply disappear into thin air. What situation will be monitored and how will it be managed? How much wrack needs to accumulate before it becomes a problem for KIPT? Who will be responsible for the continuous cleaning of the beaches?	10 – COASTAL PROCESSES
1372	Yumbah	p. 116	Oceanic circulation – causeway construction will significantly impact sea currents and the accumulation of wrack.	10 – COASTAL PROCESSES
1372	Yumbah	p. 31	The suggested benefits of the causeway - with an emphasis on the effect to Yumbah KI seawater intakes - is flawed. The suggested benefit to Yumbah KI's inlet turbidity reduction from such very infrequent 1:10 AEP Smith Creek storm events does not justify the causeway's construction. According to Romero (2019), the simulated large discharge and sediment loads are not verifiable. The modelling of smaller storm events is required to demonstrate the frequency, magnitude and duration of any suggested benefit.	10 – COASTAL PROCESSES

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1372	Yumbah	p. 24	A 250m solid impermeable causeway is proposed to be constructed, extending perpendicular to the coast. As a consequence, oceanic currents have been estimated to reduce by at least 30%, changing the hydrodynamic conditions of Smith Bay forever.	10 – COASTAL PROCESSES
1372	Yumbah	p. 24	Therefore, the model does not consider the full extent of impact, distribution of sediment, plumes, settle ability, concentration, reduction in photosynthetically active radiation (PAr) or intake at pipes. In the light of this the Dredging program and proposed mitigation must be completely reassessed as what is proposed in the draft EIS is completely flawed.	10 – COASTAL PROCESSES
1372	Yumbah	pp. 30, 31	The causeway will significantly reduce ocean currents by up to an estimated 40 per cent, which in turn will result in elevated water temperatures, reduced mixing and supply of fresh water, accumulation of seagrass wrack and overall compromise the oceanic conditions abalone are so reliant on.	10 – COASTAL PROCESSES
1372	Yumbah	pp. 33	The risk of wrack accumulation on the quality of the source waters to Yumbah KI's abalone farm is lacking and must be addressed, particularly given the close proximity of the proposed development to the inlet pipes.	10 – COASTAL PROCESSES
1068	Bevan Patterson		To dredge up to 200,000 cubic metres of the bay and then build a causeway 250 metres into the bay which would change the normal tidal flows could be a disaster environmentally for this shallow water bay.	10 – COASTAL PROCESSES
819	Charmaine Zealand (Mollys Run)		Oceanic currents will be altered as a result of the 450 metre groin to be built.	10 – COASTAL PROCESSES
825(3)	Kirsty Buick		The EIS also mentions that the fresh seawater, after passing into the abalone farms intakes and through the farm, returns back into Smith Bay up to 2 degrees warmer than it was when first being sucked onto the farm, especially during the warmer months. With westerly currents and tidal movements that would normally keep Smith Bay flowing with cooler water, how can KPT guarantee that the water temperatures will only rise 0.2 degrees?	10 – COASTAL PROCESSES
1366	Trent D'Antignana		The hydrodynamic modelling predicts that the maximum temperature increase as a result of the causeway will only be 0.2^{o}C (Appendix H, p. 65). Whilst this value appears small, it should not be understated. Having worked with abalone, once the water temperature rises above 22^{o}C, survival is directly correlated to temperature with small increases having a profound impact on survival. Since the water temperature increases as the water passes though the farm, any increase in conductivity between the effluent water and the incoming water as a result of changes in nearshore circulation will further result in an artificial rising of the seawater temperature. Though Cheshire recognises that farming practices will raise the temperature profile of the water by up to	10 – COASTAL PROCESSES

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			2ºC (Appendix H, pg. 15), it remains uncertain whether this factor has been considered in the modelling. Further, Cheshire (2018) only refers to the depth averaged temperature data and does not explore what might be the temperature increase during heat waves and or dodge tides. Since acute temperature spikes induce mortality, modelling the impacts of the causeway during dodge tides and extreme weather events should have been conducted.	
1366	Trent D'Antignana		The changes in nearshore circulation and the resulting increase in water temperature and conductivity between effluent and incoming water will also likely increase the bacterial load in the water which is pumped on the farm. Given, abalone are susceptible to vibriosis during summer (Hooper et al, 2014), it can be expected that a reduction in water circulation will exacerbate the issue resulting in higher mortality.	10 – COASTAL PROCESSES
956	Grant Flanagan		The establishment of a 250m Rock Causeway will certainly change shoreline and benthic deposition patterns in the bay. The change in beach deposition in Hog Bay after the construction of a much shorter breakwater at Penneshaw is well known and described.	10 – COASTAL PROCESSES
1366	Trent D'Antignana		The accumulation of seagrass wrack against the causeway will also have a negative impact on the water quality used to culture the abalone. The decomposition of the seagrass will deprive the water of oxygen whilst releasing hydrogen sulphide, tannins and nutrients into the water, factors that are known to kill marine organisms and would certainly want to be avoided near a high intensity abalone farm.	10 – COASTAL PROCESSES
1366	Trent D'Antignana		An increase in the production of seagrass wrack or the reduction in its nearshore removal will have a direct physical impact on the farm, smothering the intake pipes and causing blockages. Not only will this have a direct impact on the welfare of the abalone it will also increase pumping costs and reduce profitability.	10 – COASTAL PROCESSES
1098	Alan Noble (AusOcean)	p. 15	I would expect the dynamics of the littoral drift of sand and dissolved substances at Smith Bay to be similar to those observed over many years along the Adelaide metropolitan beaches. There, the alongshore drift is caused by the same sort of subtidal flow during winter, with tidal currents primarily acting as “turbulence” keeping suspended particulates from sinking, and the process reinforced by Stokes Drift due to the waves.	10 – COASTAL PROCESSES
1372	Yumbah	p. 9	The causeway will be built from dredge spoil. Or not. KIPT’s inadequate, outdated dredging tests leave another unknown: just what materials are in Smith Bay to actually dredge? And with what impact on the marine environment, and Yumbah’s water quality?	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 33	The risk of wrack accumulation on the quality of the source waters to Yumbah KI’s abalone farm is lacking and must be addressed, particularly given the close proximity of the proposed development to the inlet pipes.	11 – LAND-BASED AQUACULTURE

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1372	Yumbah	p. 9	The causeway is an impermeable barrier that will block and modify oceanic currents, reducing tidal flow by 30-40 per cent and increasing water temperature not more than 300 metres from Yumbah's intake pipes. While the draft EIS says causeway gates or culverts will help alleviate issues for Yumbah, KIPT also argues such mitigation is "unnecessary".	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 37	The draft EIS Main report alleges extensive cropping and grazing industries "… are likely to have had adverse effects on marine water quality along the north coast of Kangaroo Island through erosion processes within cleared catchments and along degraded creeks during rain events, resulting in the transport of silt into the marine environment via creeks, thereby increasing the turbidity of coastal waters. This statement by the proponent is both misleading and incorrect. Baseline water quality of Smith Bay measured for the purpose of the draft EIS (presented in Appendix F) indicates the opposite is true.	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 23	Sampling results are presented where the majority of samples are outside of the dredge area and therefore cannot be claimed to be representative. Sediment sampling depths are not adequate as they do not extend to the depth of dredging. This is contrary to the National Assessment Guidelines for Dredging (NAGD) (2009) which require that the full depth be characterised.	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 44	The testing environment is further flawed as test abalone were fed natural feed and tests were conducted at the optimal temperature of 18 degrees C which is not representative of the likely water temperatures in Smith Bay during the proposed dredging period of warmer summer months.	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 85	Alterations in water quality such as elevation in temperature, increased nutrients, anthropogenic contaminants and suspended fine sediment can have lethal consequence and at sub-lethal levels compromise health and growth.	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 24	Ecotoxicology One assay performed on abalone for 24 hours is in no way an ecotoxicology assessment to invent guideline trigger values for total suspended solids well in excess of well-established and recognised national water quality guidelines. [Was a guideline trigger invented or was it noted that 25 mg/L would not be problematic].	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 38	The draft EIS Main Report also concludes that TSS levels are predicted to increase at the Yumbah seawater intakes by approximately 4mg/L for the expected case, and up to 7mg/L under worst-case conditions. A concerning factor with this conclusion is the PSD and the concentration of fine sediment likely to be dispersed during dredging is unknown, given sediment sampling and analysis has not been	11 – LAND-BASED AQUACULTURE

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			conducted to the complete dredge depth of three metres. Any resulting plume modelling is unreliable.	
1372	Yumbah	p. 41	The information presented in Appendix H blatantly misconceives that data from Yumbah Narrawong (88 data sampling events since 2001) provide additional evidence that elevated levels of suspended sediments during storm events are not likely to be the cause of elevated mortalities, at least at the levels experienced at Yumbah's Narrawong (Victoria) farm which would otherwise experience much more frequent and presumably more debilitating mortality events.	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 41	The author of Appendix H purports that abalone are well adapted to high suspended sediment loads, and are more resilient than other aquaculture species that have been investigated. A further claim is that abalone are routinely subjected to high levels of suspended sediments in their natural habitat when material is entrained into the water column of high energy subtidal coastal environments. This is misleading. In their natural habitat, abalone are exposed to course sand, particularly in highly active coastal zones. The behaviour and impact of larger suspended matter to abalone is unrepresentative of fine sediments, characteristic of dredge spoil. Abalone can tolerate coarser sediment but are demonstrably not well adapted to fine sediments (silt and clay particles).	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 9	The causeway is an impermeable barrier that will block and modify oceanic currents, reducing tidal flow by 30-40 per cent and increasing water temperature not more than 300 metres from Yumbah's intake pipes. While the draft EIS says causeway gates or culverts will help alleviate issues for Yumbah, KIPT also argues such mitigation is "unnecessary".	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 9	The causeway will be built from dredge spoil. Or not. KIPT's inadequate, outdated dredging tests leave another unknown: just what materials are in Smith Bay to actually dredge? And with what impact on the marine environment, and Yumbah's water quality?	11 – LAND-BASED AQUACULTURE
707	Nicholas Savva (Australian Abalone Growers Assoc)		The proposed seaport poses an extreme risk to Yumbah Kangaroo Island farm (YKI) due to its immediate proximity, raising threats to biosecurity, pollution, elevation of fine settlement loading beyond the SAEP and ANZECC standards, air-borne pollution, sawdust and dust, artificial lighting and interruptions to the existing coastal processes within Smiths Bay.	11 – LAND-BASED AQUACULTURE

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898	Megan Harvie		However, I need some assurances. That Yumbah's interests are protected. Yumbah is a large export business, producing a highly sought-after and prized commodity that this Island loves, protecting this business is a priority. The close proximity and effect on water quality is concerning.	11 – LAND-BASED AQUACULTURE
867	John Hodgson (Kangaroo Island Eco Action)		The Draft EIS contains information on particle size, nutrient levels and much more. They claim that water quality should not be an issue for Yumbah's production of abalone to a degree higher than already exists in Smith Bay under normal heavy weather conditions. Yumbah has had mass mortality events in the past due to heavy weather suspension of particles, that are particularly lethal for juvenile abalone – so despite any information to the contrary Yumbah's experience indicates the effects of KIPT's sediments will have a high impact. Yumbah have developed measures to prevent sediment issues due to natural heavy weather conditions but prop-wash and additional sediment from the dredged depression and the inevitable accumulation of sediments associated with KIPT's causeway will present an additional hazard for Yumbah to overcome. What the KIPT Draft EIS confirms is that, if the KIPT wharf is built, there will be elevated turbidity within Smith Bay. This will be associated with dredging at the stage of port development. Such dredging will form a depression, or basin, in the dredged area. This will accumulate sediments, which may contain nutrients. These sediments will be re-suspended during berthing manoeuvres which will occur during the operation phase. Dredging will be an ongoing feature of depth maintenance in Smith Bay.	11 – LAND-BASED AQUACULTURE
559	Naomi Murton		Operation of the seaport will negatively impact/change water flows, tidal movements, turbidity, seabed, sedimentary profiles and overall ecology of Smith Bay. RISK: the Abalone farm Yumbah. The tolerance of juvenile abalone (>15mm) is unknown. Should the abalone be intolerant to disturbance a significant industry and possible expansion in the future would be lost along with many jobs. Further future tourism opportunities to bring financial gain and job creation for the area would also be lost.	11 – LAND-BASED AQUACULTURE
707	Nicholas Savva (Australian Abalone Growers Assoc)		Abalone farms use micro filtration systems for water supplied to the hatchery and nursery to remove fine silt as this inhibits larval survival and settlement. These filtration systems will be at risk of being overwhelmed. Growout systems rely on pumping large volumes of clean water and are not suited to filtration as this would dramatically increase both the pumping costs, (energy consumption) and infrastructure costs. The tank systems are also not designed to cope with heavy silt loads. Likewise, the gill configuration of abalone is adapted to a high energy environment. Abalone can cope with being covered by sand following storm events; but they are susceptible to smothering and asphyxiation by silt. Bacteria are generally not carried directly in the water column but are borne on particles; the finer the particles (silt) the greater the surface area available for bacteria to inhabit. The threat of elevated bacterial loads (Vibrio spp. in particular) associated with silt loadings and elevated temperatures was ignored in the EIS.	11 – LAND-BASED AQUACULTURE

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ID	Submission name	In-document reference (if applicable)	Source comment	Draft EIS chapter
500*	Mark Gervis		Effects on the neighbouring abalone farm As you are no doubt aware there is a successful abalone farm only from this proposed port, as an abalone farmer myself the consequences of dredging in proximity to such a farm are very likely to have disastrous consequences for the farm and these have been detailed in our associations (AAGA) letter to yourself. This includes the effect of silt on the water quality and health of the abalone, the almost assured increase in bacterial levels that dredging would result in and the costs that would be imposed in trying to mitigate these effects. Yumbah have been stalled in their investment to this site due to this proposal. Kangaroo Island is known as an island that has great local produce and caters to a burgeoning tourist trade both of which the sustainable production of abalone participates in.	11 – LAND-BASED AQUACULTURE
1374	EPA		Vandepeer (2006) concluded in the paper, *Preventing summer mortality of abalone in aquaculture systems by understanding interactions between nutrition and water temperature* FRDC Project No. 2002/200, that suspended sediment can impact abalone health based on observations on South Australian abalone farms, which may be associated with an increase in pathogens that may attach to sediment particles. This is also supported in other research. Vandepeer's report also stated that monitoring of seawater supplied to the South Australian Abalone Developments site at Louth Bay during windy months (October - November) showed an increase in the levels of the bacteria, *Vibrio* sp., associated with increased suspended solids at this time. It is interesting to note that pg. 42 Appendix H2 of the EIS references the claim by McShane (2017) that the resuspension of sediments resulted in a 'mass mortality' within Yumbah KI; however the EIS report inferred that mortalities that may have been experienced on the farm were more likely to be due to elevated levels of bacteria (e.g. *Vibrio*) rather than suspended sediment. However, according to the Vandepeer report, the presence of bacteria may have been due to the increased suspended sediment experienced at that point in time, therefore increased suspended sediments as a result of the dredging campaign and potentially during ships berthing may increase the potential of mortalities as a result of bacteria on the farms. This may be exacerbated during the warmer months.	11 – LAND-BASED AQUACULTURE
1374	EPA		Appendix H2 of the EIS states that it is unlikely that suspended sediments would impact on the filtration systems that may be used in both the hatchery and the nursery. However, there this is no evidence provided to support this statement. Elevated suspended sediments may also result in reduced flow rates through the hatchery and nursery systems, which are vital for optimal abalone health, depending on the extent of sediments accumulating on the filtration systems.	11 – LAND-BASED AQUACULTURE

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1374	EPA		Appendix H2 of the EIS claims that the construction of the causeway is likely to mitigate the potentially adverse effects that silt-laden discharges from Smith Creek may have on water quality at the abalone farm. The EPA is unsure of the difference in the circumstances surrounding the potential adverse effects of the discharges from Smith Creek on the Yumbah Aquaculture intake pipes in comparison to the potential adverse effects that suspended sediment plumes generated by dredging, which are identified in the EIS will have no adverse effects on Yumbah Aquaculture.	11 – LAND-BASED AQUACULTURE
1374	EPA		The eco-toxicity testing should be viewed with caution particularly as it did not take account of water temperature and stocking densities which vary under farm conditions and also impact survival rate of abalone. While the 10 x safety factor applied is good, it is an arbitrary number (although used in ANZECC). In reality a 24 hour test is not long enough for many gross endpoints (such as mortality) and many animals are likely to have enough energy reserves to provide resilience, particularly when the toxicity mode of action is not likely to be one of toxicity but more likely irritant (or similar). The toxicity tests show possible short term impacts around the no observed effect concentration (NOEC) and the text should use this in this context particularly when discussing possible triggers. This is also consistent with other trigger values that do not allow the water quality to reach the NOEC. Having said this, the EPA is aware of the lengths that KIPT have gone to in order to acquire animals for toxicity testing and the limitations this caused with respect to numbers of animals to test. The numbers and length of testing is inadequate to have high confidence in the results, but it does provide some information that is relevant in this assessment. Given this data and the existing ANZECC Guideline for aquaculture production, the use of the 10 mg/L TSS guideline value is recommended.	11 – LAND-BASED AQUACULTURE
1374	EPA		It is stated that juvenile abalone were used because Yoon and Park (2011) have shown that these are the most vulnerable phase in the life history; however, previous sections suggest that the larval phases are more sensitive to sediment than the larger sizes as these would be the more vulnerable life stage.	11 – LAND-BASED AQUACULTURE
1374	EPA		The EIS mentions the poor quality of the data and, as such, the Narrawong water quality analysis is reasonable but should be viewed with caution as 86 data points over 17 years does not provide good coverage of water quality conditions. It is not known what the farm was doing on the days of high turbidity. In relation to the 37 mg/L maximum observed value, it is not known whether the farm was operating or not at the time. If it was not operating then such water quality would have had no impact on operation of the abalone farm.	11 – LAND-BASED AQUACULTURE

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1372	Yumbah	p. 24	Algal blooms Changes to the light environment, reduced circulation of nearshore waters and elevated water temperatures increase the risk of harmful algal blooms at Smith Bay with potential catastrophic impacts on Yumbah's farmed abalone.	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 81	The causeway will reduce ocean currents by an estimated 30-40 per cent, which, in turn, will elevate seawater temperatures, reduce mixing of oceanic water, accumulate drift seaweed (wrack) and compromise oceanic conditions.	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 81	These are all prerequisite and currently stable conditions for Yumbah KI's ongoing operation.	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 80	The photo below depicts the magnitude of wrack accumulation at the Emu Bay boat ramp. This structure is minute and extends a few metres offshore. The solid causeway proposed by KIPT at Smith Bay will extend 250 metres offshore. The significant risk of wrack accumulation on the quality of the source waters to Yumbah's KI abalone farm is critically lacking and needs to be addressed as a priority, particularly given the close proximity of the proposed solid causeway to the inlet pipes.	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 80	Seagrass wrack accumulation has the potential to impact Yumbah's intake pipes. Coastal structures (e.g. groynes, causeways) often cause the accumulation of seagrass wrack and degradation of seawater quality that did not occur prior to their placement. The proximity of the causeway to the Yumbah KI facility's intakes may cause wrack accumulation and water quality degradation of source water entering the abalone farm.	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 80	The report by Romero (2019)(Appendix 1) shows the DEIS Appendix G is lacking information to address the potential impacts of seagrass wrack on the abalone farm.	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 40	Appendix H lacks consideration of cumulative impacts to reduced water quality, and subsequent impacts to abalone particularly during the summer months when dredging is proposed.	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 24	Increased mortality, reduced PAR from sediment plume and increased turbidity will further compromise survival of seagrass and macroalgae. This has not been modelled nor simulated however the destruction of 10ha of seagrass and the impact of the loss of habitat is covered elsewhere in this report. Smothered intake pipes, increased pumping costs, increased detritus and lower oxygen concentration are among the impacts.	11 – LAND-BASED AQUACULTURE
1372	Yumbah	p. 8	The most disturbing statement in the entire draft EIS is the cavalier expectation that a seaport can be built immediately adjacent, 400m from an on-shore aquaculture enterprise with no negative impact.	11 – LAND-BASED AQUACULTURE

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825(3)	Kirsty Buick		Secondly, the EIS states that with the addition of the rock wall that will be a part of the Seaport, that tidal flows and currents will be affected with in Smith Bay, and cause temperature increases up to 0.2 degrees within the Bay, and at the Abalone Farms intakes. The EIS writes that Abalone thrive best with seawater temperatures below 22-23 degrees, anything above that puts the Abalone under stress and mortality increases.	11 – LAND-BASED AQUACULTURE
707	Nicholas Savva (Australian Abalone Growers Assoc)		This was very short acute study conducted at the ideal temperature for survival. It is impossible to determine chronic effects from such a study. It ignores the compounding effects of elevated bacteria levels associated with increased silt loading. It ignores compounding effects of the above at higher summer water temperatures. Yet Cheshire (2018) concludes that there would be no impact on the Yumbah Smith Bay Abalone Farm, (regardless of chronic effects and at higher summer temperatures).	11 – LAND-BASED AQUACULTURE
1366	Trent D'Antignana		To address the absence of information on the effects of fine sediments on abalone health, KIPT commissioned Interkek to conduct a series of targeted ecotoxicology studies which were published by Stringer (2018b). The EIS relies extensively on these studies to justify that the ANZECC (2000) trigger value of 10mg/L TSS is overly conservative for abalone and that a trigger value of 25mg/L should be applied. (Appendix H, p. 69).	11 – LAND-BASED AQUACULTURE
FL5	Form Letter 5 (Yumbah's postcards)	Pollution and amenity 1	Water quality During the construction, dredging would create silt plumes that could adversely affect water quality in Smith Bay and will significantly compromise abalone health and productivity at Yumbah abalone farm. Abalone health and productivity compromised.	11 – LAND-BASED AQUACULTURE
1375	EPA/DEW		The Risk Assessment Table identifies the direct loss of approximately 10ha of 'mixed habitat', including seagrass, and determines that the residual risk rating is Low due to the identified management measures. The EPA is concerned that the direct loss of this habitat is not an action that can be 'managed' and does not allow for a residual risk rating of Low.	12 – MARINE ECOLOGY
1375	EPA/DEW		The Risk Assessment Table identifies the loss of local seagrass and other benthic communities due to light reduction and smothering, and identifies that the residual risk rating is Low due to the identified management measures. The EPA considers that the residual risk would not be reduced to Low unless turbidity was prevented from impacting sensitive habitats. Indirect impacts on seagrass have not been adequately assessed. The focus has been TSS impacts on the abalone farm but the results indicate that the tolerance levels of the abalone is higher than seagrass which given their habitat mapping indicates that this is the likely sensitive habitat in the dredge plume.	12 – MARINE ECOLOGY

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1375	EPA/DEW		The EIS states a total area of 10.7 ha will be directly impacted by the dredging, causeway and pontoon development. Without detailed mapping of benthic habitats within this area it is unclear how the figure of 7.5 ha (page 253) of seagrass has been generated, or how it could be supported. Appendix I1 states that approximately 10 ha of sparse seagrass will be directly impacted consisting mainly Posidonia sinuosa. Additionally, indirect effects due to turbidity and sedimentation are likely. This is not reflected in the EIS.	12 – MARINE ECOLOGY
1376	DEW		An investigation into the short term and long term impacts of potential sedimentation from construction including dredging has been undertaken for seagrass and macro-algae but is absent for the other benthic communities that are present immediately adjacent to or surrounding site. Invertebrate reef communities would be particularly susceptible to sedimentation, namely sessile filter-feeding organisms that can't move away from the threat such as ascidians, bivalves and sponges. These can become smothered and the apertures used to draw water through their bodies may be blocked. Further information/detail is required to ascertain whether these communities could recover from potential sedimentation or changes in water quality during construction.	12 – MARINE ECOLOGY
1376	DEW		Impacts have largely been discussed in isolation, and cumulative impacts have been listed as insignificant (pg. 257). Cumulative impacts on intertidal communities (e.g. increased sedimentation + increased temperature) may have implications beyond the individual impacts which are advised as being insignificant. A more detailed discussion of cumulative impacts is required before the impact can be regarded as insignificant. For example, impacts may be compounded if the development coincides with an El Nino event.	12 – MARINE ECOLOGY
1376	DEW		Seabed erosion and degradation of seagrass meadows, adjacent the dredge basin, as a result of dredging, has been considered to be unlikely because of the depth where dredging will occur and the lack of wave energy meeting the sea floor (pg. 253). However, seabed erosion and degradation of seagrass meadows has not been addressed for shallower waters adjacent the breakwater, including during construction. For example the seagrass meadow's ability to deal with a major stressor such as a storm, combined with a slight increase in sedimentation and/or water temperature, could lead to a gradual break down in the meadows functions e.g. natural recruitment, potentially leading to blowouts and ongoing physical erosion which can impact on a wider area.	12 – MARINE ECOLOGY
1376	DEW		The risk assessment should consider 'cumulative' impacts for each activity as this may increase the consequence.	12 – MARINE ECOLOGY
1372	Yumbah	p. 24	Increased mortality, reduced PAR from sediment plume and increased turbidity will further compromise survival of seagrass and macroalgae. This has not been modelled nor simulated.	12 – MARINE ECOLOGY

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1372	Yumbah	p. 111	The draft EIS's intent to remove 10 hectares of seagrass and create trails of sediment in Smith Bay will contribute large amounts of CO2 into the atmosphere. which will continue into a future well beyond that which KIPT foresees. The seagrass meadow cannot be replanted in the hope of acting as a new carbon sink. As part of a more comprehensive and accountable EIS than the existing draft, KIPT must assess the carbon sequestration of their timber plantation compared with the carbon capture potential in the seabed it proposes to dredge.	12 – MARINE ECOLOGY
1372	Yumbah	p. 91	On a specific point, the draft EIS fails to mention the severe impact on the critically endangered pipefish, with estimated elimination of 5000 Syngnathid spp. as a result of the seaport construction.	12 – MARINE ECOLOGY
1372	Yumbah	p. 92	Posidonia sp. is a seagrass the EPA is particularly predisposed to protecting. In Yumbah's experience, if KIPT was proposing an aquaculture venture and Posidonia sp. was present, South Australia's peak environmental regulator would not support the proposal.	12 – MARINE ECOLOGY
867	John Hodgson (Kangaroo Island Eco Action)		The Draft EIS has not identified what the sedimentation tolerance levels are for Smith Bay's benthic communities. The Draft EIS claims indicative values for a single genus (Halophira spp.), but not for a community. The 'indicator' (Halophira spp.) is from NW Australia, a tropical region. Edgar (2008) only lists one of Australia's three native species of Halophira as a tropical species, Halophira decipiens (Delicate paddlegrass). Delicate paddlegrass, being a tropical species is unlikely to even survive in Smith Bay, let alone be present, and, therefore, should not be used as an indicator for survival at the community level in Smith Bay's temperate waters. What is well known is that many marine plants, generally, do not do well in environments prone to siltation. Silt resultant from dredging will often contain nutrients that promote epiphytic growth on leaves which can lead to seagrass and seaweed loss. The Draft EIS does not effectively address these issues and once again the adopting the precautionary principle is essential with more scientific research required.	12 – MARINE ECOLOGY
679	Michael Fooks (Marine Fishers Association)		1 The wharf and associated dredging will have a direct impact on two marine scale licences holders who target squid, snapper and whiting (mainly in winter) this has been compounded by a closure for whiting during May leaving a limited area of access adjacent to the coast.	12 – MARINE ECOLOGY
447	Vic Lodge		(5) Smith Bay is a very shallow area & massive dredging will be required to allow Panamax type vessels to get into Smith Bay. Dredging would no doubt destroy the recently discovered two metre high coral structure which is a rarity for the area & home for several different species of fish.	12 – MARINE ECOLOGY

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913	Steve Reynolds (Marine Life Society)		The proposed development by KIPT will have significant environmental impacts on land and sea, with ongoing implications. The construction of a causeway, floating wharf and land-based infrastructure will have an initial detrimental effect on the environment. There is also some concern that future shipping operations might have ongoing detrimental consequences for the environment. The EIS for the port development focuses mainly on the land-based constructions and rehabilitation of the habitat with very little emphasis on the marine environment. Smith Bay is a pristine environment worthy of preservation. Two large colonies of increasingly rare coral, Plesiastrea versipora and Coscinaria mcneilli, are located in the bay. If the proposed development by KIPT proceeds, we should try to ensure that there is minimal habitat destruction, especially to the corals. The operation of the nearby abalone farm is most at risk by this development.	12 – MARINE ECOLOGY
1061	Melissa Pepper		Smith Bay has a rocky reef that runs parallel to the coast, with large coral bommies recently discovered during AusOcean surveys that are estimated to be 400 years old. In sandy areas close to shore are critical seagrass habitats, of seagrass species Posidonia sinuosa and Amphibolis spp., both of ecological importance. These ecosystems will be destroyed by KPT's dredging operations. Some 100,000 cubic metres of seabed will need to be dredged to convert this shallow bay into a deep water port. This equates to a direct loss of approximately 10.2ha of mixed habitat, including seagrass, which will have a subsequent impact on marine species that call Smith Bay home, including the iconic Leafy Sea Dragon.	12 – MARINE ECOLOGY
1106	Susan Myers		Smith Bay's marine environment would also suffer greatly, due to dredging and the movement of sediment. Smith Bay is home to seadragons and pipefish which are protected under the Environmental Protection and Biodiversity Conservation (EPBC) Act. These iconic animals, including South Australia's marine emblem, the leafy seadragon, must be protected.	12 – MARINE ECOLOGY
FL1	Form Letter 1 (EPBC, native vegetation and fauna)		Proposed dredging activities to gouge 100,000 cubic metres from the floor of Smith Bay, ongoing port operations and an inevitable future dredging program. This will have a significant impact on the marine environment by disturbing and smothering benthic biota and habitats, degrading water quality through elevated turbidity, bioavailability of pollutants and reducing dissolved oxygen in the water column.	12 – MARINE ECOLOGY

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FL2	Form Letter 2 (biosecurity, coast and marine)		The volume of soil blasted and scraped from the seabed by the proponent's dredges is equivalent to filling 40 Olympic-size swimming pools, resulting in: • the loss of at least 100,000 square metres of seagrass - admitted by the proponent, which claims it can "offset" by simply planting some seagrass in another place (if only it were so simple). • sediment uplift into the water column. • marine life mortality due to choking hazards, suffocation and red tide potential from disruption of toxic organisms in the sediment.	12 – MARINE ECOLOGY
253	Craig Wilkins (Conservation Council SA)		Dredging, construction and operation will reshape the sea floor, change tidal flows and cause the immediate loss of 100,000 square metres of seagrass - and anything dependent on it. Siltation and disturbance from dredging, along with propeller wash and the inevitable ballast and other contamination will dislodge and suffocate sea life; turbidity will reduce the ability of the Bay to support life.	12 – MARINE ECOLOGY
FL1	Form Letter 1 (EPBC, native vegetation and fauna)		Noise and light emissions from dredging will disrupt larger sea mammals such as southern right whales and dolphins, while future dredging, plus propeller wash and contamination from commercial shipping vessels, will prohibit regrowth.	12 – MARINE ECOLOGY
1098	Alan Noble (AusOcean)	p. 12	Maintaining the connectivity of shallow water habitats is important for healthy fish communities (Perry et al. 2018). Seagrass meadows within Smith Bay likely play a pivotal role in shaping fish assemblages and diversity in the wider marine environment. Destruction of this system will result in habitat fragmentation impacting the interconnectivity of shallow water areas that comprise the wider “seascape nursery”. Therefore, Smith Bay should be considered an integral component of a highly diverse and interconnected marine environment.	12 – MARINE ECOLOGY
1098	Alan Noble (AusOcean)	p. 16	The composition of mixed habitat (seagrass, sponges and rocky reef) should be taken into account when determining appropriate environmental offsets. Any exclusion of sponges from monitoring and conservation programs is concerning, particularly because they have the potential to exert a major influence on overall ecosystem functioning. The proposal doesn’t take into account the extensive loss of rocky reef habitat and sponges which are integral components of the wider marine environment. We suggest that restoration efforts should centre on improving water quality and restoring habitat and associated biodiversity where the damage has occurred, i.e. at Smith Bay.	12 – MARINE ECOLOGY

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1098	Alan Noble (AusOcean)	p. 10	Suspended sediments in response to dredging and ongoing port use have a high probability in driving the loss of diversity in Smith Bay. Less productive and structurally complex habitats monopolised by turf-forming algae are likely to replace the highly productive and diverse macroalgae habitat.	12 – MARINE ECOLOGY
1098	Alan Noble (AusOcean)	p. 9	The direct loss of seagrass due to dredging would result in substantial losses of critical syngnathid habitat. Indirect effects due to sedimentation and increasing levels of turbidity have the potential to negatively impact syngnathids. Research has demonstrated the effects of turbidity on sexual selection in several species of pipefish. Ongoing environmental perturbations such as increasing levels of turbidity may have detrimental consequences. Due to their limited mobility and small home range sizes, loss of critical habitat due to dredging is likely to result in the loss of substantial numbers of syngnathids. In the event that individuals can move away from the construction zone, environmental perturbations such as increasing levels of turbidity may have ongoing negative consequences. AusOcean question the following statement in the EIS. “There is no reasonable or foreseeable possibility that construction of the wharf at Smith Bay will fragment or decrease the size of populations of any species of pipefish, affect their critical habitat or disrupt their breeding cycles. It is concluded that the project proses no credible risk to the viability of pipefish on the north coast of Kangaroo Island.”	12 – MARINE ECOLOGY
547	Trek Hopton		• Multiple protected species of pipefish will lose habitat and likely be killed by the causeway construction and dredging.	12 – MARINE ECOLOGY
547	Trek Hopton		I have had the opportunity to review the EIS for the port and I must say I'm am truly saddened to think this is a real proposal for the following reasons: • Large protected seagrass beds will be destroyed by the causeway construction and dredging.	12 – MARINE ECOLOGY
679	Michael Fooks (Marine Fishers Association)		Thoughts KIPT has said it will be mitigating losses of seagrass by investing in habitat restoration in Nepean Bay this is yet to be proven successful and like it or not the contributing cause may never be address properly. The biodiversity at the proposed dredging sight isn’t under the same stresses so you can’t compare the two. It is doubtful that KIPT will retain the same ownership if a port is established. Where is guarantee that its corporate conscience is transferable when it comes to any mitigation issues.	12 – MARINE ECOLOGY

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ID	Submission name	In-document reference (if applicable)	Source comment	Draft EIS chapter
956	Grant Flanagan		Smith Bay is one of the sites on KI where seagrass is pristine. As a keen fisher and diver I can testify to the diversity of marine life supported by seagrasses. This is indicated by the species list provided in the EIS and I refer you to the AUS Oceans submission for more details. Our experiences in Western Cove indicate that increased turbidity is a major cause of seagrass loss and that seagrass restoration is expensive and difficult in high energy marine environments. Western Cove is a completely different environment and offsetting the loss in Smith Bay with plantings there conflicts with the like for like principle in vegetation offsetting where as much as possible the offset site/community should be the same as the cleared site/community. I note there is no commitment to on-going monitoring despite the recognition that there is a risk of on-going sea bed disturbance and hence turbidity. Another of the important roles seagrass has is to reduce the energy of waves as they approach the shoreline. Smith Bay is a high energy marine environment and winter storms in particular can generate large waves reduction in seagrass beds will reduce this dampening effect which creates the further risks of increased turbidity in the bay and shoreline erosion. This issue was not addressed at all in the EIS.	12 – MARINE ECOLOGY
559	Naomi Murton		• Dredging and wharf construction will result in the destruction of 10.2 hectares of mixed habitat including seagrasses Posidonia sinuosa and Amphibolis spp. considered ecologically particularly important.	12 – MARINE ECOLOGY
1095	Jeanette Gellard		There will be a loss of 10.2 ha of mixed marine habitat including seagrass, as a direct result of dredging and wharf construction. Dredging will remove 200,000 tonnes of material from the seabed. In other locations around the Island, tens of thousands of State and Commonwealth dollars have been invested in restoring and revegetating seagrass beds due their importance as nursery habitat for marine species including commercial fishery species. It makes no sense to allow the clearance of seagrass habitat at Smith Bay considering this investment.	12 – MARINE ECOLOGY
1185	Janine Mackintosh		The poor choice of site means it is necessary to dredge the shallow waters of Smith Bay, creating silt plumes and destroying 15 hectares of the rich sea floor environment and creating 200,000 cubic metres of material to be disposed of; the loss of 10 ha of seagrass is not acceptable.	12 – MARINE ECOLOGY
FL1	Form Letter 1 (EPBC, native vegetation and fauna)		The proponent admits its industrial facility at Smith Bay will result in a significant loss of seagrass in Smith Bay. It estimates - and on past record, we are certain underestimates - it will destroy 100,000 square metres (10 hectares!) of seagrass in the bay.	12 – MARINE ECOLOGY

The ID numbers are from an index of the public submissions received on the Draft EIS. All public submissions (and the index) are located on DPTI's website: <https://www.sa.gov.au/topics/planning-and-property/land-and-property-development/building-and-property-development-applications/major-development-applications-and-assessments/proposals-currently-being-assessed/kangaroo-island-plantation-timber-port-at-smith-bay>

ID	Submission name	In-document reference (if applicable)	Source comment	Draft EIS chapter
1115	Dr S Petit (Assoc Prof in Wildlife Ecology)		6. The damage to a 10-ha seagrass meadow for dredging has been mentioned, with some likely damage to adjacent areas. Having worked on seagrass in Queensland before, I know that the impact of sediments can be wide-ranging and long-lasting. The model showing a sediment plume limited to within 300 m for the low level (still a gigantic impact in terms of area) is underestimating the real impacts of different sediments over much greater areas. Poor photosynthesis will decrease the carrying capacity of species of economic, ecological, and touristic significance to the island. Seagrass meadows are of considerable value to marine life including species relevant to fisheries (silver trevally occurs in the area). The impacts of such sediments on seagrass meadows are never "temporary minor impact[s]". Note also that dredging is never a once off.	12 – MARINE ECOLOGY
1372	Yumbah	p. 13	The Commonwealth Minister for the Environment and Energy has determined (EPBC no.2016/7814) that the proposed action is likely to, or may have, a significant impact on the following controlling provisions (matters of national environmental significance (MNES)): • a number of species of pipefish will be lost with the removal of 10ha of seagrass (Syngnathid spp.).	14 – MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE
1043	Tony Bartram (Kangaroo Island/Victor Harbour Dolphin Watch)	p. 2	Dolphins stranded on the beaches of Florida and Massachusetts show in their brains amyloid plaques, together with an environmental toxin produced by cyanobacterial blooms.	14 – MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE
1117	Heidi Alleway		The allocation of environmental offsets is a challenging topic that exposes gaps in policy when a proponent does not adequately the context in which their development will occur. Offsets that describe, as is the case in the Draft EIS, the use of 'sponsorship' for existing programs are not consistent with 'like for like' approaches. They do not accurately represent the baseline of 'no net loss' against which offsets should be assessed and approved 3. This scenario has not be appropriately described in the Draft EIS and it is considered the proposed offsets will achieve very little in offsetting the impact of the development. This is particularly true for the offset associated with clearing of seagrass, which is proposed to be sponsorship of a nutrient reduction program for agricultural land holders in an entirely separate catchment system and embayment, and is obviously subject to the uptake of this program by farmers.	14 – MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

The ID numbers are from an index of the public submissions received on the Draft EIS. All public submissions (and the index) are located on DPTI's website: <https://www.sa.gov.au/topics/planning-and-property/land-and-property-development/building-and-property-development-applications/major-development-applications-and-assessments/proposals-currently-being-assessed/kangaroo-island-plantation-timber-port-at-smith-bay>

ID	Submission name	In-document reference (if applicable)	Source comment	Draft EIS chapter
1043	Tony Bartram (Kangaroo Island/Victor Harbour Dolphin Watch)	p. 2	The effects of dredging and the resultant silt plumage will not only directly impact upon the seagrass actively destroyed. The ongoing smothering of further seagrass via maintenance dredging and vessel movements together with the toxicity introduced will lead inevitably to situations of anoxia with resultant algal bloom impacts. 343 sei whales died from a harmful algal bloom in Chilean Patagonia.	14 – MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE
1372	Yumbah	p. 55	The EIS highlights shipping vectors (ballast water and biofouling) and acknowledges other vectors are relevant during construction but provides no discussion of risks from sediment associated with dredge or hopper barges.	15 – BIOSECURITY
1215	Andrew Triggs		Table 15-1: Importation of rock material – should include visual checks for soil & plant material.	15 – BIOSECURITY
1374	EPA		Under the heading, 'Dredge Spoil Dewatering', it is stated that the groundwater is saline, but this is based on two data points and GW2's salinity (grab sample taken within the site) has not been referenced anywhere.	16 – GEOLOGY, SOILS AND WATER
1374	EPA		It is stated under the heading, 'Dredge Spoil Dewatering', that 'Sediment load will not impact groundwater'.	16 – GEOLOGY, SOILS AND WATER
1374	EPA		Section states that there will be a mobilisation of potentially contaminated sediments during dredging. If contaminated sediments are placed onto land that this may result in site contamination occurring in the area impacted by this material.	16 – GEOLOGY, SOILS AND WATER
1372	Yumbah	p. 63	In simple terms, the first sediment plume generated by KIPT's unmanaged dredging program …that enters Yumbah's intake pipes marks the end of Yumbah KI. With it go more than 25 direct and seven associated FTE jobs, and a local economic contribution of more than $4 million annually.	20 – ECONOMIC ENVIRONMENT
635	Graham Walkom		Not included in the environmental assessment is the awful aesthetics of the rock structure itself which appears to additionally be a significant risk factor to Bay water characteristics - failure of rock armour in storm Ref Table 4.6 temperature, sand buildup and clean water movements, but that is not something I am qualified to debate.	23 – VISUAL AMENITY

The ID numbers are from an index of the public submissions received on the Draft EIS. All public submissions (and the index) are located on DPTI's website: <https://www.sa.gov.au/topics/planning-and-property/land-and-property-development/building-and-property-development-applications/major-development-applications-and-assessments/proposals-currently-being-assessed/kangaroo-island-plantation-timber-port-at-smith-bay>

ID	Submission name	In-document reference (if applicable)	Source comment	Draft EIS chapter
1372	Yumbah	p. 125	KIPT has no idea if historic shipwrecks or relics are present within the direct dredge area or the 500 m wider radius that may be influenced by indirect impacts. KIPT cannot irrevocably confirm that damage, destruction, interference, removal, or disposal of objects of historic shipwrecks or relics will not occur as part of the construction and operation of the seaport.	24 – HERITAGE
1372	Yumbah	p. 125	The disturbance of sediment using the cutter suction dredge will likely remove any maritime cultural heritage material before discovery.	24 – HERITAGE
1372	Yumbah	p. 125	As stated in Appendix S3 (page 2), characteristics of the environment, although not ideal for preservation, do not exclude the chance for heritage materials having survived. The disturbance of sediment using the cutter suction dredge will likely remove any maritime cultural heritage material before discovery. It is vital that the history of Smith Bay is better understood, and not merely by using reports that present reports with invalidated and vague conclusions.	24 – HERITAGE
1372	Yumbah	p. 124	A flaw in this report (S3, maritime heritage report) is the design and footprint of the seaport, and its alignment in Smith Bay is incorrect. It appears the footprint may be the previous seaport design. Hence the findings in this investigation that were to understand the possibility of wrecks do not correctly capture 500 meters of the study area.	24 – HERITAGE
1372	Yumbah	p. 124	As the investigation (referring to S3, maritime heritage) has been conducted for a development footprint that does not exist, this report cannot be relied on for the consent. A revised report is required reflecting the actual seaport development footprint and an investigation within the actual 500 m development impact area.	24 – HERITAGE
1375	EPA/DEW		Post dredge monitoring (up to 2 years post dredging) should be used to assess the recovery of the seagrass through a Before and After Control and Impact (BACI) design monitoring assessment. This is also critical as the extent of habitat assessment is lacking so there is uncertainty regarding the habitat types and their extent and condition in areas likely to be impacted by the dredging. BACI designed monitoring is critical. This will also link into the native vegetation clearance process.	26 – ENVIRONMENTAL MANAGEMENT FRAMEWORK
1375	EPA/DEW		The EIS states that “Sediment deposition is likely to result in reduced recruitment of macroalgae within several hundred metres of the dredge footprint through alteration of the substrate on which spores settle. However, this effect would probably be restricted to a single year of recruitment due to the relatively small depth of sedimentation (i.e. generally less than 10 mm except within 240 metres of the dredge footprint) and the probable rapid dispersion of sediment during winter storms”.	26 – ENVIRONMENTAL MANAGEMENT FRAMEWORK

The ID numbers are from an index of the public submissions received on the Draft EIS. All public submissions (and the index) are located on DPTI’s website: <https://www.sa.gov.au/topics/planning-and-property/land-and-property-development/building-and-property-development-applications/major-development-applications-and-assessments/proposals-currently-being-assessed/kangaroo-island-plantation-timber-port-at-smith-bay>

ID	Submission name	In-document reference (if applicable)	Source comment	Draft EIS chapter
			The EIS suggests that there will be significant (albeit short term) impacts to the reef. This has not been considered in the risk assessments and the overall assessment of habitats lost. A 1 year impact on large areas (potentially 240 m from the dredge area) would be considered a major impact. Sedimentation impacts to the reef are subject to uncertain recovery trajectories, so 1 year impact is uncertain and will need a BACI monitoring program. Required details can be included in Environmental Management Plans.	
1372	Yumbah	p. 48	The plan is to stop dredging when an alarm rings. Does this assume somehow the abalone will know to stop eating at the same time? There will be unacceptable effects on water quality at Yumbah's seawater intakes. This will happen. The risks may be reduced but not eliminated. Alarms may sound when TSS thresholds are reached, but containing unacceptable dredge plumes will be difficult.	26 – ENVIRONMENTAL MANAGEMENT FRAMEWORK
1372	Yumbah	p. 116	MISSING DREDGE MANAGEMENT PLAN The draft EIS clearly recognises that there are no clear environmental windows that offer the opportunity to significantly reduce impacts associated with dredging. Further recognition is granted to that although dredging during winter rather than summer would avoid sensitive periods for the reproduction of seagrasses and invertebrates, it would not benefit macroalgae, which reproduces in winter, and southern right whales, which may visit the area during winter. Consequently, the draft EIS concludes there are no persuasive ecological arguments for dredging during a particular season. How can a Dredge Management Plan consider the risks that will result at varying degrees no matter what time of the year this hazardous activity will be performed? A Dredge Management Plan has been excluded from KIPT's draft EIS. This is a major concern for Yumbah given KIPT's deficient performance during what should have been straightforward sediment investigations in 2017. Yumbah has no confidence, nor does it believe should the South Australian and Australian Governments, in the potential performance of this proponent.	26 – ENVIRONMENTAL MANAGEMENT FRAMEWORK
1371	Kangaroo Island Council	#2	*The dredge spoil dewatering system has been designed to discharge water with acceptable sediment levels. No untreated dredge water would be discharged directly into the marine environment or into the adjoining Smith Creek.* - State ASA reference.	27 – COMMITMENTS

The ID numbers are from an index of the public submissions received on the Draft EIS. All public submissions (and the index) are located on DPTI's website: <https://www.sa.gov.au/topics/planning-and-property/land-and-property-development/building-and-property-development-applications/major-development-applications-and-assessments/proposals-currently-being-assessed/kangaroo-island-plantation-timber-port-at-smith-bay>

ID	Submission name	In-document reference (if applicable)	Source comment	Draft EIS chapter
1371	Kangaroo Island Council	#10	*Designing the causeway structure for a 1-in-500 year storm event (that is, a 10 per cent encounter probability over the 50-year life of the structure) on the basis that the wave modelling undertaken demonstrates that the additional engineering required to meet this standard is not significantly greater-than for lesser storm event frequencies. Causeway maintenance (for example, replacement of a small percentage of armour rocks) would be required after major storm events*. - Construction must fully resist storm events.	27 – COMMITMENTS
1371	Kangaroo Island Council	#20	*If considered necessary, an open bypass system could be installed in the near-shore section of the causeway to minimise the interruption to tidal currents. This could comprise either large culverts or a pier, the size of which would be determined by hydrodynamic modelling. Given the small predicted maximum increase in temperature such a measure is not considered essential and it needs to be recognised that the benefit of such a bypass system may be offset by compromising the protective barrier formed by the causeway in relation to effluent from the degraded Smith Creek during rainfall events* - An observation?	27 – COMMITMENTS
1371	Kangaroo Island Council	#21	*It may be possible to engineer a gated culvert through the causeway that could fulfil a dual function by allowing through-flows during summer (thereby managing the risk of small temperature increases). The gate could then be closed during other months and thereby facilitate the redirection of Smith Creek discharges further offshore during major flow events (particularly during autumn and winter) thus improving nearshore water quality.* - An observation?	27 – COMMITMENTS
1371	Kangaroo Island Council	#23	*The fines content of material used in the causeway core construction will be minimised in order to minimise the impact of plume due to causeway construction.* - Specify targets and limits.	27 – COMMITMENTS
1371	Kangaroo Island Council	#24	*The length of exposed causeway core before geotextile fabric and armour placement will be minimised in order to minimise the impact of plume due to adverse sea states, and erosion prior to rock armouring, during causeway construction* - Specify limits.	27 – COMMITMENTS

The ID numbers are from an index of the public submissions received on the Draft EIS. All public submissions (and the index) are located on DPTI's website: <https://www.sa.gov.au/topics/planning-and-property/land-and-property-development/building-and-property-development-applications/major-development-applications-and-assessments/proposals-currently-being-assessed/kangaroo-island-plantation-timber-port-at-smith-bay>

Appendix C – Marine Assessment

Appendix C1 – Revised Water Quality and Coastal Process Impact Assessment

Smith Bay EIS - Revised Water Quality and Coastal Process Impact Assessment

Reference: R.B22454.007.01.RevisedEIA
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1 Introduction

Kangaroo Island Plantation Timbers (KIPT) propose to develop a deep-water wharf at Smith Bay on the north coast of Kangaroo Island (Figure 1). The wharf will be capable of accommodating 30,000 DWT bulk carrier ships. Although the primary purpose of the wharf will be to export timber from plantations on the island, KIPT proposes to make it available for other shipping uses.

Following submission of the Draft EIS there has been design changes to some of the key project components. The main marine design features of the development at Smith Bay will be:

- A suspended deck jetty extending to a floating wharf, approximately 650m offshore; and
- No requirement for capital or maintenance dredging.

The purpose of this report is to revise the assessment of potential impacts to marine water quality and coastal processes based on the revised project design. The project baselines and numerical model descriptions were documented in technical reports released with the Draft EIS (BMT 2018a; BMT 2018b; BMT 2018c).

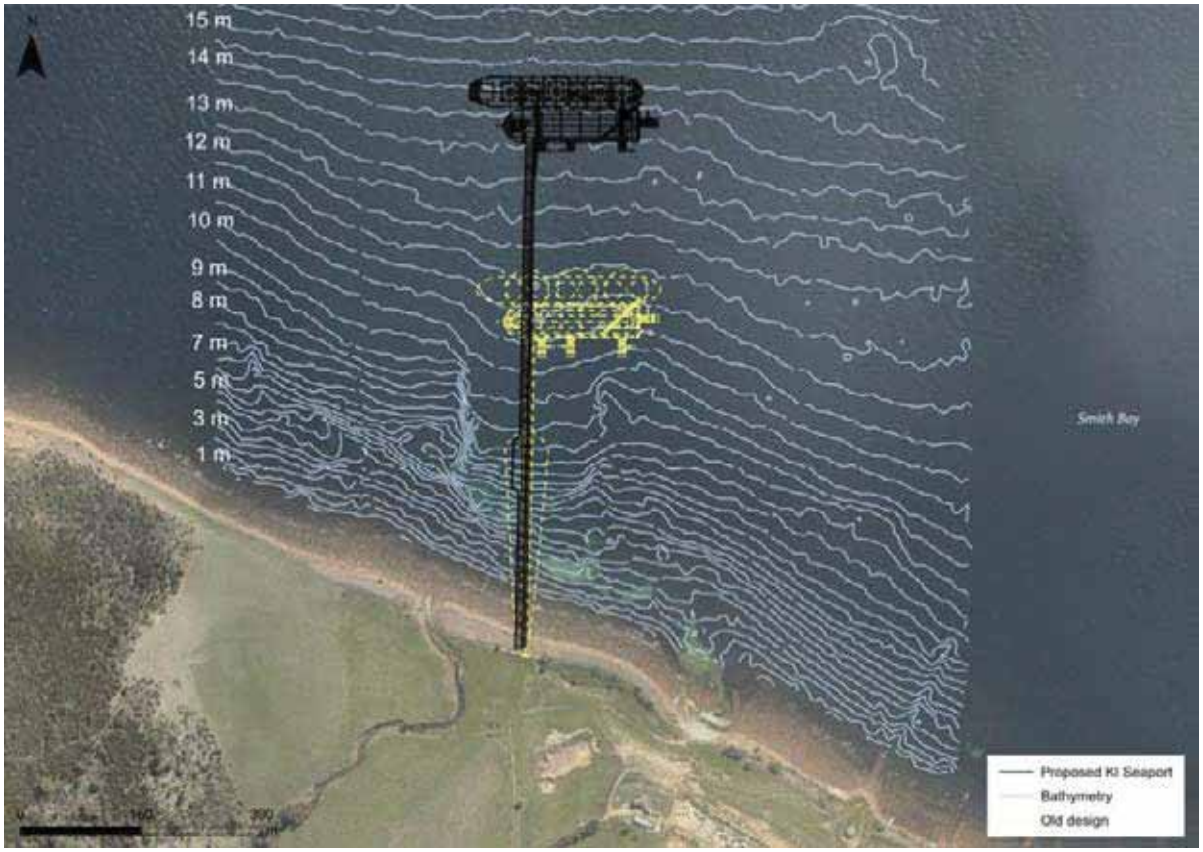

Figure 1-1 Conceptual layout of the KI Seaport infrastructure (overlaying the previous design)

2 Revised Water Quality Impact Assessment

2.1 Overview

The marine water quality impact assessment undertaken for the Draft EIS (BMT 2018b) has been revised based on the updated design (Figure 1-1). For additional information on the marine water quality baseline and impact assessment methodologies refer to the Draft EIS technical report (BMT 2018b).

2.2 Construction Phase Impacts

2.2.1 Construction Methodology

The assessment of potential impacts associated with the proposed KI Seaport construction requires the development of scenarios related to the construction methodology. Assessments for the previous design focussed on the capital dredging construction works, however the revised design does not require dredging and therefore the potential for generation of sediment plumes during construction is greatly reduced.

The suspended deck structure would consist of driven tubular steel piles with steel beams welded in place and orientated perpendicular to the jetty alignment to connect pile groups approximately every 12 metres. These in turn would support longitudinal deck support members and a concrete roadway.

The installation of tubular steel piles would be undertaken from a jack-up barge equipped with a crawler crane and hydraulic hammer for pile driving. The most likely construction scenario is that the majority of piles will be installed entirely by percussive driving and this methodology would generate negligible sediment plumes.

In some cases where premature refusal of the piles occurred due to encountering shallow rock then installation would require a “drill/drive” methodology. The term “drill/drive” refers to drilling into the seafloor from inside the pile casing and creating a hole from within the pile. Once the hole has been created the pile is hit with a hammer and it slides down through the available hole in the rock. The majority of sediment would remain within the pile casing and any sediment brought to the top of the casing would be captured and retained on board for offsite disposal.

2.2.2 Suspended Sediment Mobilisation

The Expected Case scenario for the revised KI Seaport design is that the majority of piles will be installed using a standard driving methodology and that there will be negligible sediment plumes generated by this activity.

A Worst Case scenario was developed in order to assess potential impacts if some of the pile installation required a drill/drive approach (Section 2.2.1). In such a scenario, drilling would be conducted from within a partially driven pile and any sediment brought to the surface of the pile casing would be captured and retained on the drilling barge. These drill cuttings would be suitably disposed of elsewhere and would not be released into the water column. As such, under the Worst Case conditions, no sediment plume generation will occur.

During construction, small levels of sediment may be intermittently re-suspended from the bed during piling, barge manoeuvring, anchoring and construction vessel movements. However, the quantity of sediment re-suspended will generally be negligible and the intensity, frequency and duration of any associated plumes would all be at very low levels. Moreover, any plumes generated by these mechanisms would contain ambient surface sediments which are frequently re-suspended by wave and current action.

2.2.3 Sediment Deposition

Zones of impact for sediment deposition are not applicable to either the Expected or Worst Case scenarios as neither of these generate sediment plumes that can then deposit in meaningful quantities.

2.2.4 Mobilisation of Contaminants

The Draft EIS assessment considered sediment sampling undertaken from within the proposed construction footprint (COOE, 2017) and showed that the sediment is relatively pristine with no synthetic or natural pollutants. The revised design with no requirement for dredging will disturb a much smaller volume of seabed and sub-surface sediment. The potential for mobilisation of contaminants during KI Seaport marine construction activities presents a temporary and negligible impact to marine water quality.

2.2.5 Construction Plant and Equipment

Due to the need for construction plant and equipment to build the wharf infrastructure, there is potential that fuel/oil spills and other contaminants may pollute marine waters if not appropriately managed.

Construction contractors must, by law, comply with established fuel/oil storage and handling standards and protocols to reduce the risk of incidents. Appropriate operational procedures are included in the Construction Environmental Management Plan (CEMP), which sets out management measures to reduce that the risk of fuel/oil spills and contaminants, and if they occur, how they are managed to minimise impact.

If managed appropriately, the potential for fuel/oil spills as part of the construction phase of the project presents a temporary negligible impact to marine water quality.

2.3 Operational Phase Impacts

Potential impacts on the marine environment associated with the upgraded wharf will be addressed and mitigated with the implementation of the port's Environmental Management System for port operational activities. Further details are provided in the following sections for shipping operations with the potential to impact marine waters during the operational phase of the project.

2.3.1 Operational Shipping

No changes to the operational shipping and associated impacts will occur based on the updated design. As such, all water quality impacts are the same as presented in the Draft EIS (BMT 2018b).

2.3.2 Operational Propwash

Sediment plumes can potentially be generated by propwash caused by inbound and outbound ships at the proposed wharf. Vessel propulsion leads to localised velocity fields which may be capable of generating sufficient bed shear stress to suspend sediment.

The operational propwash modelling assessment undertaken for the Draft EIS (BMT 2018a) was updated for the revised KI Seaport design. The revised design shifted the berth location further offshore by around 300 m and therefore the sediment resuspension impacts of shipping are expected to be reduced compared with the Draft EIS.

In order to assess the influence of differing weather conditions on the construction plume behaviour an ensemble of simulation periods was assessed. The ensemble of 2 different periods were selected to span a typical range of seasonal and wind-strength conditions. The selection of the simulation periods is described in the Draft EIS modelling report (BMT 2018a).

Neither the median or 99th percentile maps show any plume that is above the minimum scale limit shown (0.2 and 1.0 mg/L respectively). This is because the sediment plume occurs over such a short duration that it is not observable for these percentiles. Figure 2-1 presents the maximum concentration observed by either scenario, and shows that local plumes in the berth area are ~10 mg/L and no plumes extend to the Yumbah Intakes. Based on the revised modelling it is concluded that operational propwash represents a negligible risk to marine water quality in Smith Bay.

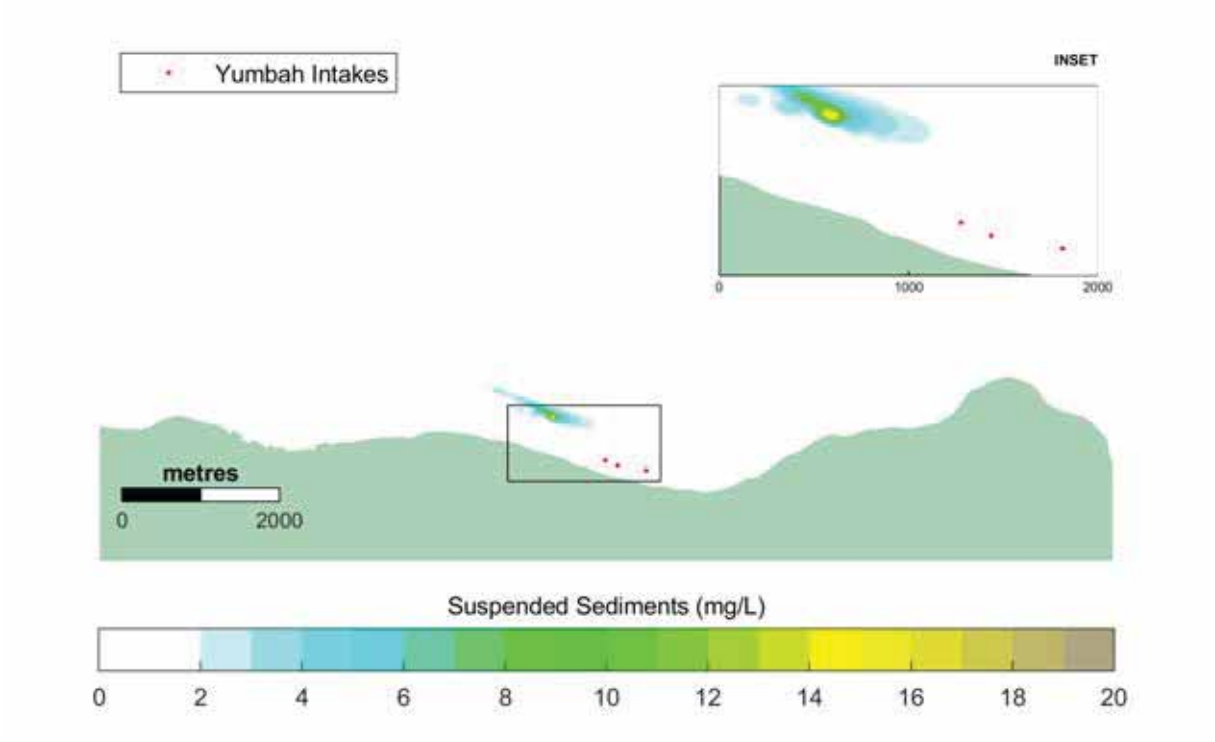

Figure 2-1 Maximum depth-averaged operational propwash TSS

2.4 Recommended Mitigation Measures

2.4.1 Construction Phase

To minimise potential turbidity impacts generated by marine construction works, the following mitigation measures are to be implemented:

- Construction activities are to be conducted in accordance with any EPA licences.
- Drill/drive pile installation is restricted to instances where early refusal occurs during pile driving.
- During drill/drive activities sediment loss to the water column is restricted through onboard management practices which retain drill cuttings on board for offsite disposal.
- Reactive sediment plume monitoring is undertaken during operations which may generate sediment plumes to monitor water quality between the construction footprint and sensitive receptors (e.g. Yumbah intakes).
- Monitoring data is assessed against threshold triggers, with appropriate management actions implemented if threshold triggers are exceeded.
- If trigger levels are exceeded, the marine works contractor will be responsible for taking actions to ensure impacts are avoided at sensitive receptors.
- The reactive water quality monitoring program will be detailed further in the Construction Management Plan.

The standard operational mitigation measures to reduce the risk of fuel/oil spills and other contaminants entering the marine waters are unchanged from those found in the Draft EIS (BMT 2018a).

2.4.2 Operational Shipping

The proposed adopted mitigation measures to reduce the potential risk to marine water quality due to operational shipping are unchanged from the Draft EIS (BMT 2018a).

2.4.3 Monitoring

Water quality monitoring during the construction phase of the project will be undertaken in accordance with the reactive monitoring programs described above and detailed in the Construction Management Plan.

2.5 Residual Impacts and Assessment Summary

In accordance with the methodology described in the Draft EIS technical report (BMT 2018b), Table 2-1 summarises the marine water quality issues identified by the impact assessment in the previous sections. This assessment table also includes the significance of each of the identified impacting processes, the likelihood of the impact occurring, and the resulting risk rating.

The standard and additional mitigation measures discussed in previous sections are also summarised in Table 2-1, with a risk rating indicated for the residual impacts after mitigation. As indicated in this assessment table, all residual impacts are rated as either a low or negligible risk.

Construction phase residual impacts would be temporary (days to months) in duration, while operational phase residual impacts would be long-term in duration extending over the life of the project.

Table 2-1 Risk assessment summary – marine water quality

Ref	Activity	Hazard (Environmental Aspect)	Potential Impact	Consequence	Likelihood	Inherent risk level	Management / mitigation measures	Consequence	Likelihood	Residual risk level
	Construction Phase									
1	Marine construction works	Generation of turbid plumes	Degradation in marine water quality causing adverse impacts to sensitive ecological receptors (e.g. seagrass) and aquaculture receptors	Negligible	Unlikely	Low	• Nil	Negligible	Unlikely	Low
2		Sediment deposition	Seagrass and benthic community decline due to smothering by construction plume sediments	Negligible	Unlikely	Low	• Nil	Negligible	Unlikely	Low
3		Mobilisation of contaminants into water column	Degradation in marine water quality causing adverse impacts to sensitive ecological receptors (e.g. seagrass) and aquaculture receptors	Negligible	Unlikely	Low	• Nil	Negligible	Unlikely	Low

Ref	Activity	Hazard (Environmental Aspect)	Potential Impact	Consequence	Likelihood	Inherent risk level	Management / mitigation measures	Consequence	Likelihood	Residual risk level
4		Use of construction plant and equipment	Hydrocarbon spills cause adverse impacts to marine water quality and sensitive ecological receptors	Minor	Possible	Medium	• CEMP to include established management procedures covering vessel maintenance, reporting of leaks and use of spill kits in the event of a spill • Development and implementation of a Construction Management Plan by the Contractor. • Hydrocarbon spill kit is to be located on the piling and transport barges. • First strike spill response equipment and staff are accessible and able to respond to events and have access to more spill response resources if the event escalates. • All fuel and chemical supplies to be stored appropriately.	Minor	Unlikely	Low
Operational Phase										
6	Operational shipping	Hydrocarbon spills	Hydrocarbon spills cause adverse impacts to marine water quality and sensitive ecological receptors	Minor	Possible	Medium	• Preparation and implementation of a Fuel and Chemical Storage and Handling Plan • Placement of containment bunds around storage tanks and drums • Lining of bunds with impervious material • Clean up any spills in a timely manner • Provision of spill kits on site	Minor	Unlikely	Low

Ref	Activity	Hazard (Environmental Aspect)	Potential Impact	Consequence	Likelihood	Inherent risk level	Management / mitigation measures	Consequence	Likelihood	Residual risk level
7		Ballast water	Introduction of pest species and diseases into marine waters of Smith Bay	Minor	Unlikely	Low	• Ensure that correct ballast disposal protocols are followed (i.e. ballast water is disposed of offshore) • Ensure that ships come to Smith Bay directly from a controlled port • Implementing a strict Pest/Disease Control Management Plan prepared in consultation with BioSecurity SA	Minor	Unlikely	Low
8		Propwash	Degradation in marine water quality from turbid plumes from propwash	Negligible	Possible	Low	• Nil	Negligible	Possible	Low

3 Revised Coastal Process Impact Assessment

3.1 Overview

The marine water quality impact assessment undertaken for the Draft EIS (BMT 2018c) has been revised based on the updated design (Figure 1-1). The updated design uses a suspended jetty to connect with a floating wharf located approximately 650 m offshore. The most notable changes compared to the previous design is that there is no dredged berth pocket or inshore causeway.

For additional information on coastal process baseline and impact assessment methodologies refer to the Draft EIS technical report (BMT 2018c).

3.2 Nearshore Circulation

The updated design does not include any impermeable causeway within the coastal zone. The 650 m long jetty will be suspended on groups of tubular steel piles located at headstocks approximately every 12 m. Each pile is expected to have a diameter ~1 m and each headstock to be supported by around 3 piles. The disruption to coastal circulation within Smith Bay by the proposed suspended jetty would therefore by negligible.

The 168 m x 40 m floating wharf is located approximately 650 m offshore and aligned with the prevailing currents and is also unlikely to have a significant impact on coastal circulation.

On this basis the updated KI Seaport design is expected to have only negligible impacts on the following processes:

- Water levels;
- Currents;
- Water temperature; and
- Smith Creek Plumes.

3.3 Waves

The suspended jetty will effectively transmit incoming wave energy and the floating wharf would also be expected to have only a very localised effect on wave fields. The updated KI Seaport design is expected to have a negligible impact on wave fields at the shoreline and outside the immediate project footprint.

3.4 Sediment Transport

Following from the negligible impacts to both nearshore circulation and wave fields the updated KI Seaport design is expected have a negligible impact on sediment transport processes both within the project footprint and more broadly within Smith Bay.

3.5 Seagrass Wrack

The suspended jetty will have negligible impact on retention of seagrass wrack both within the project footprint and more broadly along the Smith Bay shoreline.

3.6 Residual Impact and Assessment Summary

In accordance with the methodology described in the Draft EIS technical report (BMT 2018c), Table 2-1 summarises the coastal process impacts identified by the assessment in the previous sections. This assessment table also includes the significance of each of the identified impacting processes, the likelihood of the impact occurring, and the resulting risk rating.

Any associated standard and/or additional mitigation measures are also summarised in Table 2-1, with a risk rating indicated for the residual impacts after mitigation. As indicated in this assessment table, residual impacts to coastal processes are in all cases rated as low risk.

The coastal processes impact assessments are summarised in Table 2-1 together with the anticipated risk and potential mitigation measures (where relevant). Based on the assessments, all risks to coastal processes that have been identified can be reduced to a low or medium residual risk through the application of controls inherent of the Project design.

Table 3-1 Risk assessment summary – coastal processes

Ref	Activity	Hazard (Environmental Aspect)	Potential Impact	Consequence	Likelihood	Inherent risk level	Management / mitigation measures	Consequence	Likelihood	Residual risk level
	Construction Phase									
-	Marine construction works	Generation of turbid plumes	Construction phase impacts have been assessed in Section 2							
Operational Phase										
1	Coastal zone infrastructure: • Floating wharf • Suspended jetty • Jetty abutment	Modification to coastal water levels	• No detectable increase to water levels	Negligible	Unlikely	Low	• Nil	Negligible	Unlikely	Low
2		Modification to coastal circulation - currents	• Negligible changes to coastal circulation within area immediately adjacent to project infrastructure	Negligible	Unlikely	Low	• Nil	Negligible	Unlikely	Low
3		Modification to coastal circulation – water temperature	• Negligible changes to water temperature within Smith Bay	Negligible	Unlikely	Low	• Nil	Negligible	Unlikely	Low
5		Modification to coastal waves	• Negligible modification of coastal wave climate outside project area	Negligible	Unlikely	Low	• Nil	Negligible	Unlikely	Low

Ref	Activity	Hazard (Environmental Aspect)	Potential Impact	Consequence	Likelihood	Inherent risk level	Management / mitigation measures	Consequence	Likelihood	Residual risk level
6		Change to sediment transport pathways and beach processes	• Negligible change to sediment pathways in Smith Bay	Negligible	Unlikely	Low	• Nil	Negligible	Unlikely	Low
7		Requirement for future maintenance dredging	• Project infrastructure should not require maintenance dredging	Minor	Unlikely	Low	• Nil	Minor	Unlikely	Low
8		Modification to seagrass wrack accumulation	• Negligible trapping of seagrass wrack by suspended jetty	Negligible	Unlikely	Low	• Nil	Negligible	Unlikely	Low

4 References

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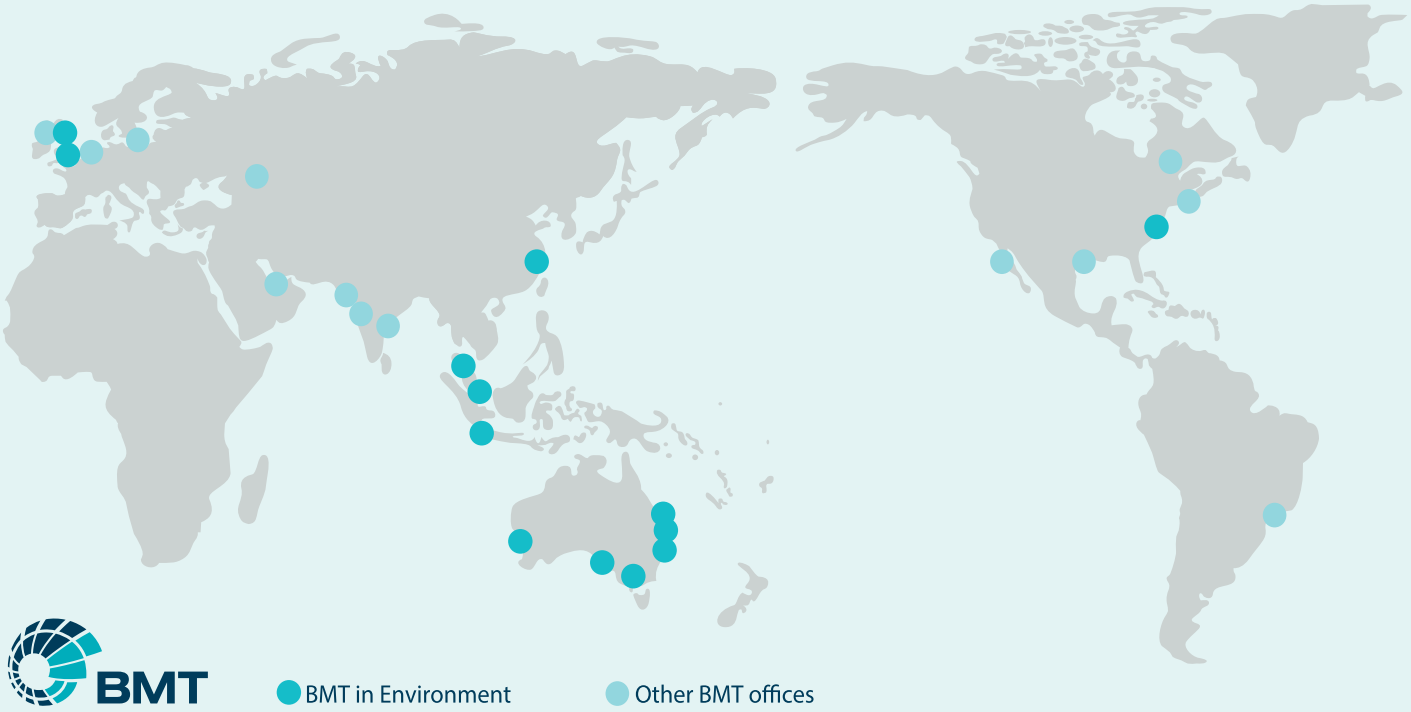

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Appendix C2 – Revised Smith Bay Marine Ecological Assessment

Kangaroo Island Plantation Timbers Ltd

Revised Smith Bay Marine Ecological Assessment

Prepared by: David Wiltshire and James Brook

SEA Pty Ltd

23rd September 2019

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1 INTRODUCTION

Kangaroo Island Plantation Timbers (KIPT) proposes to develop a deepwater wharf at Smith Bay on the north coast of Kangaroo Island. KIPT has released a Draft Environmental Impact Statement (EIS), which included a synthesis of marine ecological surveys undertaken in August 2016 (a general inspection with no specific sites), November 2017 and August 2018 (KIPT 2019). Since the publication of the Draft EIS, the project has changed such that the wharf will be further offshore (Figure 1). Consequently, a further survey was undertaken to assess the habitat and flora and fauna within the extended footprint.

2 METHODS

2.1 Subtidal surveys

The marine survey of the offshore area within the development site was undertaken on 4 September 2019 by David Wiltshire and James Brook of SEA.

Ten new sites were added, including (Figure 1):

- two sites (S22 and S24) within the direct footprint of the berthing area of the revised seaport design
- three sites 100 m offshore from the berthing area, along existing site alignments
- four sites a further 100 m offshore within the ship approach area, three of which are along existing site alignments and the fourth further west
- one site (S31) at a feature of topographical interest.

The first five sites described above were surveyed by divers using scuba equipment and underwater cameras. Notes on flora and fauna were taken on waterproof paper. At each site a 30 metre transect line was laid due north (magnetic) from the GPS mark. The cover of macroalgae and seagrass and the abundance of fish and invertebrates occurring within one metre of the transect line were recorded using a three-category logarithmic scale (1 = 1–2 organisms or patches; 2 = 3–10 organisms or patches; 3 = 11–100 organisms or a continuous distribution). Estimates of percentage cover of seagrass were also recorded. The presence of any introduced species was also noted. A species list was generated for fish, large mobile invertebrates, sessile invertebrates, macroalgae and seagrass. Taxa were identified to the lowest taxonomic level possible in the field (typically genus or species).

The remaining sites were surveyed using camera drops to characterize the habitat. Scuba surveys to characterise flora and fauna in more detail were not undertaken because of decompression limits and the lower relevance to the project. The camera was a Go Pro 5 set to medium field of view.

The GPS marks for all sites surveyed during current and previous surveys are provided in Table 1.

Table 1. GPS marks of marine and intertidal survey sites.

Sites from the most recent survey are highlighted in green.

Site	Latitude (degrees)	Longitude (degrees)
November 2017 – dive sites		
S01	-35.58803	137.41891
S02	-35.58676	137.41942
S03	-35.58485	137.42014
S04	-35.58937	137.42381
S05	-35.58838	137.42410
S06	-35.58638	137.42482
S07	-35.59014	137.42625
S08	-35.58878	137.42665
S09	-35.58696	137.42737
S10	-35.59100	137.42848
S11	-35.58963	137.42911
S12	-35.58781	137.42972
S13	-35.59304	137.43451
S14	-35.59177	137.43491
S15	-35.58995	137.43575
Aug 2018 – dive sites		
S16	-35.58635	137.42567
S17	-35.58630	137.42676
S18	-35.58629	137.42784
S19	-35.58627	137.42882
S20	-35.58646	137.43014
S21	-35.58557	137.42782
Sept 2019 – dive sites		
S22	-35.58537	137.42520
S23	-35.58459	137.42543
S24	-35.58580	137.42616
S25	-35.58481	137.42813
S26	-35.58523	137.43065
Sept 2019 - camera drop sites		
S27	-35.58375	137.42357
S28	-35.58382	137.42571
S29	-35.58385	137.42841
S30	-35.58404	137.43096
S31	-35.58478	137.43122
Sept 2019 – intertidal sites		
B01	-35.59037	137.42346
B02	-35.59111	137.42584
B03	-35.59177	137.42818

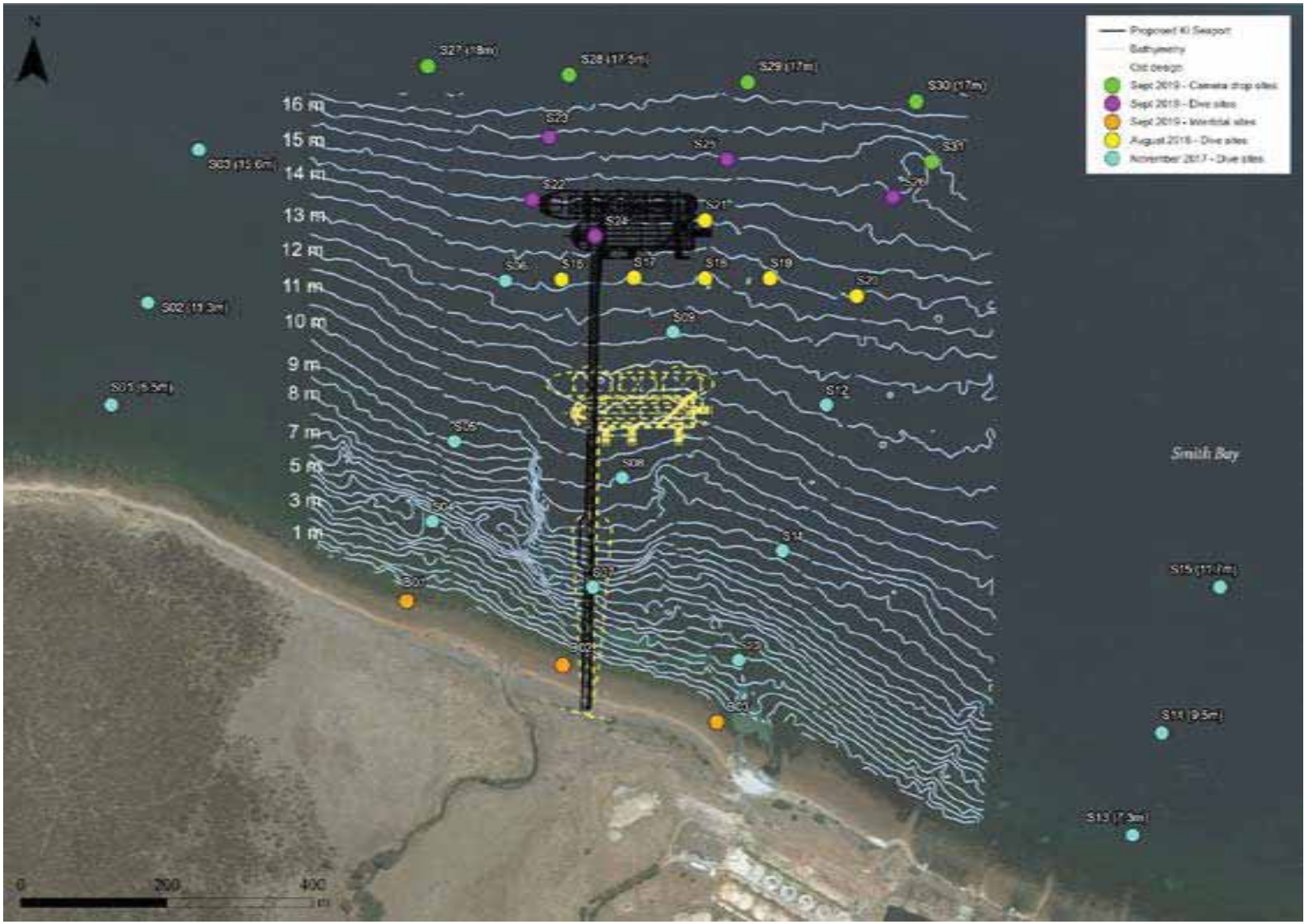


Figure 1. Location of marine and intertidal survey sites in Smith Bay.

2.2 Intertidal surveys

Intertidal surveys were undertaken on 3 September 2019 by David Wiltshire and James Brook of SEA. Three sites were established, each being an onshore extension of the marine survey site alignments (Figure 1). The GPS marks for the intertidal sites are provided in Table 1.

At each site a one square metre quadrat was placed haphazardly over the rocky substrate at three positions within a radius of 10 metres from the site mark (Figure 2). The area inside each quadrat was searched, including turning (where possible) the top layer of rocks, and the organisms found were recorded.

Figure 2. Intertidal survey using one square metre quadrat placed haphazardly over rocks.

3 RESULTS

3.1 Subtidal surveys

The substrate was a mixture of sand, rubble including shells and shell fragments, and rhodoliths. Seagrass cover was sparser than the areas further inshore that had previously been surveyed.

Seagrass cover was greatest at S24 and S25, each with about 5% cover of *Amphibolis*, and the latter site also with 1–5% *Posidonia*. There were small patches (<1% total) of *Posidonia* at all other sites surveyed by scuba. *Amphibolis* cover was 1–5% at S26. There were small patches (<1% total) of *Amphibolis* at all other sites surveyed by scuba. There were traces (<1% total) of *Zostera nigicaulis* and *Halophila australis* at each of the sites surveyed by scuba.

At the drop camera sites, small patches of *Posidonia* and *Amphibolis* (totalling <5%) were evident at S27, S28 and S31, and traces of *Halophila* were evident at all sites. Site S31 was at a boundary of an area of low platform reef dominated by *Lobophora variegata* and *Sargassum* spp.

Transition of marine habitats in Smith Bay from shallow to deep water near the jetty alignment is shown in Figure 3 and Figure 4. Representative images of the benthic habitats at all sites from previous and current surveys (Figure 1) are provided in Attachment A.

Several macroalgal species were recorded in patches on transects during the scuba surveys, including *Caulerpa cactoides*, *C. trifaria, C. brownii*, *Sargassum* spp. (subgenus *Sargassum*), *Zonaria* sp. and a species of red membranous macroalgae. The latter two and the forked codium *Codium duthiae* had not been recorded during surveys for the Draft EIS, and *Caulerpa brownii* had not been recorded since an initial survey in August 2016.

Dominant invertebrates were erect, lacy bryozoans, including *Triphyllozoan* sp., the queen scallop *Equichlamys bifrons* and doughboy scallop *Mimachlamys asperrimus*. Other mobile species recorded several times were the red-mouth ascidian *Herdmania grandis,* holothurians including *Australostichopus mollis*, the red whelk *Pleuroploca australasia,* Vermilion biscuit star *Pentagonaster dubeni,* the eleven arm seastar *Coscinasterias muricata* and orange reef star *Echinaster glomeratus*. Several gastropod egg collars were observed. Invertebrate species not recorded during surveys for the Draft EIS included the bristled sponge crab *Austrodromidia octodentata,* smooth seagrass crab *Naxia aurita* and a soft coral.

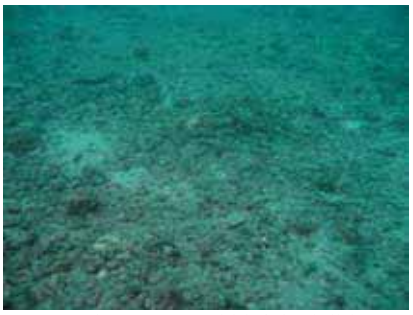
No introduced species were recorded in Smith Bay during either of the marine surveys.

Photographs of species listed above are provided in Attachment B. The list of species recorded all sites from previous and current subtidal surveys (refer Figure 1) is provided in Attachment C.

S28 Depth 17m. Rubble, patch of *Amphibolis* and traces of *Halophila.*

S29 Depth 16.8 m. Rubble with traces of *Halophila.*

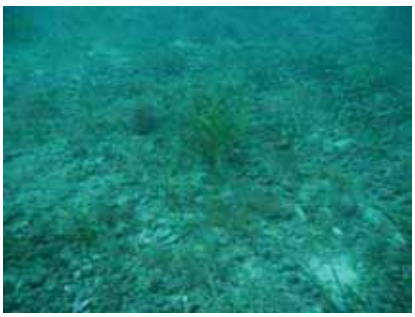
S30 Depth 16.8 m. Rubble with traces of *Halophila.*



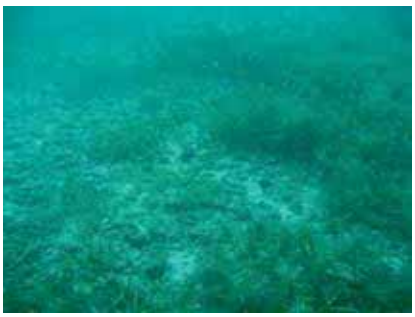
S22 Depth 14.5 m. Rubble/ rhodoliths with traces of *Zostera.*

S21 Depth 14 m. Rubble with *Amphibolis* and *Posidonia* patches

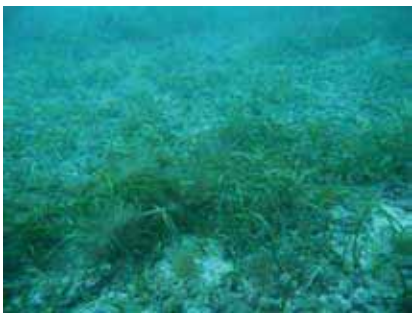
S20 Depth 13.5 m. Rubble with *Posidonia* patches



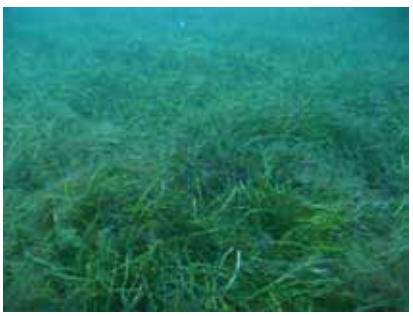
S06 Depth 13 m. Rubble with turf and *Posidonia* patches.



S09 Depth 13.6 m. *Posidonia*



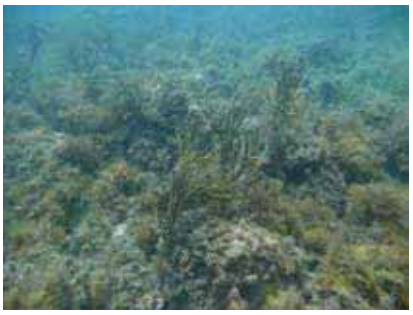
S12 Depth 13.1 m. *Posidonia*



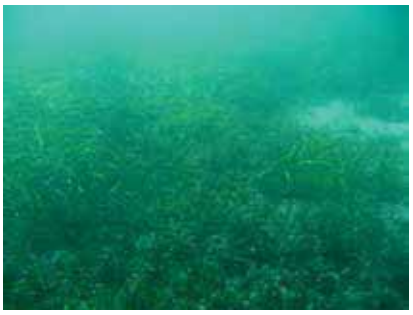
S05 Depth 10.4 m. Dense *Posidonia*

S08 Depth 10.5 m. Dense *Posidonia*

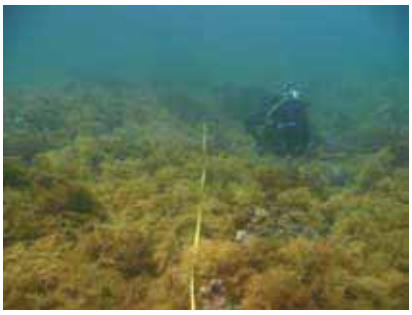
S11 Depth 9.5 m. Dense *Posidonia*



S04 Depth 6.8 m. *Scaberia* and *Sargassum*



S07 Depth 7.3 m. *Posidonia* and *Amphibolis*



S10 Depth 4.5 m. *Cystophora*

Figure 3. Transition of marine habitats in Smith Bay from shallow water (bottom) to deep water (top) near the jetty alignment (see Figure 1 for locations).

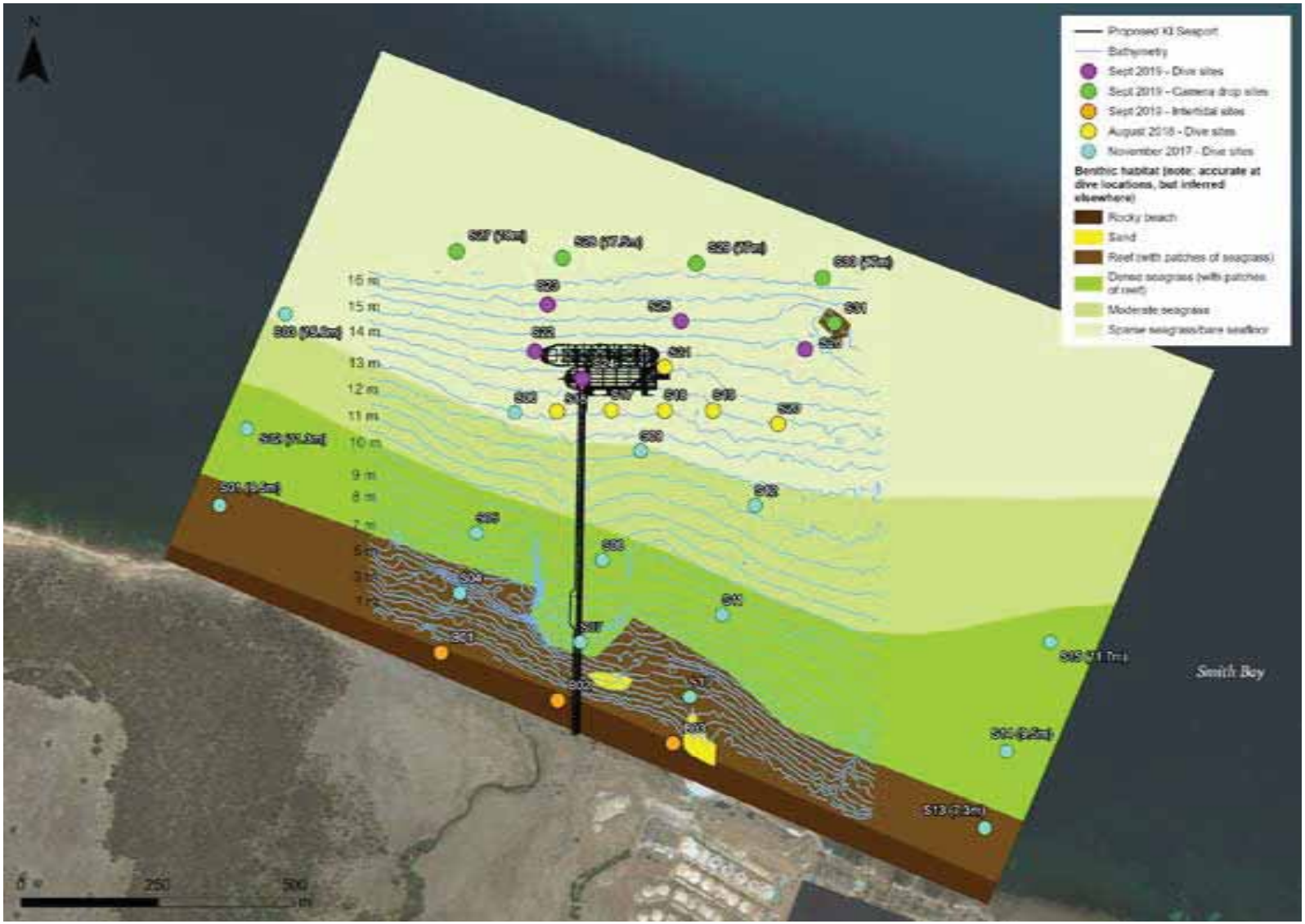


Figure 4. Dominant marine habitats in Smith Bay.

3.2 Intertidal surveys

The intertidal area of Smith Bay consists almost entirely of round rocks and boulders that have been weathered and smoothed by wave action.

The results of the intertidal survey are summarised in Table 2. The most abundant species was the small gastropod *Nodilittorina unifasciata* with abundances in the range 10–290 across all replicates. Other gastropods were *Nerita atamentosa* and *Austrocochlea concamerata* (Plate 1) and the limpet *Notoacmea* sp. (Plate 2). Grapsid crabs (Plate 3) were recorded at all sites (most replicates), and the isopod *Ligia australiensis* was recorded in some replicates of sites B01 and B02.

Plate 1. Intertidal gastropod *Austrocochlea concamerata*

Plate 2. Limpet *Notoacmea* sp.

Plate 3. Grapsid crab

Table 2. Taxa recorded during intertidal survey in September 2019.

Note: std. err. = standard error of mean.

Site / Species	B01					B02					B03				
	Replicates			Mean	Std. err.	Replicates			Mean	Std. err.	Replicates			Mean	Std. err.
	1	2	3			1	2	3			1	2	3		
Nerita atramentosa	2	3	1	2.0	0.6	2	1	3	2.0	0.6	14	17	24	18.3	3.0
Austrocochlea concamerata	4	3	1	2.7	0.9	5	5	16	8.7	3.7	43	8	43	31.3	11.7
Notoacmea sp.	3	-	-	1.0	1.0	-	-	4	1.3	1.3	3	1	3	2.3	0.7
Nodilittorina unifasciata	260	10	90	120.0	73.7	290	185	110	195.0	52.2	127	285	42	151.3	71.2
Undifferentiated barnacle	-	-	-	0.0	0.0	-	-	-	0.0	0.0	-	-	5	1.7	1.7
Undifferentiated grapsid crab	-	1	10	3.7	3.2	9	3	-	4.0	2.6	2	5	1	2.7	1.2
Ligia australiensis	-	5	9	4.7	2.6	5	-	-	1.7	1.7	-	-	-	0.0	0.0
Galeolaria caespitosa	-	-	-	0.0	0.0	-	-	-	0.0	0.0	1	-	-	0.3	0.3

4 DISCUSSION AND CONCLUSIONS

The previously unsurveyed area within the revised wharf area and shipping approaches comprised sandy substrate, rubble and rhodoliths, with a sparse cover (generally <5%) of seagrass. This represents a continuation of the gradient of decreasing seagrass cover with increasing depth, as identified during previous surveys. The flora and fauna were similar to the adjacent sites at the previous wharf area, although several species of macroalgae and two species of crab had not been previously recorded during surveys for the Draft EIS. Neither of these crab species were recorded during the 2019 Ausocean citizen science surveys (Larkin 2019).

The intertidal communities recorded at Smith Bay for the current study are consistent with those recorded at other sites on Kangaroo Island (Thomas & Edmonds 1979), and are representative of the mid-eulittoral zone for rocky coastlines on the north coast of Kangaroo Island (Womersley & Edmonds 1979).

No listed or protected species and no introduced species were recorded during either the subtidal or intertidal surveys in September 2019.

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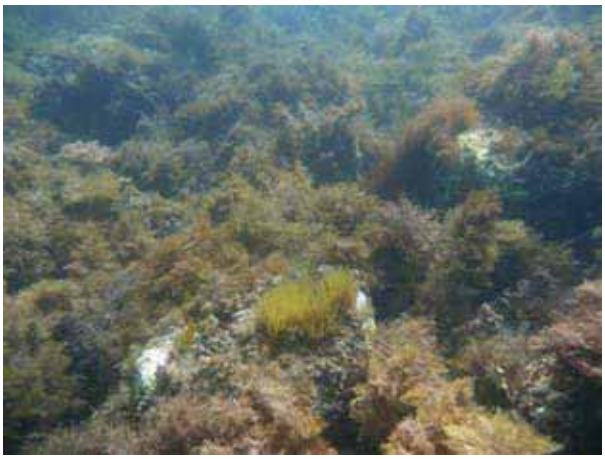
Womersley HBS & Edmonds SJ 1979. *Intertidal ecology of marine organisms*. In Tyler, MJ, Twidale CR & Ling JK, Natural History of Kangaroo Island. Royal Society of South Australia.

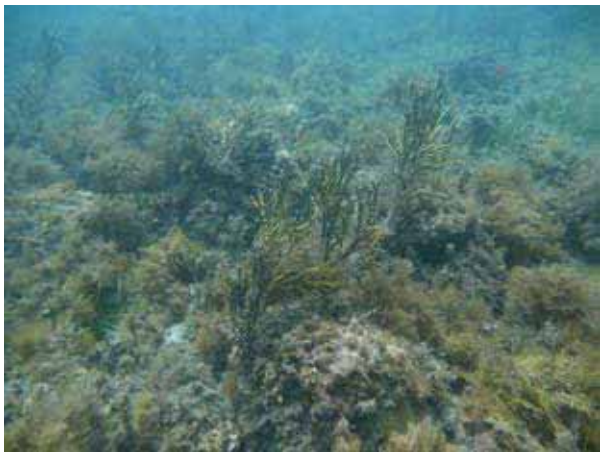
Attachment A: Typical habitat at Smith Bay marine survey sites. (Refer to Figure 1 of main document for site locations).



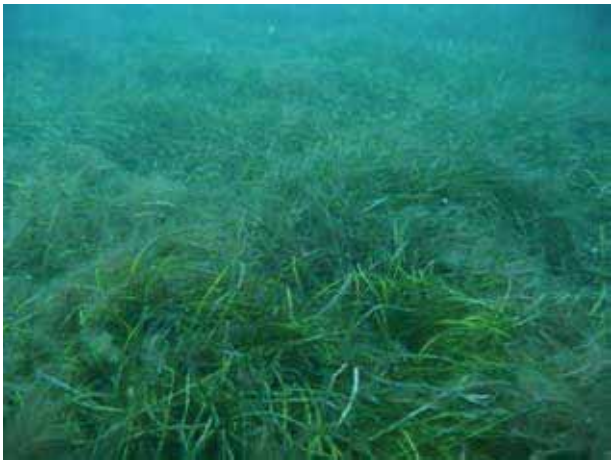
S01 Depth 6.5 m. Reef habitat dominated by *Cystophora* spp.

S02 Depth 11.3 m. Continuous, dense *Posidonia sinuosa*

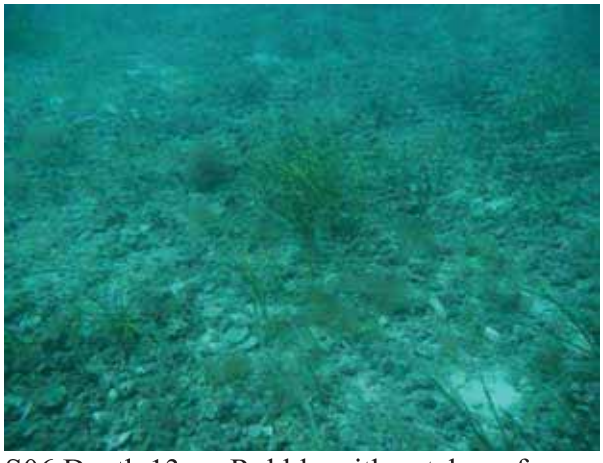
S03 Depth 15.6 m. Rubble with patches of *Posidonia sinuosa* and *Amphibolis antarctica*



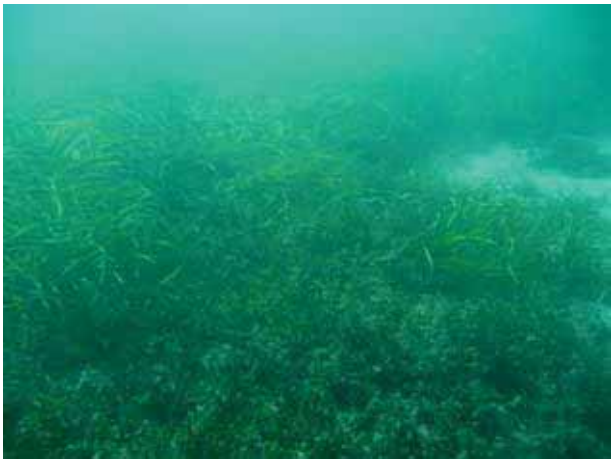
S04 Depth 6.8 m. Reef habitat dominated by *Scaberia agardhii* and *Sargassum* spp.



S05 Depth 10.4 m. Continuous, dense *Posidonia sinuosa*



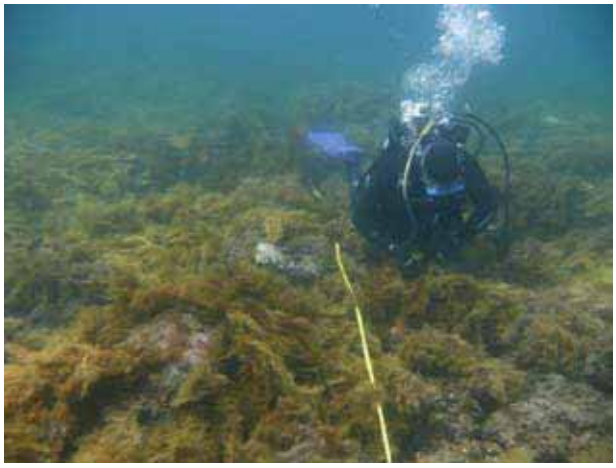
S06 Depth 13 m. Rubble with patches of *Posidonia sinuosa*



S07 Depth 7.3 m. Junction of areas of sand, *Posidonia sinuosa* and *Amphibolis antarctica*

S08 Depth 10.5 m. Continuous, dense *Posidonia sinuosa*

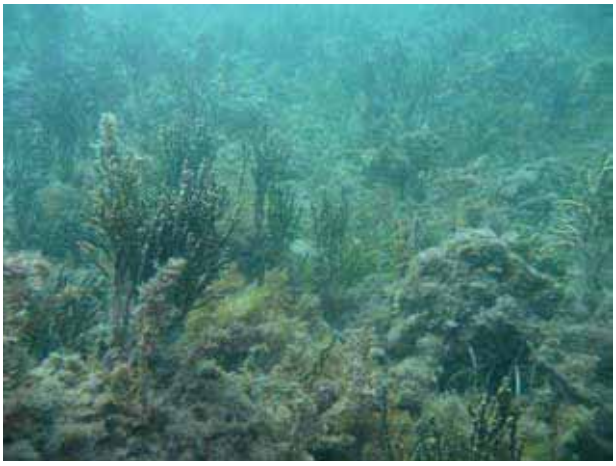
S09 Depth 13.6 m. Rubble (including shell fragments and rhodoliths) with moderately dense cover of *Posidonia sinuosa*



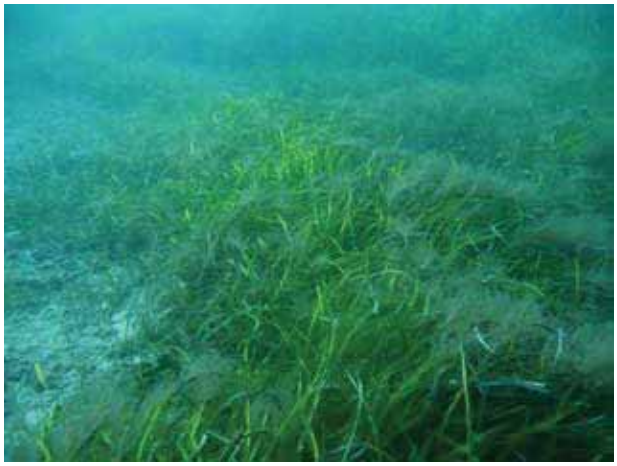
S10 Depth 4.5 m. Reef habitat dominated by *Cystophora* spp.

S11 Depth 9.5 m. Continuous, dense *Posidonia sinuosa* with brown filamentous epiphytes

S12 Depth 13.1 m. Continuous, moderately dense *Posidonia sinuosa* with brown filamentous epiphytes



S13 Depth 7.3 m. Low profile reef dominated by *Scaberia agardhii*, with patches of *Posidonia sinuosa*



S14 Depth 9.5 m. Continuous, dense *Posidonia sinuosa* with brown filamentous epiphytes

S15 Depth 11.7 m. Continuous, dense *Posidonia sinuosa* with brown filamentous epiphytes

S16 Depth 13.2 m. Rubble (including shell fragments and rhodoliths) with sparse patches of *Posidonia sinuosa*

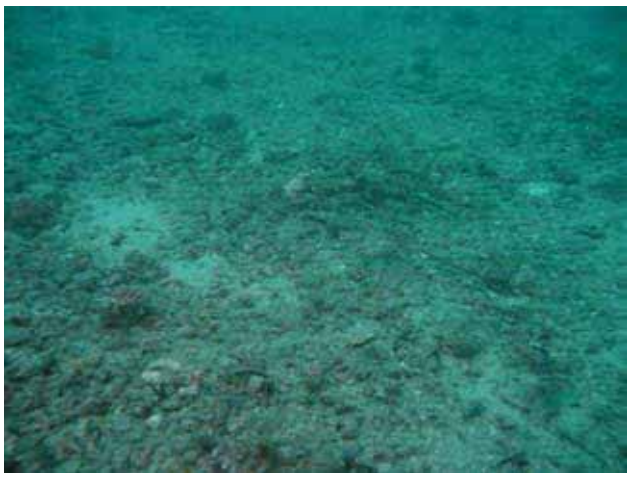
S17 Depth 13 m. Rubble with sparse patches of *Posidonia sinuosa*

S18 Depth 13 m. Rubble (including shell fragments and rhodoliths) with moderately dense cover of *Posidonia sinuosa*

S19 Depth 13.4 m. Rubble with sparse patches of *Posidonia sinuosa*

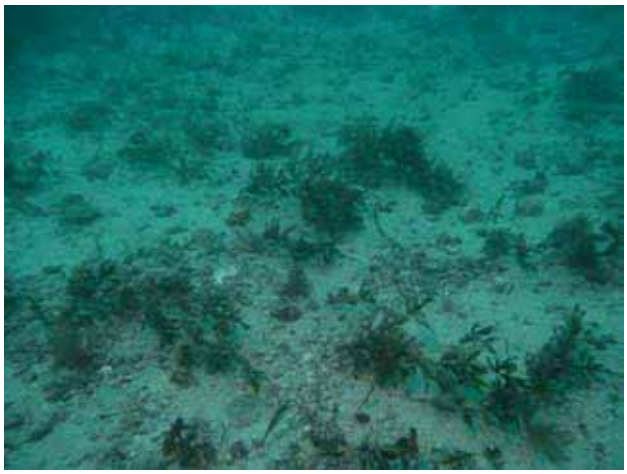
S20 Depth 13.5 m. Rubble with sparse patches of *Posidonia sinuosa*

S21 Depth 14 m (wharf area). Rubble with sparse patches of *Posidonia sinuosa* and *Amphibolis antarctica*



S22 Depth 14.5 m (wharf area). Rubble (including rhodoliths)

S23 Depth 16 m. Rubble (including shell fragments and rhodoliths)



S24 Depth 13.8 m. Rubble (including rhodoliths) with patches of *Amphibolis antarctica*

S25 Depth 15.5 m. Sand with rhodoliths and sparse patches of *Posidonia sinuosa*

S26 Depth 15 m. Rubble with sparse patches of *Posidonia sinuosa* and *Amphibolis antarctica*

S27 Depth 17 m (ship approach). Rubble (including shell fragments and rhodoliths)

S28 Depth 17 m (ship approach). Rubble (including shell fragments) with patches of *Amphibolis antarctica* and traces of *Halophila australis*

S29 Depth 16.8 m (ship approach). Rubble (including shell fragments and rhodoliths)

S30 Depth 16.8 m (ship approach). Rubble (including shell fragments) with traces of *Halophila australis* and *Zostera nigricaulis*

S31 Depth 15.5 m (ship approach). Sparse patches of low profile reef, *Posidonia sinuosa* and *Halophila australis*, with continuous section of reef in top-left of image. Magpie perch *Cheilodactylus nigripes*

Attachment B: Images of flora and fauna recorded during September 2019 subtidal surveys.

Plate 4. ***Caulerpa cactoides***

Plate 5. ***Caulerpa trifaria***

Plate 6. ***Sargassum*** **sp. subgenus** ***Sargassum***

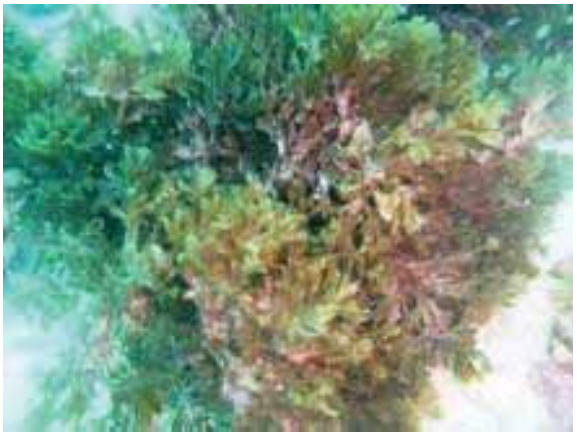


Plate 7. ***Zonaria*** **sp.**

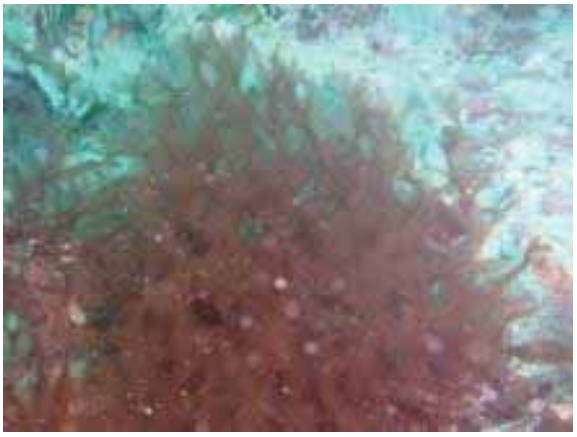


Plate 8. Red membranous macroalga

Plate 9. C*odium duthiae*

Plate 10. Lacy bryozoans among rhodoliths

Plate 11. The lacy bryozoan *Triphyllozoan* sp.

Plate 12. The lacy bryozoan *Iodictyum phoeniceum*

Plate 13. The queen scallop *Equichlamys bifrons* (3 in front) and the doughboy scallop *Mimachlamys asperrimus* (two at rear).

Plate 14. Doughboy scallop *Mimachlamys asperrimus*

Plate 15. Red-mouth ascidian *Herdmania grandis* covered by *Lobophora variegata.*

Plate 16. Southern sea cucumber *Australostichopus mollis* among *Caulerpa trifaria.*

Plate 17. Red whelk *Pleuroploca australasia*

Plate 18. Vermilion biscuit star *Pentagonaster dubeni*

Plate 19. Eleven-armed sea star *Coscinasterias muricata*

Plate 20. Orange reef seastar *Echinaster glomeratus*

Plate 21. Gastropod egg case

Plate 22. Bristled sponge crab *Austrodromidia octodentata*

Plate 23. Smooth seagrass crab *Naxia aurita*

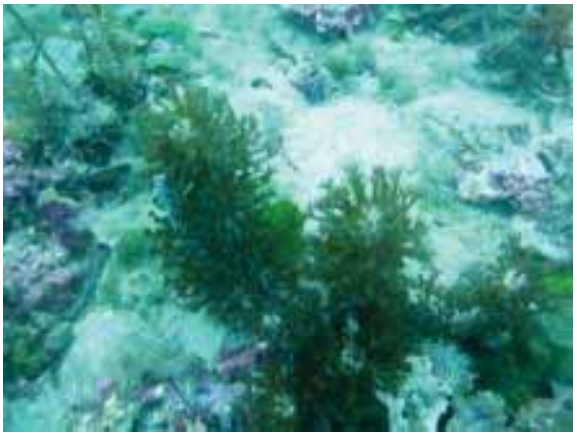


Plate 24. Soft coral

Attachment C. Taxa recorded during the subtidal surveys.

Notes: results from the most recent survey are highlighted in green. An asterisk (*) indicates an incidental off-transect observation. Site names for the September 2019 survey, and the abundance score for *Laurencia* at S21 differ from those erroneously presented in Table 2 of Appendix I1 of the Draft EIS.

		November 2017 survey															August 2018 survey						September 2019 survey				
		Mixed habitat (0–9 m)					Seagrass (9–12 m)					Sparse seagrass (12–16 m)					Sparse seagrass (12–16 m)						Sparse seagrass (14–18 m)				
Species	**Common name (after Edgar 2008 unless denoted by #)**	**S01**	**S04**	**S07**	**S10**	**S13**	**S02**	**S05**	**S08**	**S11**	**S14**	**S03**	**S06**	**S09**	**S12**	**S15**	**S16**	**S17**	**S18**	**S19**	**S20**	**S21**	**S22**	**S23**	**S24**	**S25**	**S26**
Macroalgae																											
Acrocarpia paniculata	Bushy tangleweed																										
Avrainvillea ?clavatiramea	Giant lobes#						1		1																		
Botryocladia sonderi	Red grapeweed	2	2		1	1	1									1											
Caulerpa brownii	Brown's caulerpa																								2	1	1
Caulerpa cactoides	Cactus caulerpa				1										2		3	3		2				2			
Caulerpa flexilis	Fern caulerpa	1				1																					
Caulerpa flexilis var. *muelleri*	Mueller's fern caulerpa	2				1																					
Caulerpa scalpelliformis	Serrated caulerpa																					1					
Caulerpa sedoides	Bubble caulerpa	2				1				1	1		1														
Caulerpa simpliciuscula	Simple-branched caulerpa																					1					
Caulerpa trifaria	Three-cornered caulerpa																					1				1	2
Chlorophyta spp.	Green lobed algae#																	1									1
Cladosiphon filum	Brown spaghetti weed							3		3	3			3	3												
Codium pomoides	Sea apple					2	2	1	1																		
Codium spongiosum	Green spongeweed												1*														
Codium duthieae	Forked codium																										1
Colpomenia ?sinuosa	Sinuous bullweed							2		1				3	3												
Cystophora brownii	Brown's cystophora		1		1																						
Cystophora expansa	Expansive cystophora	2				1																					
Cystophora monilifera	Three-branched cystophora	3	2			3																					
Cystophora moniliformis	Zigzag cystophora	2	1		2																						
Cystophora retorta	Open-branched cystophora																										
Cystophora siliquosa	Slender cystophora	3	3		3	2																					
Cystophora subfarcinata	Bushy cystophora	2																									
Dictyosphaeria sericea	Liverwort seaweed	2	3		3	1		1																			

Species	Common name (after Edgar 2008 unless denoted by #)	November 2017 survey															August 2018 survey						September 2019 survey				
		Mixed habitat (0–9 m)					Seagrass (9–12 m)					Sparse seagrass (12–16 m)					Sparse seagrass (12–16 m)						Sparse seagrass (14–18 m)				
		S01	S04	S07	S10	S13	S02	S05	S08	S11	S14	S03	S06	S09	S12	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26
Gloiosaccion brownii	Poseidon's fingers	2	2		2	1												1									
?Gracilaria sp.	Yellow antlers#	2	1			1																					
Haliptilon roseum	Rosy coralline			2	3	1	1			2																	
Laurencia spp.	Laurencias				1	1														1	1	2	1	1			
Lobophora variegata	Peacockweed	2	1		1						1*																1
Metagonionlithon sp.	Articulated corallines	1	2		1	1	1																				
Osmundaria prolifera	Twisted red strapweed																										
Peyssonnelia spp.	Lobed red algae	2	2		2	1	1		1																		
Rhodophyta spp.	Red filamentous algae#												2					1			1						
Rhodophyta spp.	Red lobed algae#																	1				1					
Rhodophyta spp.	Red membranous algae#																						2				
Sargassum subgenus *Arthrophycus*	Sargassums		3		1	2																					
Sargassum subgenus *Phyllotrichia*	Sargassums	1																									
Sargassum subgenus *Sargassum*	Sargassums	1	1			2																					2
Scaberia aghardii	Brown fingerweed	1	2			3																					
Sporolithon durum	Rhodolith																										
Zonaria spiralis	Spiral fanweed	1			1																						
Zonaria sp.	Undifferentiated zonaria#																										1
Seagrasses																											
Amphibolis antarctica	Wire weed			2				3	1	2	2	1	1					1	2	2	1	3	2	1		2	2
Amphibolis griffithii	Griffith's sea nymph			1																							
Halophila australis	Southern paddlegrass	1										1	1									2	1	1	1		
Posidonia coriacea	Thin-leafed strapweed			1																							
Posidonia sinuosa	Smooth strapweed	1	1	3			3	3	3	3	3	1	2	3	3	3	3	3	3	3	3	3	1	1	1	2	1
Zostera nigricaulis	Black-stemmed eelgrass			1					1	2	1	1	1				1	1			1	2	1	1	1	1	1
Fishes																											
Acanthaluteres brownii	Spiny-tailed leatherjacket					2*																					
Acanthaluteres vittiger	Toothbrush leatherjacket																										
Achoerodus gouldii	Western blue groper					2*																					
Aetapcus maculatus	Warty prowfish				1																						
Austrolabrus maculatus	Black-spotted wrasse					1																					
Cheilodactylus nigripes	Magpie perch					1*																					
Chelmonops curiosus	Western talma					1*																					

Species	Common name (after Edgar 2008 unless denoted by #)	November 2017 survey															August 2018 survey						September 2019 survey				
		Mixed habitat (0–9 m)					Seagrass (9–12 m)					Sparse seagrass (12–16 m)					Sparse seagrass (12–16 m)						Sparse seagrass (14–18 m)				
		S01	S04	S07	S10	S13	S02	S05	S08	S11	S14	S03	S06	S09	S12	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26
Dactylophora nigricans	Dusky morwong					1*																					
Dotolabrus aurantiacus	Castelnau's wrasse																										
Enoplosus armatus	Old wife					1*																					
Girella zebra	Zebra fish					2*																					
Helcogramma decurrens	Black-throated threefin					1																					
Kyphosus sydneyanus	Silver drummer					2*																					
Meuschenia hippocrepis	Horseshoe leatherjacket				1	2*																					
Monocathid sp.	Leatherjacket																1										
Notolabrus parilus	Brown-spotted wrasse			1																							1
Notolabrus tetricus	Blue-throated wrasse	1			1	2*																					
Omegaphora armilla	Ringed toadfish									1												1					
Othos dentex	Harlequin fish					1*																					
Parascyllium ferrugineum	Rusty catshark									1*																	
Parascyllium variolatum	Varied catshark	1*																									
Parequula melbournensis	Southern silverbelly			1																							
Pictilabrus laticlavius	Senator wrasse	1	1																								
Pseudocaranx sp.	Trevally																										
Scobinichthys granulatus	Rough leatherjacket																					1					
Scorpis aequipinnis	Sea sweep					2*																					
Siphonognathus beddomei	Pencil weed whiting																										
Stipecampus cristatus	Ringed-back pipefish																										
Tilodon sexfasciatus	Moonlighter					2*																					
Trachurus novaezelandiae	Yellowtail scad								3*																		
Mobile invertebrates																											
Acrosterigma cygnorum	Western heart cockle													1			1	1		1	1						
Amblypneustes sp.	Egg urchin																										
Anthaster valvulatus	Mottled seastar													1			1	2			1	1				1*	
Astralium squamiferum	Seagrass star																										
Austrodomidia octodentata	Bristled sponge crab															1											
Calliostoma ?armillatum	Pink top shell							1																			
Cenolia trichoptera	Orange feather star	3	3		3																						
Centrostephanus tenuispinus	Western hollow-spined urchin									1*																	
Coscinasterias muricata	Eleven-armed seastar						1*						1				1	1	1			1			1	1	

Species	Common name (after Edgar 2008 unless denoted by #)	November 2017 survey															August 2018 survey						September 2019 survey				
		Mixed habitat (0–9 m)					Seagrass (9–12 m)					Sparse seagrass (12–16 m)					Sparse seagrass (12–16 m)						Sparse seagrass (14–18 m)				
		S01	S04	S07	S10	S13	S02	S05	S08	S11	S14	S03	S06	S09	S12	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26
Echinaster arcystatus	Pale mosaic seastar					1																					
Echinaster glomeratus	Orange reef star		1		1		1*					1	1	1*	1		1		1	1	2	1	1				1
Equichlamys bifrons	Queen scallop					1						3	2	2	2		3	3	3	3	3	3	3	3	3	3	3
Fusinus australis	Southern spindle						1															1					
Gastropoda sp.	Gastropod egg collar																1			1	1			1	1	1	
Goniocidaris tubaria	Stumpy pencil urchin																		1								
Haliotis laevigata	Greenlip abalone																										
Haliotis spp.	Abalone#									1				2		2		1		2	1	1	1				1
Heliocidaris erythrogramma	Purple urchin																										
Jasus edwardsii	Southern rock lobster	1	1																								
Leptomithrax gaimardii	Giant spider crab																1	1	1			1					
Luidia australiae	Southern sand star									1*				1									1				
Meridiastra gunii	Gunn's six-armed star																		1	1					1		
Mimachlamys asperrimus	Doughboy scallop											1			1	1	3	2	3	3	2	2	2	2	3	3	3
Naxia aurita	Smooth seagrass crab																						1				
Nectocarcinus integrifrons	Seagrass swimmer crab														1								1				
Nectria pedicelligera	Multi-spined seastar			1			1										1	1	1	1							1
Neodoris chrysoderma	Marigold dorid																1			1	1							
Austrodromidia octodentata	Bristled sponge crab																						1				1
Pagurid sp.	Grey hermit#				1																						
Paguristes frontalis	Southern hermit crab																			1			1				
Pecten fumatus	King scallop																1		1								
Pentagonaster dubeni	Vermilion biscuit star						1	3		2			1			2	1	2	1		1	1	1				2
Petricia vernicina	Cushion seastar													1	1				1						1*		
Phasianella australis	Painted lady						1		1											1								
Phasianella ventricosa	Swollen pheasant shell				2					1																	
Phasianotrochus eximus	Giant kelp shell	1																									
Phyllacanthus irregularis	Western slate-pencil urchin	4	2		1	1																					
Plagusia chabrus	Red bait crab				1																						
Plectaster decanus	Mosaic seastar														1			1					1				
Pleuroploca australasia	Tulip shell			2								1		1	1			2	1	1	1		1				1
Sepia apama	Giant Australian cuttlefish																										
Stchopodid spp.	Sea cucumbers	1				1	1	1	1				1		2	1	1	2	2	2	2	2	1	1			1

Species	Common name (after Edgar 2008 unless denoted by #)	November 2017 survey															August 2018 survey						September 2019 survey				
		Mixed habitat (0–9 m)					Seagrass (9–12 m)					Sparse seagrass (12–16 m)					Sparse seagrass (12–16 m)						Sparse seagrass (14–18 m)				
		S01	S04	S07	S10	S13	S02	S05	S08	S11	S14	S03	S06	S09	S12	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26
Tellina ?victoriae	Rough tellin#				1																						
Thyone okeni	Burrowing holothurian#								1																		
Tucetona flabellata	Fan-like dog-cockle												1														
Turbo torquatus	Turban shell																						1				
Uniophora granifera	Granular seastar					1											1										
Sessile invertebrates																											
Alcyonacea sp.	Soft coral																										2
Ascidiacea spp.	Unidentified colonial ascidians	1	1		1																						
Ascidiacea sp.	Unidentified solitary ascidian																				1	1					
Botrylloides anceps	Magnificent ascidian																1										
Botryllus schlosseri	Petal ascidian#																			1							
Bryozoa spp.	Erect byozoans									2		3	3		2		3	3	3	3	3	3	3	3	3	3	3
Clavelina spp.	A colonial ascidian									1*	1*																
Erythropodium hicksoni	Encrusting soft coral	1																									
Herdmania grandis	Red-mouthed ascidian						1		1		1*	1		1*		1	1	1	1	1	1	1	2	1	2	2	1
Iodictyuum phoeniceum	Purple bryozoan																										
Malleus meridianus	Southern hammer oyster																	1	1			1					
Orthoscuticella ventricosa	Orange filamentous bryozoan																										
Parmularia smeatoni	Little fan bryozoan								1																		
Phallusia obesa	Obese ascidian																										
Pinna bicolor	Razor clam						1					1		1													
Plesiastrea versipora	Green coral																							1			
Polycarpa clavata	Club ascidian						2	1												1							
Polycarpa viridis	Mauve-mouthed ascidian		2		3	1				3	2					2											
Porifera spp.	Sponges	2	2		2	3	1	2	2	1					1	1	2	1	1	1	1	1					
Pyura spp.	Sea tulip					1				1													1				
Sycozoa ceribriformis	Brain ascidian						2	2			1			1	1	1											
Sycozoa murrayi	Murray's ascidian																										

Appendix D – MNES Assessment

01. MNES (SOUTHERN RIGHT WHALE) UPDATED IMPACT ASSESSMENT

Section 156B of the *Environment Protection and Biodiversity Conservation 1999* (EPBC Act) requires the proponent to request a variation to the proposal (as described in the EPBC referral). The Minister, via the Department of the Environment and Energy (DoEE), has been notified of the proposed design changes.

The notification included an assessment on the revised design which concluded that:

• there was no significant change to the risk profile of the development

• the 'character' of the development, as a timber export facility incorporating storage, remains unchanged

• the development would not trigger any additional Matters of National Environmental Significance (MNES).

As the design change affects only the offshore components of the development, the impact assessment was reviewed and updated for the southern right whale (*Eubalaena australis*). The other three MNES that were subject to the impact assessment as detailed in the Draft EIS (i.e. the Kangaroo Island echidna, hooded plover (eastern) and the southern brown bandicoot (eastern)) are predominantly terrestrial and therefore would not be affected by changes made to the offshore component of the design.

1.1 Assessment of likely direct and indirect impacts

Table 14-2 of the Draft EIS identifies the development's potential impacts on the southern right whale. The impact assessments (direct and indirect) for the southern right whale have been reviewed. The review considers the revised design of a open-piled jetty structure of approximately 650 metres in length, which would position the berth face of the pontoon at the -13.8 metre depth. No dredging would be required, and no solid causeway would be constructed. The open-piled jetty would require the installation of approximately 156 piles.

Table 1-1 includes updated information for the assessment of likely direct or indirect impacts to southern right whale in the context of the design change.

Table 1-1: Identification of potential impacts on the southern right whale

Hazard	Direct/Indirect	Phase of project	Potential impact	Impact status (unknown, unpredictable, irreversible)
Vessel collision	Direct	Operation Decommissioning	Mortality	Irreversible
Vessel disturbance	Direct	Operation Decommissioning	Behaviour disruption (avoidance of vessels)	Short term
Noise and vibration pollution – piling	Direct	Construction	Behaviour disruption Hearing damage – temporary threshold shift Hearing damage – permanent threshold shift	Short term Short term Long term
Shipping noise	Direct	Operation	Behaviour disruption Hearing damage – temporary threshold shift Hearing damage – permanent threshold shift	Short term Short term Long term
Marine debris	Direct	Operation	Ingestion of debris leading to health impacts	Irreversible

Hazard	Direct/Indirect	Phase of project	Potential impact	Impact status (unknown, unpredictable, irreversible)
Introduction of marine pests and diseases – shipping activity	Direct	Operation	Mortality Diseases	Irreversible
Introduction of marine pests and diseases – third party shipping activity	Consequential	Operation	Mortality Diseases	Irreversible
Third party use of the port facility leading to increased shipping activity	Consequential	Operation	Mortality Behaviour disruption Ingestion of debris leading to health impacts Hearing damage – temporary threshold shift Hearing damage – permanent threshold shift	Long term Irreversible Long term Short term Long term
Third party use of the port facility leading to increased shipping activity	Cumulative	Operation	Mortality Behaviour disruption – short and long-term Hearing damage – temporary threshold shift Hearing damage – permanent threshold shift	Long term Irreversible Short term Long term

1.2 Management and mitigation measures

As stated in Section 18.4.1 of the Draft EIS, regulation of underwater noise impacts is currently limited to policy outlined in the EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales (DEWHA 2008). Although the policy is not considered as suitable criterion for long-term and fixed-location industrial noise the principles that underly the development of management measures are considered transferable to impacts from piling activity.

The proposed management measures, as presented in Table 1-2, are consistent with the principles described in this policy statement.

1.3 Assessment of effectiveness of proposed mitigation measures

The Draft EIS (see Table 3-7 of Appendix K3 – MNES Background Information) provides an assessment of the effectiveness of the proposed avoidance or mitigation measures for the southern right whale. The measures proposed for the development are considered effective.

Based on the design change, the assessment of effectiveness of proposed mitigation measures has been updated and is provided in Table 1-2. The measures proposed for the revised development are considered effective.

1.3.1 Piling in multiple locations

Increasing the number of pile installations to construct a longer jetty than initially proposed in the Draft EIS would also potentially extend the duration of the impact (noise source). The underwater noise impact assessment is described in Section 4.8 of the EIS Addendum.

The extension of the jetty by approximately 250 m would result in the contours described in the Draft EIS also extending a further 250 m out to sea. The results of the piling noise impact assessment presented in Table 18.11 of the Draft EIS remain relevant as they relate to distances from the actual piling operation and the noise source (pile installation), which does not change.

Piling could be undertaken at two locations simultaneously and has been considered in impact assessment, see Table 1-2.

Impact piling has the greatest potential impact on low-frequency cetaceans. Piling in two places simultaneously would effectively double the number of blows per minute/day, which has the effect of increasing the cumulative sound exposure level (SEL) by 3 dB, and increases the 'threshold distances' for temporary threshold shift (TTS) and permanent threshold shift (PTS) onset by approximately 1.6 times the values in Table 18.11 of the Draft EIS, assuming the exposure time is the same.

The use of two piling rigs would reduce the total duration of piling. Avoiding months when cetaceans are likely to be present could result in a more effective risk mitigation strategy than restricting the number of piling rigs or piles/blows per day that consequently extends the duration of piling activity (i.e. the impact source) in the project area. These mitigation measures would be considered for planning construction activities.

Table 1-2: Assessment of the effectiveness of mitigation measures for the southern right whale

Impact	Avoidance or mitigation measure	Outcome of mitigation measure	Effectiveness of mitigation measure		
			Scale and intensity of impact	On-ground benefit from measure	Overall effectiveness of measure
Introduction of marine pest species and/or diseases	Compliance with the Australian Ballast Water Management Requirements Compliance with the Anti-fouling and in-water cleaning guidelines	No new species of marine pest are discovered in the study area or immediate surrounds that are directly related to shipping activity from the development	10–20 shipping movements a year would have a negligible impact on the numbers of marine pest species and/or diseases	No marine pest species and/or diseases are introduced into Smith Bay	Proposed measure is considered effective
Mortality from vessel strike	Compliance with AMSA Marine Notice 15/2016 (minimising the risk of collisions with cetaceans)	No fatalities or entanglements involving southern right whales and shipping activity associated with the development	Vessel strike has been modelled to be once in 300 years Shipping activity would have a negligible impact on the species based on the number of shipping movements	No mortality from vessel strike	Proposed measure is considered effective
Permanent threshold shift from piling activity	Piling would occur only during daylight hours	No permanent threshold shift caused by the development	Construction activity would have a negligible impact on whale hearing	No hearing damage to the southern right whale	Proposed measure is considered effective
	Implementation of a soft-start procedure for the commencement of piling activity	Whales would have adequate time to leave the area	Construction activity would have a negligible impact on whale hearing	No hearing damage to the southern right whale	Proposed measure is considered effective
	Trained marine mammal observers (MMO) to monitor safety zones which comprise a shut-down zone and an observation zone • the observation zone would be monitored for marine species and determine whether they are entering the shut-down zone	No permanent threshold shift caused by the development	Construction activity would have a negligible impact on whale hearing Noise modelling (Resonate 2018) was undertaken on piling duration of 30 minutes @ 60 blows/minute or 15 minutes @ 120 blows/minute, which is consistent with the revised design The extension of the jetty by 250 m would result in the contours described in the	No hearing damage to the southern right whale	Proposed measure is considered effective

Impact	Avoidance or mitigation measure	Outcome of mitigation measure	Effectiveness of mitigation measure		
			Scale and intensity of impact	On-ground benefit from measure	Overall effectiveness of measure
	• the shut-down zone would require cessation of piling, as soon as practicable, if a marine species was sighted within the shut-down zone • Safety zones will be established at the start of each day, prior to the commencement of piling activity, based on the specific location of the noise source at that point in time		Draft EIS also extending a further 250 m out to sea. The results of the piling noise impact assessment presented in Table 18.11 of the Draft EIS remain relevant as they relate to distances from the actual piling operation and are therefore independent of the length of the jetty structure itself		
	Construction program to consider the risk of cetaceans being present in the area and the possibility of scheduling piling to occur outside of the times when cetaceans are more likely to be present in the area	No whale behaviour disruption caused by the development	Construction activity would have a negligible impact on whale behaviour Extension of the piling component of the construction program to approximately 5 months would not impact cetaceans as risk assessments would inform decisions on the best possible avoidance or mitigation measures to be implemented	No injuries or mortalities to whales	Proposed measure is considered effective
	Consideration of simultaneous piling at two locations to minimise the duration of the piling component of the construction program	No permanent threshold shift caused by the development	Construction activity would have a negligible impact on whale hearing The extension of the jetty by 250 m would result in the contours described in the Draft EIS also extending a further 250 m out to sea. The results of the piling noise	No hearing damage to the southern right whale	Proposed measure is considered effective

Impact	Avoidance or mitigation measure	Outcome of mitigation measure	Effectiveness of mitigation measure		
			Scale and intensity of impact	**On-ground benefit from measure**	**Overall effectiveness of measure**
			impact assessment presented in Table 18.11 of the Draft EIS remain relevant as they relate to distances from the actual piling operation and are therefore independent of the nature of the jetty structure itself		
Behaviour disruption from the installation of infrastructure (piered structure)	Smith Bay does not contain breeding or nursery habitat The revised design removes the solid causeway, reduces the footprint by 0.65 ha and removes the potential source of behaviour disruption	No whale behaviour disruption caused by the development	The piered structure would have a negligible impact on whale behaviour The entire coastline of KI has been identified as seasonal calving habitat (DoE 2014) The revised design consists of a suspended deck (jetty) extending approximately 650 m into the sea The offshore footprint would be reduced to approximately 0.95 ha from 1.6 ha as described in the Draft EIS. The revised footprint would comprise 0.3 ha for the jetty and 0.65 ha for the pontoon	Negligible changes to whale behaviour	Proposed measure is considered effective
Behaviour disruption from vessel noise	Shipping routes are not within an area of high aggregation or historic high use	No whale behaviour disruption caused by the development	Shipping activity would have a negligible impact on whale behaviour	Negligible changes to whale behaviour	Proposed measure is considered effective
Ingestion of harmful marine debris	Implementation of a waste management plan for shipping operations	No ingestion of harmful marine debris by whales as a result of the development	Shipping activity would have a negligible impact on the species based on the number of movements (10–20 vessels per year)	No injuries or mortalities to whales	Proposed measure is considered effective

Note: Blue text indicates varied text to that provided in the Draft EIS.

Table 14-4 of the Draft EIS presents an assessment of the development against the significant impact criteria for the southern right whale. The design changes will remove the solid causeway from the design (which is a potential barrier to movement). The duration of the piling component of the construction program will also be extended to approximately up to 156 days (allowing for one (1) pile to be installed per day). Dredging activity will no longer be required. The assessment of the revised design against the significant impact criteria is provided in Table 1-3.

Table 1-3: Assessment of the development against significant impact criteria: southern right whale

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:	**Background**	**Relevant aspects of proposal**	**Assessment of impact**
lead to a long-term decrease in the size of a population	A small increase in shipping along the southern Australian coastline has the potential to result in death of an individual whale through vessel strike. However, the probability of this happening has been estimated at just once in 300 years (BMT WBM 2018), and thus the risk of vessel strike is unlikely to lead to a long-term decrease in the size of the population. Current plans do not include any vessel movements across the Great Australian Bight, except for the sea tow of the pontoon itself prior to deployment at Smith Bay. Genetic studies suggest there are two distinct Australian sub-populations: south-western (incorporating Western Australia and South Australia) and south-eastern (Victoria, Tasmania and New South Wales), with some level of ongoing or recent historical interbreeding (Carroll et al. 2011). There is some ambiguity in the description of the Australian sub-populations in the available documentation. DSEWPaC (2012a) refers to a south-western population extending from Cape Leeuwin in Western Australia to Ceduna in South Australia and a south-eastern population as inhabiting waters between Ceduna and Sydney. However, the work by Carroll et al. (2011) to delineate the sub-populations, and cited by DSEWPaC (2012a), includes samples from Encounter Bay, near Victor Harbor, in its south-western group. There is limited data on demographics of the south-east sub-population and numbers are considered to be low (AMMC 2009), however the total Australian population is estimated at below 3000 (Bannister et al. 2016).	Shipping activity during operation along the entire shipping route could encounter individuals from either of the Australian sub-populations. Potential cumulative impact to species based on existing shipping activity.	**Assessment**: Unlikely to have a significant impact

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:	Background	Relevant aspects of proposal	Assessment of impact
	Southern right whales have a long lifespan and a relatively low productive rate and mortality of an adult female is potentially significant (DSEWPaC 2012a). The additional shipping movements generated by the development (10-20 vessels a year) is not likely to lead to any significant cumulative shipping impacts on the southern right whale population.		
reduce the area of occupancy of the species	The National Conservation Values Atlas identifies the entire coastline to a distance of 1.5 km offshore, of Kangaroo Island as a biologically important area, which is used for seasonal calving habitat by southern right whales (DoEE 2015). Presence of the port is unlikely to reduce the whales' use of this area. Similarly, a small increase in shipping along the southern Australian coastline is unlikely to reduce the whales' use of area because the shipping routes would be some distance off-shore, while this whale species prefers to breed within 2 km of the shoreline. Current plans do not include any vessel movements across the Great Australian Bight, except for the sea tow of the pontoon itself prior to deployment at Smith Bay. The removal of the solid causeway from the design, and replacement with a pier structure will remove the potential barrier to whale movement in Smith Bay. The causeway footprint was 0.95 ha as described in the Draft EIS, however the revised design would have an offshore footprint of approximately 0.95 ha (comprising 0.3 ha for the jetty and 0.65 ha for the pontoon).	Shipping activity during operation. Operation – additional infrastructure. Potential cumulative impact to species based on existing shipping activity.	**Assessment**: Unlikely to have a significant impact.
fragment an existing population into two or more populations	Southern right whales are known to travel vast distances and will have no trouble bypassing Smith Bay if they wish to avoid the development area. There is no evidence that southern right whales avoid areas with marine infrastructure but, even if they did, the development is not large enough to cause fragmentation of existing populations.	Shipping activity during operation. Potential cumulative impact to species based on existing shipping activity.	**Assessment**: Unlikely to have a significant impact.

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:	Background	Relevant aspects of proposal	Assessment of impact
adversely affect habitat critical to the survival of a species	The National Conservation Values Atlas identifies the entire coastline of Kangaroo Island as a biologically important area that is used for seasonal calving by the southern right whale (DoEE 2015). The bay is not considered to be habitat critical to these whales' survival.	Shipping activity during operation. Potential cumulative impact to species based. on existing shipping activity.	**Assessment**: Unlikely to have a significant impact
disrupt the breeding cycle of a population	The National Conservation Values Atlas identifies the entire coastline of Kangaroo Island as a biologically important area that is used for seasonal calving by the southern right whale (DoEE 2015), and there are no records of breeding in this area. The presence of the port is unlikely to impact breeding at other sites, such as Encounter Bay and Fowlers Bay, as they are too far away to be affected.	Shipping activity during operation. Potential cumulative impact to species based on existing shipping activity.	**Assessment**: Unlikely to have a significant impact
modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The National Conservation Values Atlas identifies the entire coastline of Kangaroo Island as a biologically important area that is used for seasonal calving by the southern right whale (DoEE 2015). It is unlikely that the development would decrease the availability or quality of southern right whale habitat in any meaningful way.	Shipping activity during operation. Potential cumulative impact to species based on existing shipping activity.	**Assessment**: Unlikely to have a significant impact
result in invasive species that are harmful to a critically endangered or endangered species becoming established in this species' habitat	There are no known invasive species that affect the southern right whale and that may be introduced as a result of the development. Biosecurity controls under the *Biosecurity Act 2015* would be enforced by the Department of Agriculture (DA) to minimise the risk of introducing pests and diseases to the marine environment.	Shipping activity during operation. Potential cumulative impact to species based on existing shipping activity. Importation of equipment and materials from the mainland.	**Assessment**: Unlikely to have a significant impact
introduce disease that may cause the species to decline	There are no known diseases that affect the southern right whale and that may be introduced as a result of the development. Biosecurity controls under the *Biosecurity Act 2015* would be enforced by the Department of Agriculture (DA) to minimise the risk of introducing pests and diseases to the marine environment.	Shipping activity during operation. Potential cumulative impact to species based on existing shipping activity. Importation of equipment and materials from the mainland and international waters. Biosecurity measures, ballast water management and biofouling management for shipping.	**Assessment**: Unlikely to have a significant impact

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:	Background	Relevant aspects of proposal	Assessment of impact
interfere with the recovery of a species	The National Conservation Values Atlas identifies the entire coast of Kangaroo Island as a biologically important area that is used for seasonal calving by the southern right whale (DoEE 2015). The presence of the wharf is unlikely to interfere with the recovery of a species as it is likely to increase in number and expand in range within the many other identified areas of suitable habitat along the coast.	Shipping activity during operation. Potential cumulative impact to species based on existing shipping activity.	**Assessment**: Unlikely to have a significant impact

Note: Blue text indicates varied text to that provided in the Draft EIS.

1.4 Assessment of residual impacts

Based on the above assessment, there would be no residual significant impacts on the southern right whale as a result of the revised design for the KI Seaport.

1.5 Updated Protected Matters Search

An updated EPBC Act Protected Matters Search was undertaken on 11 September 2019. The updated search is included as Attachment 1. When comparing the 2019 search results to the 2018 search results (see Appendix K2 of the Draft EIS) two additional threatened species were identified. The species were *Leionema equestre* (Kangaroo Island phebalium) and *Ardenna grisea* (sooty shearwater).

The relevant aspects of the impact assessment documented in the Draft EIS (Appendix J3 – MNES Impact assessment – flora and fauna) have been reviewed to reflect the two additional species identified in the new Protected Matters Search. See Table 1-4 for additions to Table 1-1 of Appendix J3 and Table 1-5 for additions to Table 1-2 of Appendix J3.

The revised offshore design will not have a significant impact on the additional listed species.

Table 1-4: MNES potentially occurring in the study area – flora

Species name	EPBC Act status	Likelihood of presence and significance of habitat in the study area
Leionema equestre Kangaroo Island phebalium	Endangered	**Not present:** EBS Ecology's field survey of the study site in August 2016 did not find this species (EBS Ecology 2018). Given the generally degraded nature of remnant vegetation on the site, it is considered unlikely to exist in the study area.

Table 1-5: MNES potentially occurring in the study area – fauna

Species name	EPBC Act status	Likelihood of presence and significance of habitat in the study area
Ardenna grisea Sooty shearwater	Marine Migratory	**Possible (fly-over):** The sooty shearwater forages in pelagic (open ocean) sub-tropical, sub-Antarctic and Antarctic waters. The species migrates and forages in the North Pacific and Atlantic oceans during the non-breeding season. Sooty shearwaters may occasionally forage inshore, especially during rough weather. In Australia, the sooty shearwater breeds on islands located off the coast of New South Wales and Tasmania. The species is a relatively common visitor to Victoria and South Australia (Marchant & Higgins 1990). The Atlas of Living Australia does not have any records of the species within a 10 km radius of the site. It is a marine, pelagic, aerial species that is unlikely to be affected by the proposal.

1.6 Conclusion

The changes to the design do not change the risk profile of the development as described in the Draft EIS. No additional MNES would be triggered by the changes to the proposal. Mitigation measures as described in the Draft EIS and in Table 1-2 are considered effective to manage any direct or indirect impacts to the southern right whale. The revised proposal would not generate any residual significant impacts on the southern right whale.

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ATTACHMENT 1

EPBC Act Protected Matters Report

Created 11 September 2019

Australian Government
Department of the Environment and Energy

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

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

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

Report created: 11/09/19 17:14:13

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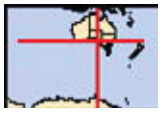
Coordinates
Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	45
Listed Migratory Species:	41

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	74
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	6
Regional Forest Agreements:	None
Invasive Species:	48
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Kangaroo Island Narrow-leaved Mallee (Eucalyptus cneorifolia) Woodland	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calyptorhynchus lathami halmaturinus Glossy Black-Cockatoo (Kangaroo Island), Glossy Black-Cockatoo (South Australian) [64436]	Endangered	Breeding likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Zoothera lunulata halmaturina Bassian Thrush (South Australian) [67121]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat likely to occur within area
Sminthopsis aitkeni Kangaroo Island Dunnart [300]	Endangered	Species or species habitat may occur within area
Tachyglossus aculeatus multiaculeatus Kangaroo Island Echidna [87597]	Endangered	Species or species habitat likely to occur within area
Plants		
Caladenia tensa Greencomb Spider-orchid, Rigid Spider-orchid [24390]	Endangered	Species or species habitat likely to occur within area
Cheiranthera volubilis Twining Finger Flower [3125]	Vulnerable	Species or species habitat likely to occur within area
Leionema equestre [64923]	Endangered	Species or species habitat likely to occur within area
Pomaderris halmaturina subsp. halmaturina Kangaroo Island Pomaderris [21964]	Vulnerable	Species or species habitat likely to occur within area
Ptilotus beckerianus Ironstone Mulla Mulla [3787]	Vulnerable	Species or species habitat likely to occur within area
Pultenaea villifera var. glabrescens Yellow Bush-pea, Splendid Bush-pea [10271]	Vulnerable	Species or species habitat known to occur within area
Spyridium eriocephalum var. glabrisepalum MacGillivray Spyridium [13771]	Vulnerable	Species or species habitat likely to occur within area
Thelymitra matthewsii Spiral Sun-orchid [4168]	Vulnerable	Species or species habitat may occur within area
Veronica derwentiana subsp. homalodonta Mount Lofty Speedwell [82836]	Critically Endangered	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Sharks		
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		

Name	Threatened	Type of Presence
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat known to occur within area
Ardenna grisea Sooty Shearwater [82651]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Breeding known to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

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

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Foraging, feeding or related behaviour likely to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat known to occur within area
Puffinus griseus Sooty Shearwater [1024]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Campichthys tryoni Tryon's Pipefish [66193]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Hypselognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus robustus Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Stipecampus cristatus Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Vanacampus vercoi Verco's Pipefish [66286]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area

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

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Unnamed (No.HA1277)	SA
Unnamed (No.HA241)	SA
Unnamed (No.HA392)	SA
Unnamed (No.HA792)	SA
Unnamed (No.HA864)	SA
Unnamed (No.HA895)	SA

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Meleagris gallopavo Wild Turkey [64380]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Pavo cristatus Indian Peafowl, Peacock [919]		Species or species habitat likely to occur within area
Phasianus colchicus Common Pheasant [920]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Annona glabra Pond Apple, Pond-apple Tree, Alligator Apple, Bullock's Heart, Cherimoya, Monkey Apple, Bobwood, Corkwood [6311]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Cryptostegia grandiflora Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913]		Species or species habitat likely to occur within area
Cylindropuntia spp. Prickly Pears [85131]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Mimosa pigra Mimosa, Giant Mimosa, Giant Sensitive Plant, ThornySensitive Plant, Black Mimosa, Catclaw Mimosa, Bashful Plant [11223]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Caveat

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

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

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

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

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

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-35.597398 137.429365,-35.596072 137.42473,-35.581694 137.424472,-35.582461 137.436746,-35.597328 137.429365,-35.597398 137.429365

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix E – Light Spill Assessment

LVX GLOBAL
DUBLIN
COLOMBO
DARWIN
SANFRANCISCO
LOS ANGELES
BRISBANE
PERTH
ADELAIDE
SYDNEY
MELBOURNE
LVX GLOBAL
HEADQUARTERS
E admin@lvxglobal.com
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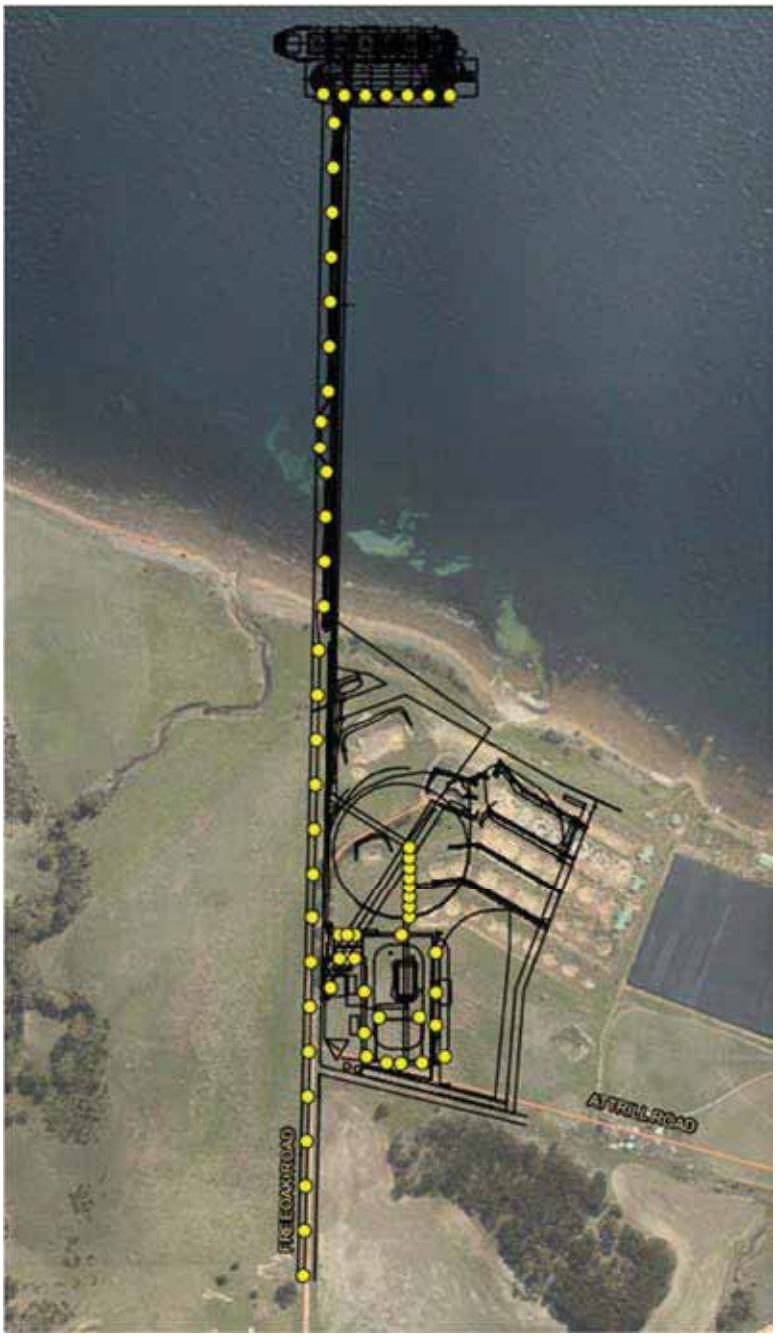
Kangaroo Island Plantation Timbers

Obtrusive Lighting Study



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Contents

1 Executive Summary

Kangaroo Island Plantation Timbers ('KIPT') is proposing the development of a deep-water wharf at Smith Bay, on Kangaroo Island. The wharf is to be suitable for both log and woodchip cargo vessels.

LVX has been engaged to model and evaluate the obtrusive effects of the proposed lighting design in accordance with the Australian Standard ***AS/NZS 4282:2019 Control of the Obtrusive Effects of Outdoor Lighting*** and comment upon its compliance or otherwise, and make any suggestions to amend the design as/if required.

Based on the design data provided the proposed lighting is compliant with the requirements of the Standard. This indicates that the amenity to surrounding residences is not anticipated to be negatively impacted by the lighting proposed to be installed. While the Standard is written to account for potential impact on *residences* and not commercial entities, it is noted that the levels of light calculated to reach the neighbouring Yumbah Aquaculture facility, are less than the required levels designated for a residence.

2 Introduction

2.1 Project Background

Kangaroo Island Plantation Timbers ('KIPT') is an ASX listed hardwood and softwood forestry plantation company that manages holdings on Kangaroo Island, South Australia.

KIPT is proposing the development of a deep-water wharf at Smith Bay, on Kangaroo Island. The wharf is to be suitable for log and woodchip cargo vessels.

Figure 1 - Smith Bay Location, Kangaroo Island South Australia [1]

The wharf shall incorporate a deep-water pontoon and shiploader accessed via a piled jetty connected to the land infrastructure. A storage and support facility are proposed to be developed on the landside, to assist the function of the wharf. The support facility will be used to store and load woodchips, logs and containerised cargo.

LVX Global has been engaged to undertake an Obtrusive Lighting Study, in accordance with the Australian Standard ***AS/NZS 4282:2019 Control of the Obtrusive Effects of Outdoor Lighting*** on the, client-supplied, concept lighting design for the project in order to determine the compliance or otherwise of the proposed development with this Standard.

[1] Google Maps - Accessed 10/9/2019 [www.google.com.au/maps]

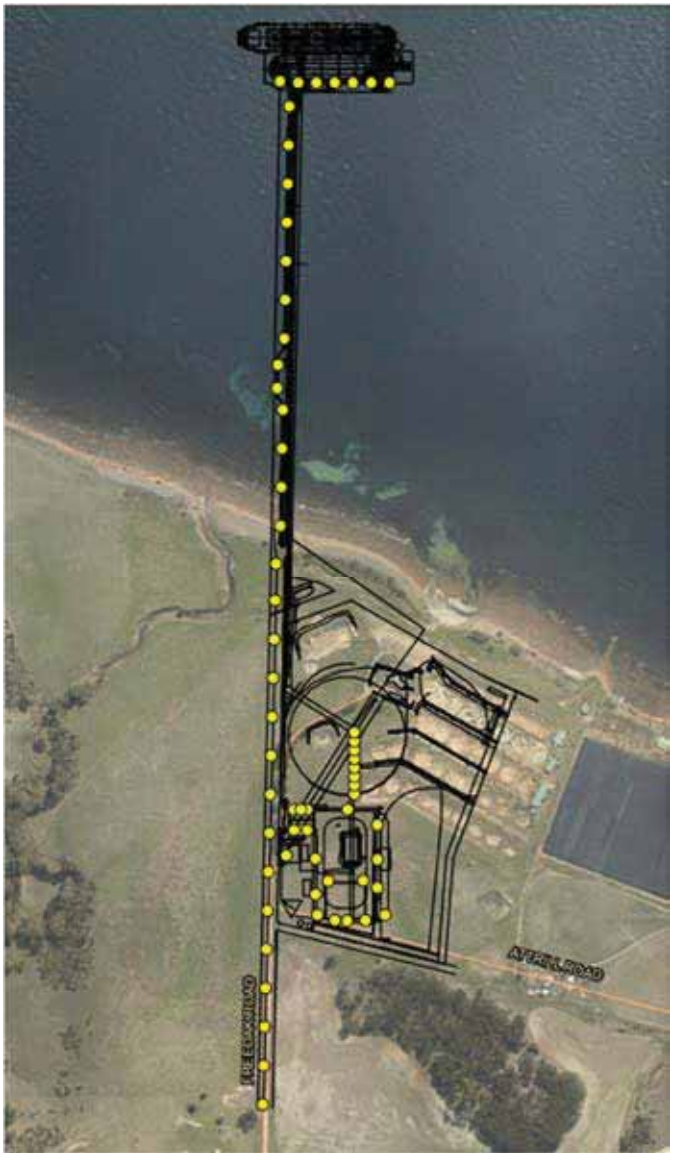

Figure 2- Smith Bay Wharf - Proposed Outline

2.2 Scope

LVX's scope of work was:

1. Desktop Review
    - Review, verify and validate Concept Illumination Design including:
        - Luminaire locations, orientations & wattages
        - IES files used
        - Operational Levels
        - Assumptions
            - Reflectances, if/where applicable
            - Maintenance Factor
            - Lumen Depreciation
2. Illumination Engineering
    - Model Concept Illumination Design for compliance (or otherwise) with ***AS/NZS4282:2019 Control of the Obtrusive Effects of Outdoor Lighting***
    - Prepare Technical Report summarising
        - Compliance or otherwise of the Concept Illumination Design with ***AS/NZS4282:2019 Control of the Obtrusive Effects of Outdoor Lighting***
        - Assessment criteria, classifications and assumptions made in the modelling of the Concept Illumination Design
        - Recommendations for mitigation or alleviation of any non-compliances identified in the lighting design

The following was specifically excluded from this scope of work:

- Assessment of Concept Lighting Design for suitability for designed purpose and compliance with applicable standards, (***AS/NZS1680.Set:2006 Interior Lighting*** and ***AS/NZS1158.Set:2010 Lighting for Roads and Public Spaces***)
- Night baseline illuminance assessment (assumed to be moonlight based upon location)
- Assessment of electrical services
- Assessment of environmental impact of lighting on local terrestrial and aquatic fauna

3 Methodology

3.1 AS/NZS4282:2019

The standard ***AS/NZS4282:2019 Control of the Obtrusive Effects of Outdoor Lighting*** sets out requirements for the control of obtrusive effects of outdoor lighting. It includes limits for the relevant light technical parameters to control these effects. As the obtrusive effects of outdoor lighting are best controlled by appropriate design, the Standard is primarily applicable to new installations. The Standard specifically refers to the potentially adverse effects of outdoor lighting on nearby residents, users of adjacent roads and transport signalling systems and on astronomical observations.

The Standard is intended to be referenced by planning bodies reviewing the potential obtrusiveness of new outdoor lighting installations and by designers as to aid in producing lighting systems that control the obtrusive effects to an acceptable degree.

3.2 Software Used

LVX has used AGi32, version 19.3, for all calculations undertaken. AGi32 is a computational program that performs numerical point-by-point calculations of incident direct or reflected light on any real surface or imaginary plane. Within this scope, it is used to quantify the predicted distribution of artificial light at the sensitive receptors.

AGi32 has been validated against CIE Technical report ***CIE 171:2006 Test Cases to Assess the Accuracy of Lighting Computer Programs*** and is found to comply with the intent of the tests. [2]

3.3 Data Inputs Used

LVX utilised the following design documentation, provided by the client:

File	Type	Received	Author
New proposed design - Lighting.pdf	PDF Plan - Lighting Concept Locations	16/8/19	Unknown
Fig1.pdf	PDF Plan - Location of Sensitive Receptors	27/8/19	Resonate
AEJ753 Concept Design inc. Pontoon.dwg	AutoCAD Drawing - Lighting Concept Design	16/8/19	Unknown
AEJ753 Concept Design.agi	AGi File - Lighting Design Data	9/9/19	Unknown
n/a	Google Earth Imagery	26/8/19	Google

[2] https://lightinganalysts.freshdesk.com/support/solutions/articles/22000225856-cie-171-2006-a-software-validation-test-case

3.4 Analysis

3.4.1 Review of AGI File

The AGi32 lighting design file received was reviewed against the lighting concept design as to review and confirm there was no erroneous inputs, including:

- IES Photometric data files selected
- Luminaire Type, including output geometry and quantum
- Luminaire Location and Orientation
- Maintenance and Lighting Depreciation Factors

3.4.2 Sensitive Receptor Identification

Obtrusive lights studies are concerned about the impact of outdoor lighting on nearby receptors. It was identified that there are two residences ('R1' and 'R2') within proximity of the proposed development, as noted on 30941-L001 – Sensitive Locations, included in the appendix.

Google Earth imagery showed that these residences are conservatively estimated at least 50m above the ground plane of the KIPT development.

These residences were the focus of further analysis.

While not a residence, and therefore not strictly subject to the requirements of AS4282:2019, the adjacent Yumbah Aquaculture facility was also investigated as a sensitive receptor.

3.4.3 Compliance with AS/NZS4282:2019

Utilising the AGi32 model provided, a study of the lighting design was undertaken in accordance with the requirements of ***AS/NZS4282:2019 Control of the Obtrusive Effects of Outdoor Lighting***.

It was first determined what Environmental Zone is most representative from AS4282:2019.

TABLE 3.1

ENVIRONMENTAL ZONES

Zones	Description	Examples
A0	Intrinsically dark	UNESCO Starlight Reserve. IDA Dark Sky Parks. Major optical observatories No road lighting -unless specifically required by the road controlling authority
A1	Dark	Relatively uninhabited rural areas No road lighting - unless specifically required by the road controlling authority
A2	Low district brightness	Sparsely inhabited rural and semi-rural areas
A3	Medium district brightness	Suburban areas in towns and cities
A4	High district brightness	Town and city centres and other commercial areas Residential areas abutting commercial areas
TV	High district brightness	Vicinity of major sports stadium during TV broadcasts
V	Residences near traffic routes	Refer AS/NZS1158.1.1
R1	Residences near local roads with significant setback	Refer AS/NZS 1158.3.1
R2	Residences near local roads	Refer AS/NZS 1158.3.1
R3	Residences near a roundabout or local area traffic management device	Refer AS/NZS 1158.3.1
RX	Residences near a pedestrian crossing	Refer AS/NZS 1158.4

NOTE: Recreational areas are not considered commercial.

It was considered that, due to the presence of the existing aquaculture facility adjacent, which is noted in the EIS[3] to have floodlights running at all times, the development could be considered an A2 'Low District Brightness' zone.

On this basis AS4282:2019 requires that the Vertical Illumination Levels and Maximum Luminous Intensities meet the requirements from Tables 3.2 and 3.3.

[3] https://kipt.com.au/wp-content/uploads/2019/06/Smith_Bay_EIS_Main_Report_Web.pdf

TABLE 3.2

MAXIMUM VALUES OF LIGHT TECHNICAL PARAMETERS

Zones	Vertical illuminance levels (E_v) lx		Threshold increment (TI)		Sky glow
	Non-curfew	Curfew	%	Default adaptation level (L_{ad})	Upward light ratio
A0	See Note 1	0	N/A	N/A	0
A1	2	0.1	N/A	N/A	0
A2	5	1	20%	0.2	0.01
A3	10	2	20%	1	0.02
A4	25	5	20%	5	0.03
TV	See Table 3.4	N/A	20%	10	0.08
V	N/A	4	Note 2	Note 2	Note 2
R1	N/A	1	20%	0.1	Note 3
R2	N/A	2	20%	0.1	Note 3
R3	N/A	4	20%	0.1	Note 3
RX	N/A	4	20%	5	Note 4

NOTES:

1 For A0, E_v shall be as close to zero as practicable without impacting safety considerations.

2 Refer to AS/NZS 1158.1.1.

3 Refer to AS/NZS 1158.3.1.

4 Refer to AS/NZS 1158.4.

5 N/A means 'Not Applicable'.

6 For an internally illuminated sign in an A2 zone, $L_{ad} \leq 0.25$ cd/m^2.

Table 3.2 states a maximum Vertical Illuminance Level of 5 and 1 lux for Non-curfew and curfew times respectively for an A2 zone.

TABLE 3.3

MAXIMUM LUMINOUS INTENSITIES PER LUMINAIRE

Zone	Luminous intensity (*I*), cd		
	Non-curfew L1	Non-curfew L2	Curfew
A0	See Note	See Note	0
A1	2 500	5 000	500
A2	7 500	12 500	1 000
A3	12 500	25 000	2 500
A4	25 000	50 000	2 500
TV	100 000	150 000	0

NOTE: For A0, *I* shall be as close to zero as practicable without impacting safety considerations.

Table 3.3 states a maximum Luminous Intensities per Luminaire of 7,500, 12,500 and 1,000 Candela for non-curfew L1, non-curfew L2 and curfew times respectively.

4 Findings

The proposed lighting was modelled at both the same plane as the proposed lighting as well as 30m above the ground plane as to conservatively represent the change in topography of the surrounding site for the residences. The Yumbah facility was modelled at the same ground level as the proposed lighting.

Location	Elevation (m)	Calculation Type	Value Allowed (Curfew)	Calculated		Unit
				Value (Avg)	Value (Max)	
R1	30	Obtrusive Light - Candela - Seg 1	1000	0.00	0.00	N.A.
		Obtrusive Light - Candela - Seg 2	1000	0.00	0.00	N.A.
		Obtrusive Light - Illuminance - Seg 1	1	0.00	0.00	Lux
		Obtrusive Light - Illuminance - Seg 2	1	0.00	0.00	Lux
	0	Obtrusive Light - Candela - Seg 1	1000	96.60	99.00	N.A.
		Obtrusive Light - Candela - Seg 2	1000	20.87	23.00	N.A.
		Obtrusive Light - Illuminance - Seg 1	1	0.00	0.00	Lux
		Obtrusive Light - Illuminance - Seg 2	1	0.00	0.00	Lux
R1	30	Obtrusive Light - Candela - Seg 1	1000	0.00	0.00	N.A.
		Obtrusive Light - Candela - Seg 2	1000	0.00	0.00	N.A.
		Obtrusive Light - Illuminance - Seg 1	1	0.00	0.00	Lux
		Obtrusive Light - Illuminance - Seg 2	1	0.00	0.00	Lux
	0	Obtrusive Light - Candela - Seg 1	1000	19.14	21.00	N.A.
		Obtrusive Light - Candela - Seg 2	1000	19.96	22.00	N.A.
		Obtrusive Light - Illuminance - Seg 1	1	0.00	0.00	Lux
		Obtrusive Light - Illuminance - Seg 2	1	0.00	0.00	Lux
Yumbah	0	Obtrusive Light - Candela - Seg 1	1000	23.86	37.00	N.A.
		Obtrusive Light - Candela - Seg 2	1000	38.18	52.00	N.A.
		Obtrusive Light - Candela - Seg 3	1000	32.59	52.00	N.A.
		Obtrusive Light - Illuminance - Seg 1	1	0.00	0.00	Lux
		Obtrusive Light - Illuminance - Seg 2	1	0.01	0.02	Lux
		Obtrusive Light - Illuminance - Seg 3	1	0.00	0.00	Lux

It was found that the Maximum Vertical Illuminance and Luminous Intensities were well below the maximum limits detailed in AS4282. It is noted that the results still achieve compliance even if the Environmental Zone (Table 3.1, above) is defined as A1 'Dark'.

An overlay of the light illuminance contours over the site layout is provided in the appendices as a graphical representation.

5 Conclusion

Based upon the information provided, the Concept Lighting Design for the proposed wharf at Smith Bay complies with the requirements of ***AS/NZS4282:2019 Control of the Obtrusive Effects of Outdoor Lighting*** at both nearby residences. Furthermore, the lighting levels at the adjacent Yumbah Aquaculture facility are simulated to meet the equivalent residential lighting level requirements of the Standard.

6 Appendices

REVISION	DESCRIPTION	DRAWN	CHECKED	DATE
1	FOR INFO	CG	AB	13.09.19

SUITE 7, 1329 HAY STREET
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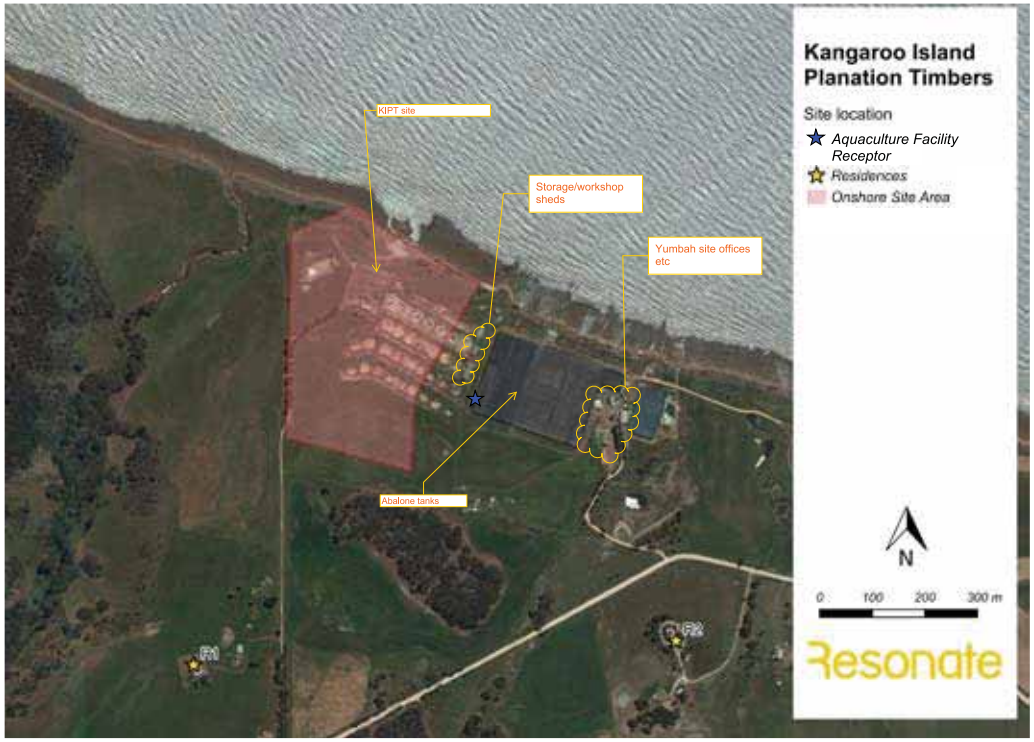
PROJECT NAME
OBTRUSIVE LIGHTING STUDY
KIPT - SMITH BAY, KANGAROO ISLAND

PROJECT ADDRESS
SMITH BAY
KANGAROO ISLAND, SOUTH AUSTRALIA

DRAWING TITLE
SITE LOCATION AND LAYOUT

PROJECT NUMBER	SCALE
30941	NTS
DRAWING NUMBER	REVISION
30941-4.00	1

CLIENT REVIEW
NOT FOR CONSTRUCTION



REVISION	DESCRIPTION	DRAWN	CHECKED	DATE
1	FOR INFO	CG	AB	13.09.19

SUITE 7, 1329 HAY STREET
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PROJECT NAME
OBTRUSIVE LIGHTING STUDY
KIPT - SMITH BAY, KANGAROO ISLAND

PROJECT ADDRESS
SMITH BAY
KANGAROO ISLAND, SOUTH AUSTRALIA

DRAWING TITLE
SENSITIVE LOCATIONS

PROJECT NUMBER	SCALE
30941	NTS
DRAWING NUMBER	REVISION
30941-L01	1

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AEJ753 kangaroo Island Lighting Levels

Location	Standard	Levels
Freeoak Rd: To meet council standards (in the absence of direction from the council	AS/NZS 1158.3.1, P1	Av. Horizontal Illuminance > 7 lux Min. Horizontal Illuminance > 2 lux Horizontal Uniformity (Max/Av) < 10 Min. Vertical Illuminance > 2 lux
Internal roads:	AS/NZS 1158.3.1, P1	Av. Horizontal Illuminance > 7 lux Min. Horizontal Illuminance > 2 lux Horizontal Uniformity (Max/Av) < 10 Min. Vertical Illuminance > 2 lux
Weighbridge area: **NO VERTICALS**	AS/NZS 1680.2.5, Loading & unloading - forklift	Av. Horizontal Illuminance > 40 lux Min. Horizontal Illuminance > 5 lux Horizontal Uniformity (Max/Av) < 5
Access road to barge:	AS/NZS 1158.3.1, P1	Av. Horizontal Illuminance > 7 lux Min. Horizontal Illuminance > 2 lux Horizontal Uniformity (Max/Av) < 10 Min. Vertical Illuminance > 2 lux
Barge: **NO VERTICALS**	AS/NZS 1680.2.5, Loading & unloading - forklift	Av. Horizontal Illuminance > 40 lux Min. Horizontal Illuminance > 5 lux Horizontal Uniformity (Max/Av) < 5
Carpark:	AS/NZS 1158.3.1, P11b	Av. Horizontal Illuminance > 7 lux Min. Horizontal Illuminance > 1.5 lux Horizontal Uniformity (Max/Av) < 10 Min. Vertical Illuminance > 1.5 lux
Unloading Pad (& associated area): **NO VERTICALS**	AS/NZS 1680.2.5, Loading & unloading - forklift	Av. Horizontal Illuminance > 40 lux Min. Horizontal Illuminance > 5 lux Horizontal Uniformity (Max/Av) < 5
Internal pedestrian walkways:	AS/NZS 1158.3.1, P7	Av. Horizontal Illuminance > 14 lux Min. Horizontal Illuminance > 4 lux Horizontal Uniformity (Max/Av) < 10 Min. Vertical Illuminance > 4 lux
External conveyor walkways:	AS/NZS 1680.2.4, Table E1 10.4	Av Horizontal Illuminance > 40 lux
Underground conveyor walkways	AS/NZS 1680.2.4, Table E1 10.4	Av Horizontal Illuminance > 40 lux

H Uni = max/average for all

Luminaire Location Summary

LumNo	Label	X	Y	Z	Orient	Switched
1	EBHLEDx	719907	6058287.2	3	180	On
2	EBHLEDx	719907	6058299.2	3	180	On
3	EBHLEDx	719907	6058311.2	3	180	On
4	EBHLEDx	719907	6058323.2	3	180	On
5	EBHLEDx	719907	6058335.2	3	180	On
6	EBHLEDx	719907	6058347.2	3	180	On
7	EBHLEDx	719907	6058359.2	3	180	On
8	EBHLEDx	719907	6058371.2	3	180	On
9	GPLS-32L530NW-G2-R3M	719813.5	6058203.2	10.5	0	On
10	GPLS-48L1050NW-G2-R2M	719805.55	6058656.35	13	0	On
11	GPLS-48L1050NW-G2-R2M	719806.662	6058709.338	13	0	On
12	GPLS-48L1050NW-G2-R2M	719807.773	6058762.327	13	0	On
13	GPLS-48L1050NW-G2-R2M	719808.885	6058815.315	13	0	On
14	GPLS-48L1050NW-G2-R2M	719810.95	6058912.85	13	0	On
15	GPLS-48L1050NW-G2-R2M	719812.101	6058965.838	13	0	On
16	GPLS-48L1050NW-G2-R2M	719813.252	6059018.825	13	0	On
17	GPLS-48L1050NW-G2-R2M	719814.404	6059071.812	13	0	On
18	GPLS-48L1050NW-G2-R2M	719815.555	6059124.8	13	0	On
19	GPLS-48L1050NW-G2-R2M	719816.706	6059177.787	13	0	On
20	GPLS-48L1050NW-G2-R2M	719817.857	6059230.775	13	0	On
21	GPLS-48L1050NW-G2-R2M	719799.483	6058604.674	13	0	On
22	GPLS-48L1050NW-G2-R2M	719798.183	6058551.69	13	0	On
23	GPLS-48L1050NW-G2-R2M	719796.883	6058498.706	13	0	On
24	GPLS-48L1050NW-G2-R2M	719795.583	6058445.722	13	0	On
25	GPLS-48L1050NW-G2-R2M	719794.283	6058392.738	13	0	On
26	GPLS-48L1050NW-G2-R2M	719792.983	6058339.754	13	0	On
27	GPLS-48L1050NW-G2-R2M	719791.683	6058286.77	13	0	On
28	GPLS-48L1050NW-G2-R2M	719790.383	6058233.786	13	0	On
29	GPLS-48L1050NW-G2-R2M	719789.083	6058180.802	13	0	On
30	GPLS-48L1050NW-G2-R2M	719787.783	6058127.818	13	0	On
31	GPLS-48L1050NW-G2-R2M	719786.484	6058074.834	13	0	On
32	GPLS-48L1050NW-G2-R2M	719785.184	6058021.849	13	0	On
33	GPLS-48L1050NW-G2-R2M	719783.884	6057968.865	13	0	On
34	GPLS-48L1050NW-G2-R2M	719782.584	6057915.881	13	0	On
35	GPLS-48L1050NW-G2-R2M	719781.284	6057862.897	13	0	On
36	GPLS-48L1050NW-G2-R2M	719897.85	6058265.9	10.5	270	On
37	GPLS-48L1050NW-G2-R2M	719880.2	6058114.7	10.5	90	On
38	GPLS-48L1050NW-G2-R2M	719922.05	6058114.6	10.5	90	On
39	GPLS-48L1050NW-G2-R2M	719949.05	6058121.9	10.5	135	On
40	GPLS-48L1050NW-G2-R2M	719853.8	6058150	10.5	0	On
41	GPLS-48L1050NW-G2-R2M	719856.3	6058122	10.5	40	On
42	GPLS-48L1050NW-G2-R2M Double	719938.45	6058245.05	10.5	0	On
43	GPLS-48L1050NW-G2-R2M Double	719938.5	6058197.7	10.5	0	On
44	GPLS-48L1050NW-G2-R2M Double	719938.35	6058159.15	10.5	0	On
45	GPLS-48L1050NW-G2-R3M	719802.2	6058876.85	13	0	On
46	GPLS-48L1050NW-G2-R3M	719801.05	6058844.8	13	0	On
47	GPLS-48L1050NW-G2-R3M	719842.4	6058265.75	13	270	On
48	GPLS-48L1050NW-G2-R3M	719824.05	6058265.85	13	270	On
49	GPLS-48L1050NW-G2-R3M	719833.5	6058265.85	13	270	On
50	GPLS-48L1050NW-G2-R3M	719833.5	6058237.85	13	90	On
51	GPLS-48L1050NW-G2-R3M double	719824.05	6058237.8	13	90	On
52	GPLS-48L1050NW-G2-R3M double	719842.35	6058237.8	13	90	On
53	GPLS-48L1050NW-G2-R3M double	719853.7	6058198.65	13	0	On
54	MVP507 WB_60 1xMHN-LA1000W_23	719871.2	6058168.25	20	300	On
55	MVP507 WB_60 1xMHN-LA1000W_23	719919.1	6058168.75	20	240	On
56	MVP507 WB_60 1xMHN-LA1000W_23	719897.15	6058113.8	20	90	On
57	MVP507 WB_60 1xMHN-LA1000W_23	719930	6059263.25	20	90	On
58	MVP507 WB_60 1xMHN-LA1000W_23	719905	6059263.25	20	90	On
59	MVP507 WB_60 1xMHN-LA1000W_23	719880	6059263.25	20	90	On
60	MVP507 WB_60 1xMHN-LA1000W_23	719855	6059263.25	20	90	On
61	MVP507 WB_60 1xMHN-LA1000W_23	719830	6059263.25	20	90	On
62	MVP507 WB_60 1xMHN-LA1000W_23	719805	6059265.05	20	80	On
63	MVP507 WB_60 1xMHN-LA1000W_23	719955	6059263.25	20	100	On

Luminaire Schedule

Symbol	Qty	Label	Arrangement	Total Lamp Lumens	LLF	Description	Lum. Watts
	32	GPLS-48L1050NW-G2-R2M	SINGLE	N.A.	0.800	Type II 160W LED SL	161
	6	GPLS-48L1050NW-G2-R3M	SINGLE	N.A.	0.800	Type III 160W LED SL	160.7
	1	GPLS-32L530NW-G2-R3M	SINGLE	N.A.	0.800	Type III 50W LED SL	53
	3	GPLS-48L1050NW-G2-R2M Double	BACK-BACK	N.A.	0.800	Type II 160W LED SL DOUBLE	161
	3	GPLS-48L1050NW-G2-R3M double	BACK-BACK	N.A.	0.800	Type III 160W LED SL DOUBLE	160.7
	10	MVP507 WB_60 1xMHN-LA1000W_23	SINGLE	100000	0.800	1kW HID FLOODLIGHT	1105
	8	EBHLEDx	SINGLE	3076	0.800	30W LED WALKWAY BULKHEAD	29

LIGHTING CONCEPT DESIGN INFORMATION RECEIVED FROM CLIENT - 10/09/2019

REVISION	DESCRIPTION	DRAWN	CHECKED	DATE
1	FOR INFO	CG	AB	13.09.19

SUITE 7, 1329 HAY STREET
WEST PERTH, WA 6005
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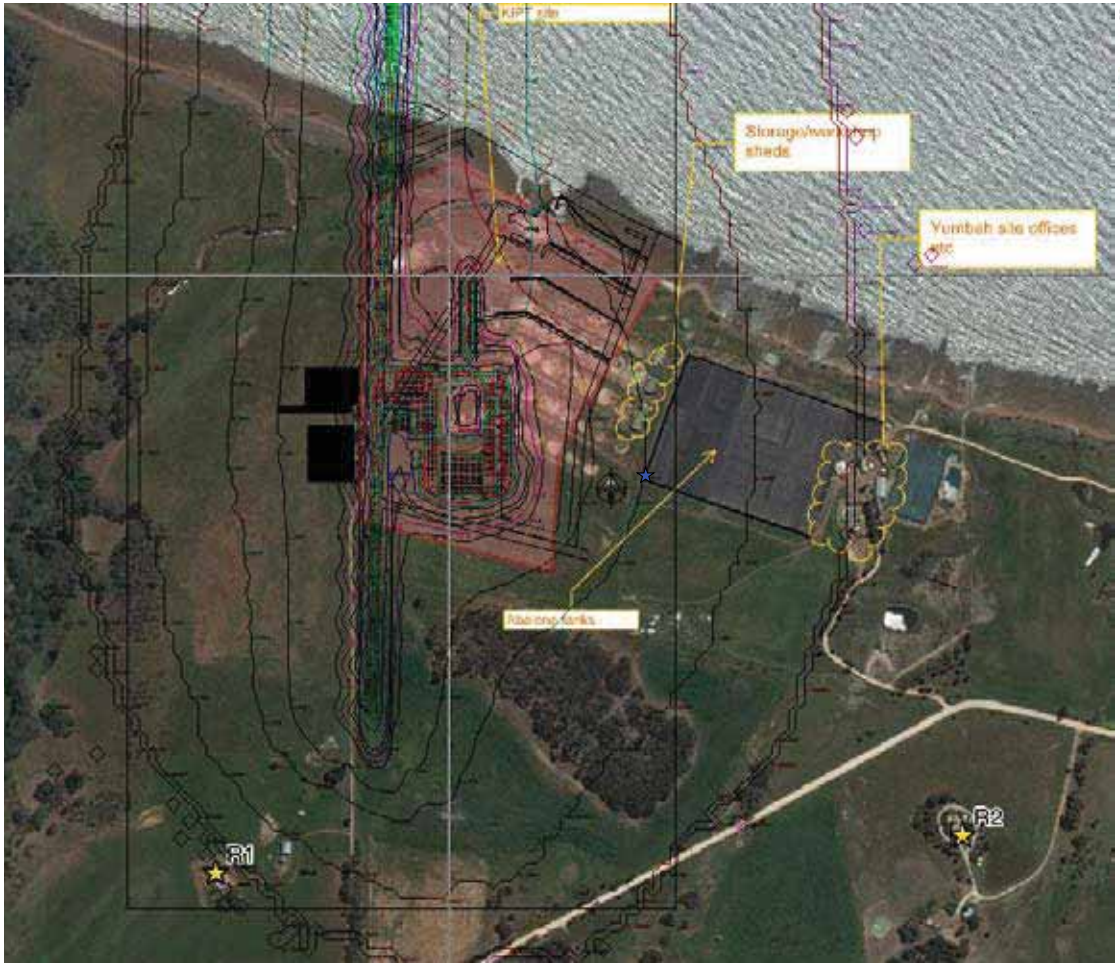
PROJECT NAME
OBTRUSIVE LIGHTING STUDY
KIPT - SMITH BAY, KANGAROO ISLAND

PROJECT ADDRESS
SMITH BAY
KANGAROO ISLAND, SOUTH AUSTRALIA

DRAWING TITLE
LIGHITNG CONCEPT DETAILS RECEIVED

PROJECT NUMBER	SCALE
30941	NTS
DRAWING NUMBER	REVISION
30941-L01	1

CLIENT REVIEW
NOT FOR CONSTRUCTION



Site location

- Aquaculture Facility
- Receptor
- Residences
- Onshore Site Area

ILLUMINANCE CONTOURS OVERLAID ON SITE PLAN

REVISION	DESCRIPTION	DRAWN	CHECKED	DATE
1	FOR INFO	CG	AB	13.09.19

SUITE 7, 1329 HAY STREET
WEST PERTH, WA 6005
tel: (08) 9485 1017 email: admin@lvxglobal.com

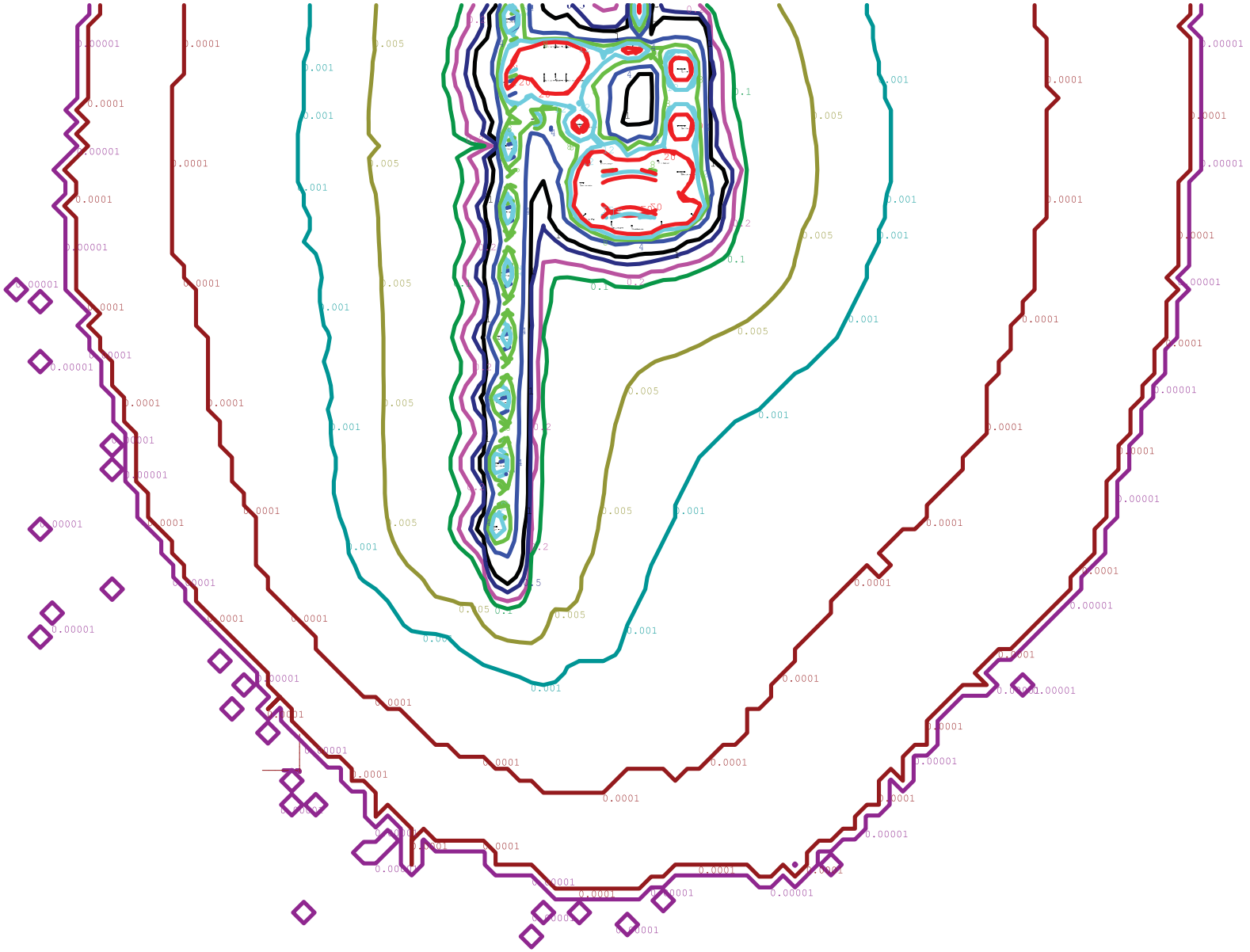
PROJECT NAME
OBTRUSIVE LIGHTING STUDY
KIPT - SMITH BAY, KANGAROO ISLAND

PROJECT ADDRESS
SMITH BAY
KANGAROO ISLAND, SOUTH AUSTRALIA

DRAWING TITLE
LIGHTING CONTOURS OVERLAID WITH SITE LAYOUT

PROJECT NUMBER	SCALE
30941	NTS
DRAWING NUMBER	REVISION
30941-L01	1

CLIENT REVIEW
NOT FOR CONSTRUCTION



ILLUMINANCE CONTOURS - PART PLAN
(DEVELOPMENT AND SENSITIVE RECEPTORS INCLUDED)

REVISION	DESCRIPTION	DRAWN	CHECKED	DATE
1	FOR INFO	CG	AB	13.09.19

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PROJECT NAME
OBTRUSIVE LIGHTING STUDY
KIPT - SMITH BAY, KANGAROO ISLAND

PROJECT ADDRESS
SMITH BAY
KANGAROO ISLAND, SOUTH AUSTRALIA

DRAWING TITLE
LIGHITNG CONTOURS PART PLAN

PROJECT NUMBER	SCALE
30941	NTS
DRAWING NUMBER	REVISION
30941-L01	1

CLIENT REVIEW
NOT FOR CONSTRUCTION

Appendix F – Visual Amenity Assessment

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1. ASSESSMENT OF IMPACT OVERVIEW

The impact assessment of the change in visual amenity at Smith Bay was undertaken and presented in section 23.5.2 of the Draft EIS. The assessment used a conceptual 3D model to show the major components of the onshore and offshore infrastructure of KI Seaport.

The conceptual 3D model was updated to assess the visual impact of an open-piled jetty extending approximately 650 metres out to sea from the shoreline.

Figure 1: Smith Bay-key sensitive receiver locations

A comparative assessment of the visual amenity for the various sensitive receiver locations, shown in **Figure 1,** extracted line of sight imagery for both the original and updated conceptual 3D models. Line of sight imagery comparisons for the original and revised designs indicate that sensitive receivers would have different views of the KI Seaport offshore components (ie. pontoon and berthed vessel).

The revised design would provide a visually less obtrusive view from land because it locates the pontoon and berthed vessels further offshore.

2. ASSESSMENT METHODOLOGY

A visual amenity assessment was undertaken by comparing the line of sight imagery incorporating the conceptual 3D model for the original design, (see appendix R2 of the Draft EIS) with new images for the revised open-piled jetty design extracted for the same set of sensitive receiver locations shown in **Figure 1**. Updated imagery views for each sensitive receiver location can be found in **Attachment 1**.

New line of sight images extracted from the 3D model of the views likely to be seen from each sensitive receiver location. These views were then compared with the first set of 3D model line of sight views. A comparative assessment was done to determine the key differences in each view, assessing the potential visual impacts of the revised design from the sensitive receiver location.

3. VISUAL AMENITY IMPACTS

A comparative assessment of the visual amenity for each location, using extracted line of sight imagery from both the original and updated conceptual models, show that:

- locations 5a and 5b now show a more visible ship in their view compared with the original design, because infrastructure is now located further offshore
- locations 6, 7, 8, 11a,11b and 11c, 12 and 13 view of the ship remains predominantly unchanged, however with infrastructure and/or the berthed ship being further offshore:
  - location 6 shows a less visually impacted view
  - locations 11a, 11b and 11c show a slightly clearer view of the ship
- locations 9a and 9b show a slightly changed view with more of the berthed ship more visible from these locations, although less imposing because the ship is located further offshore.

Figure 2 and Figure 3 show location 9a with the original design (9a original) and the updated design (9a updated), which illustrates that the pontoon and the berthed vessel would be more visible with the revised design as it is now located further offshore.

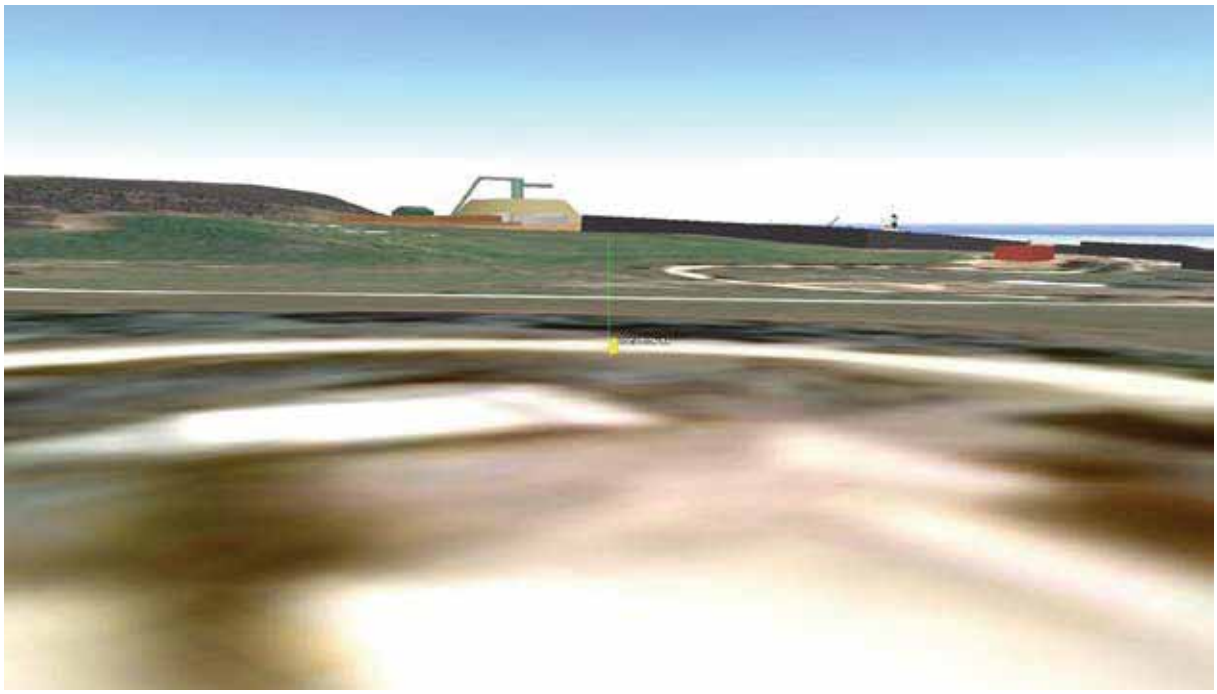


Figure 2 Location 9a original

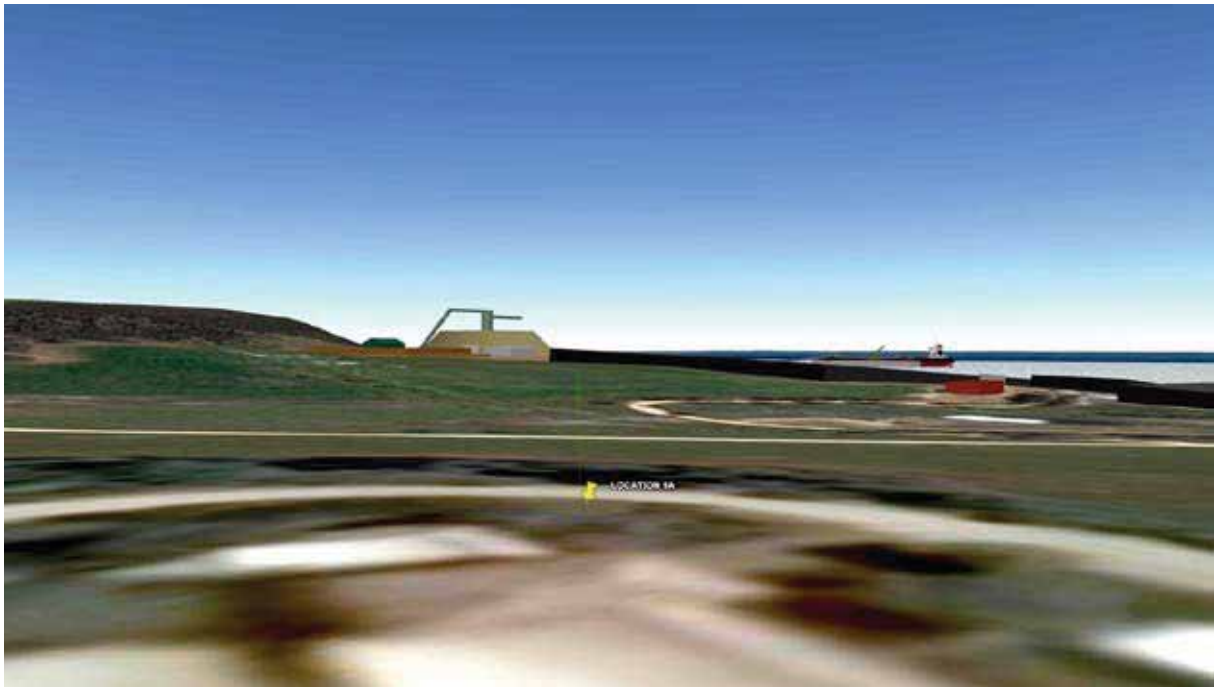


Figure 3 Location 9a updated

Figure 4 and Figure 5 show location 11a with the original offshore design (11a original) and the updated design (11a updated), both of which illustrates that the pontoon and berthed vessels would be visible in both cases but at a different angle.

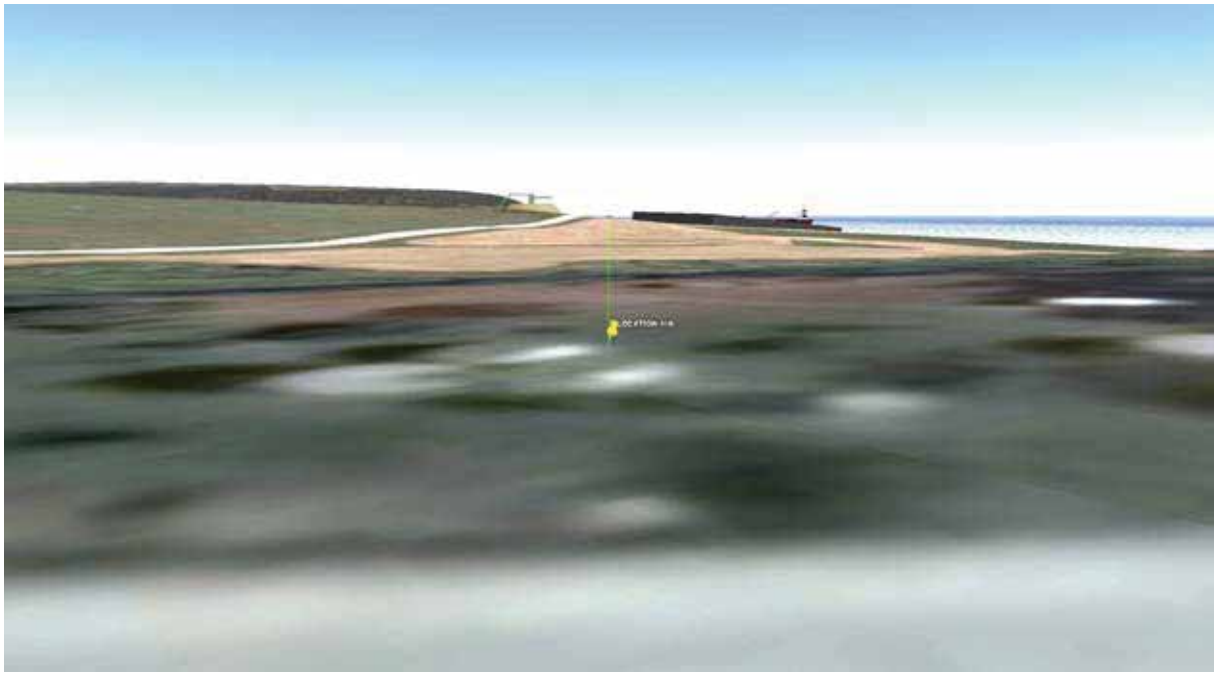


Figure 4 Location 11a original

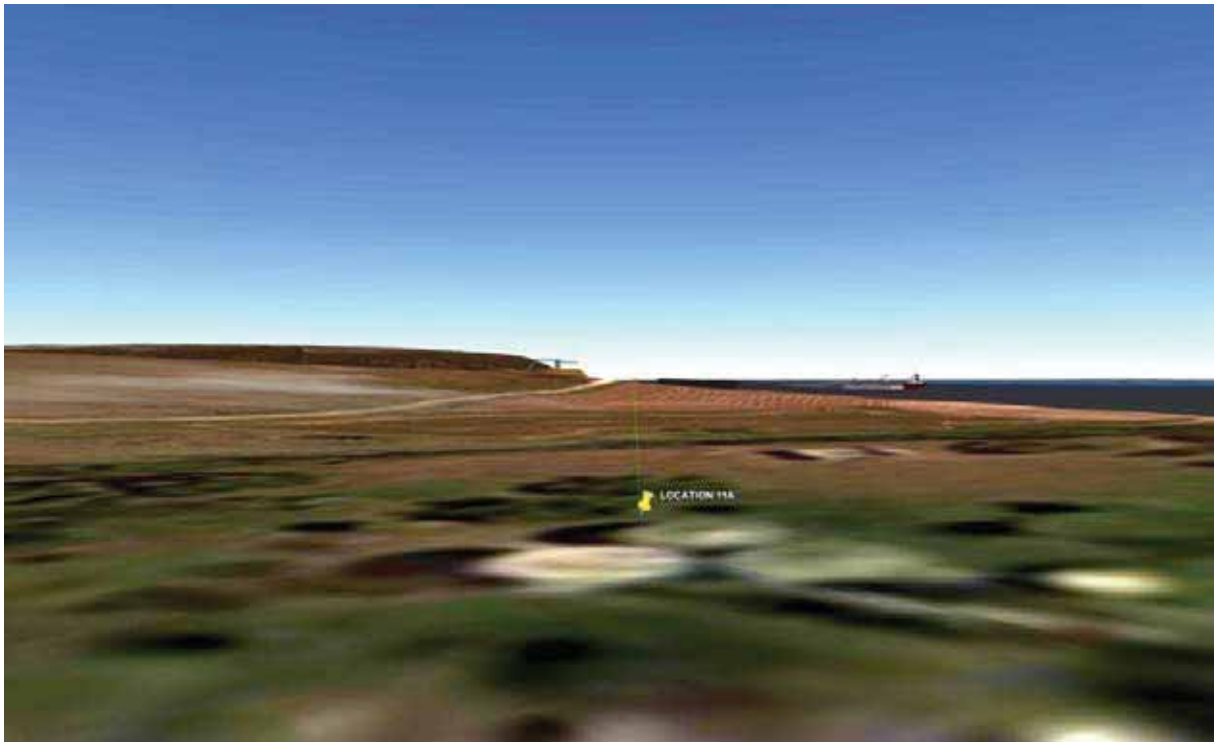


Figure 5 Location 11a updated

Figure 6 and Figure 7 show location 12 with the original design (12 original) and the revised design (12 updated), which illustrates that the jetty and berthed vessel would be visible in both cases, but further offshore for the revised design.

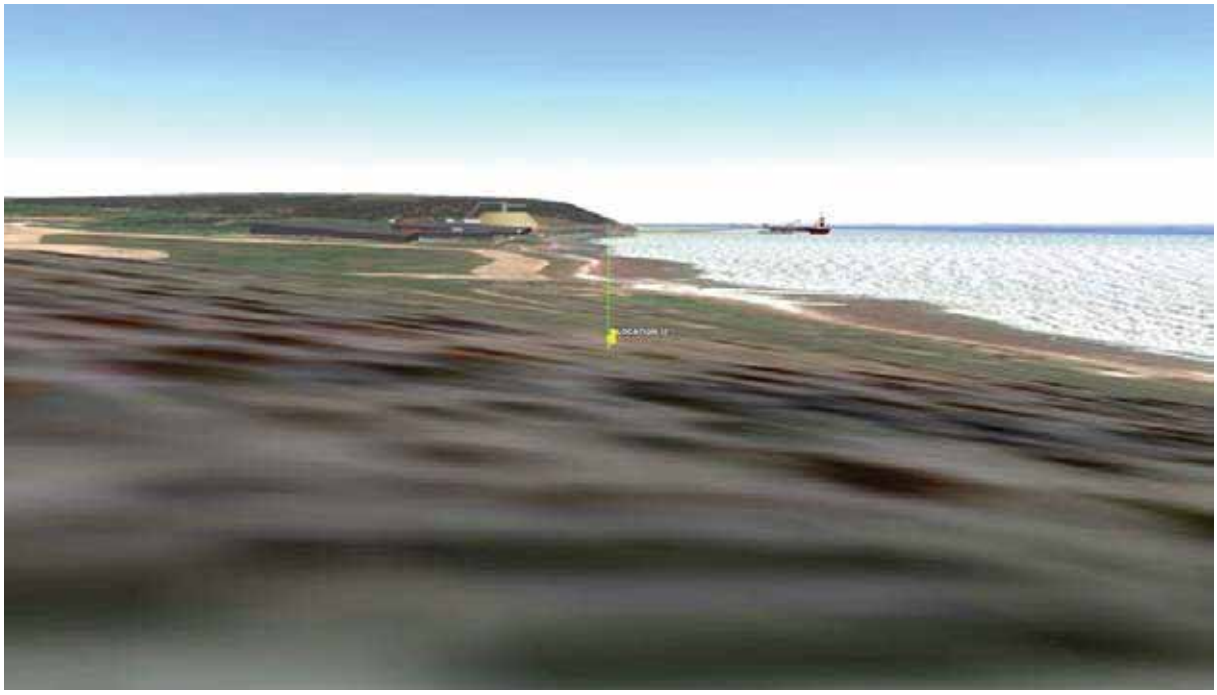


Figure 6 Location 12 original

Figure 7 Location 12 updated

4. CONCLUSIONS

As discussed in Section 23.7 of the Draft EIS, the KI Seaport would extend the relatively disturbed, industrial like character of this particular section of Smith Bay and the visual amenity impacts would be noticeable and considered significant for the local residents who are on elevated land with views to Smith Bay.

The assessment undertaken using the key sensitive receiver locations and the updated conceptual 3D model, illustrates that slight changes in visual amenity for some locations would be expected. It is expected that at some locations the pontoon and berthed vessel would be more visible as they will not be hidden behind Yumbah Aquaculture's Smith Bay facility. Whilst other locations would have a clearer view of a berthed vessel because it is located further offshore. Some locations would have a relatively unchanged view and hence level of impact to visual amenity.

Locations at either end of Smith Bay, would have a clearer view of the offshore infrastructure (jetty and pontoon) and berthed vessel as it would extend past the background landscape. However the revised design of the offshore infrastructure could be considered to be less imposing than the original design given the greater distance it would be out to sea.

It should be noted that at the locations where the pontoon and berthed vessel are now more visible, a less imposing view of the ship would be expected given the increased distance offshore. Detail of the associated offshore infrastructure would also be less visible.

Although there would be slight variations in the visual amenity for many locations, the variation of line of sight views of the original design presented in the Draft EIS compared to those of the revised design is considered insignificant. The revised design could be considered an improvement to the overall visual amenity impact that the KI Seaport could cause for Smith Bay due to the less conspicuous nature of the jetty and pontoon could pose in the coastal environment than that of a rock armoured causeway closer to the shore.

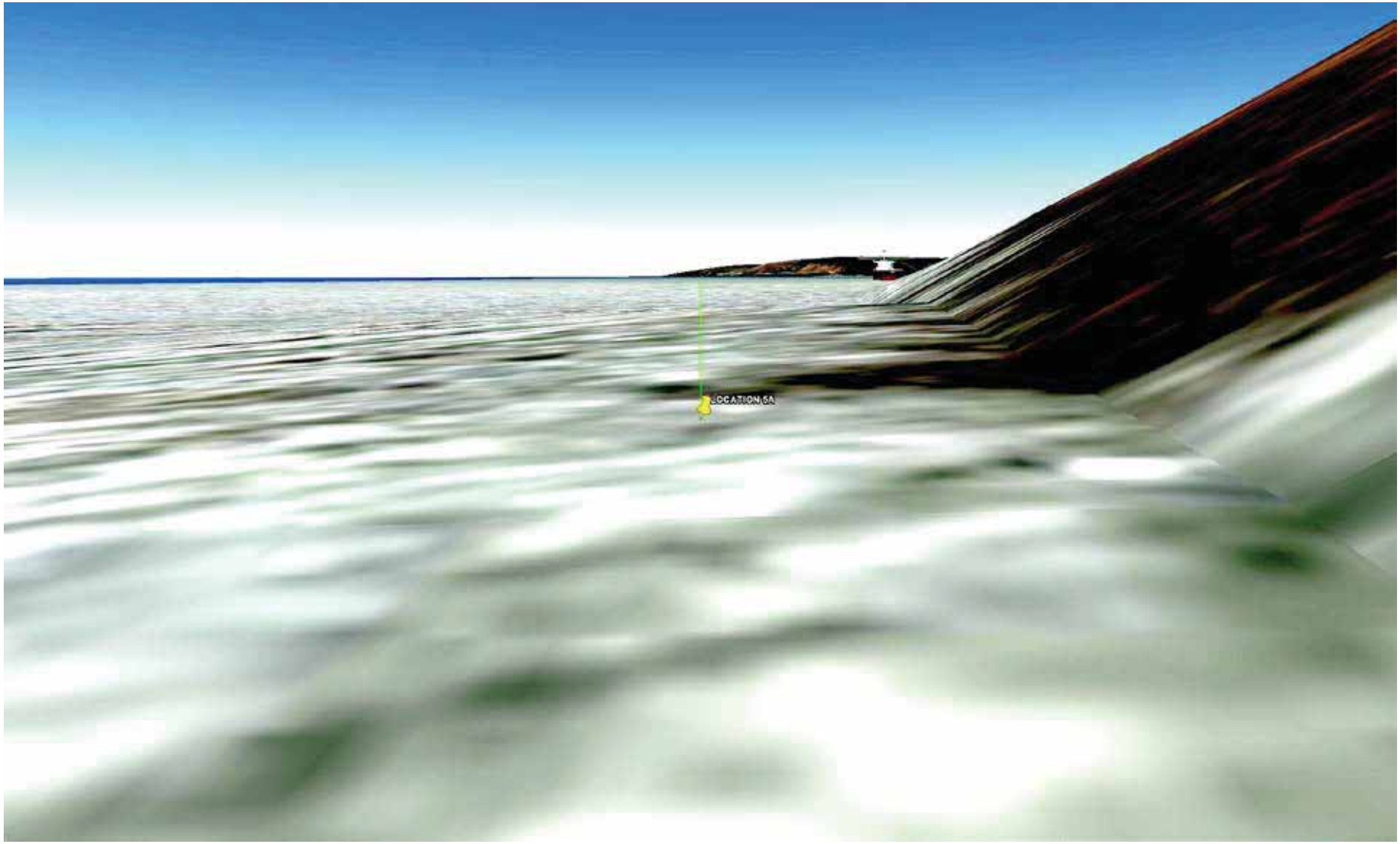
The increased length of the jetty would result in a less imposing sight of the offshore infrastructure and berthed vessel for many locations.

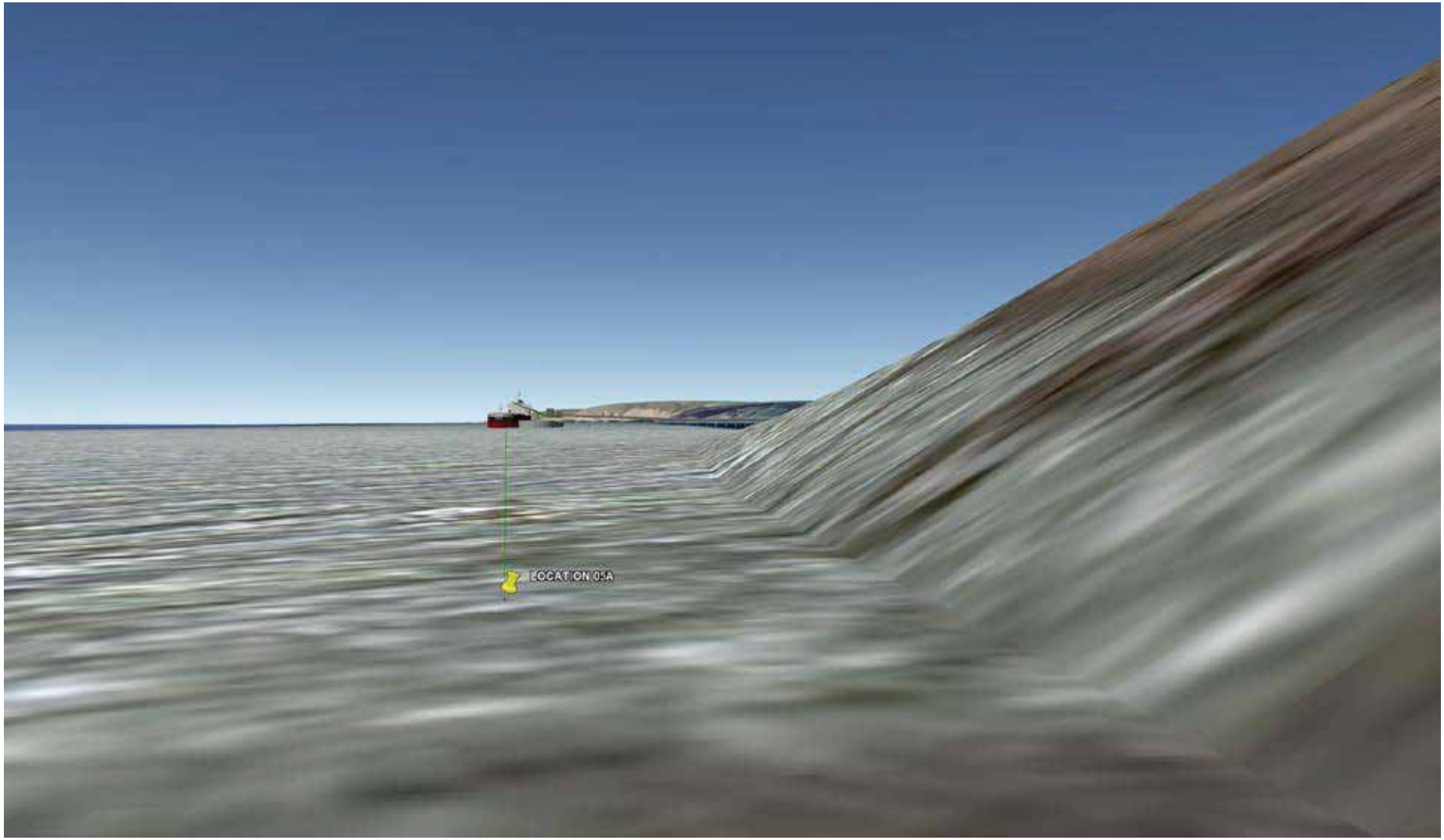
Attachment 1 – Updated Line of Sight Imagery

Attachment 1.1

Location 05a-Comparative Line of Sight

(Original/Updated)

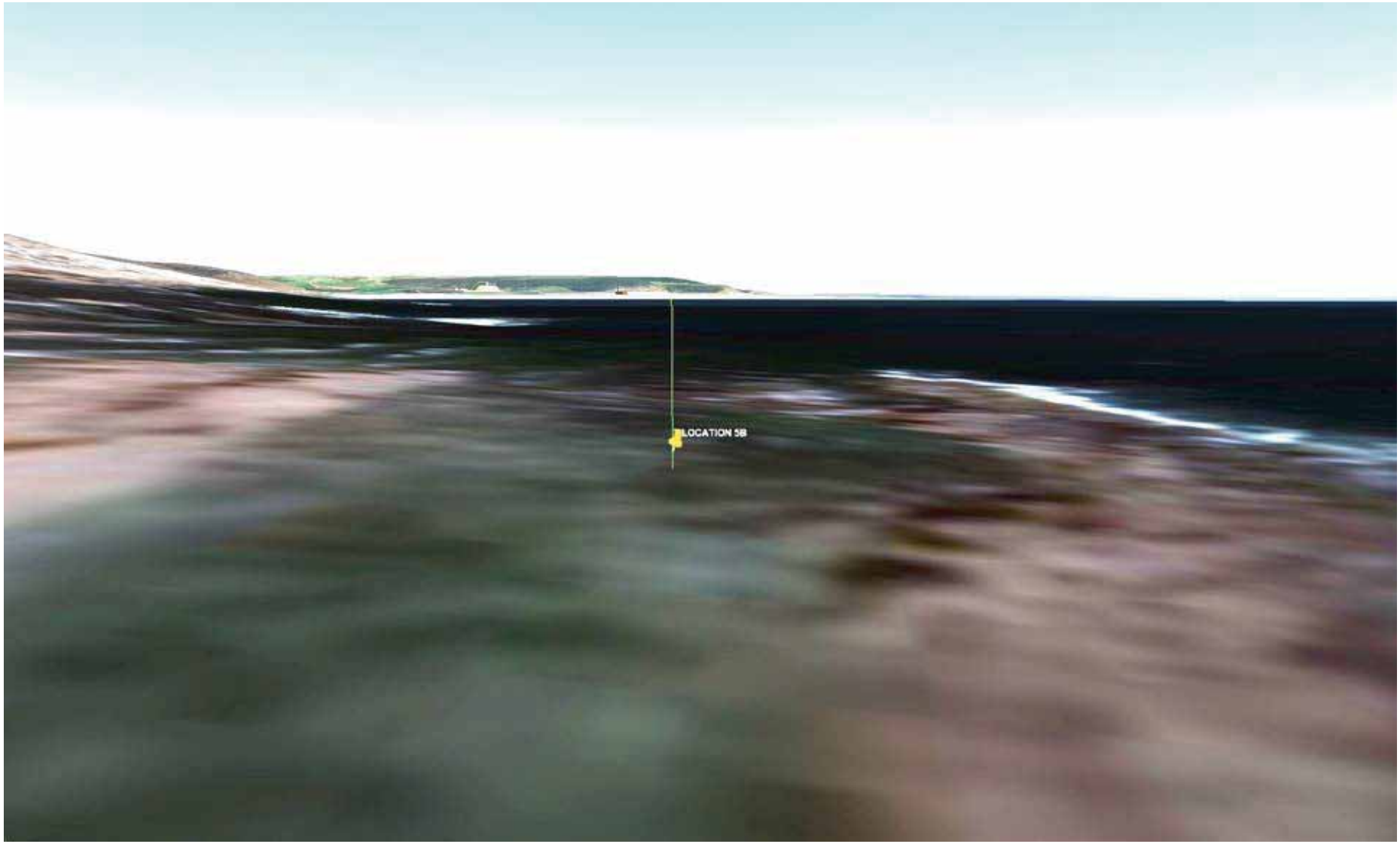

LOCATION 5A

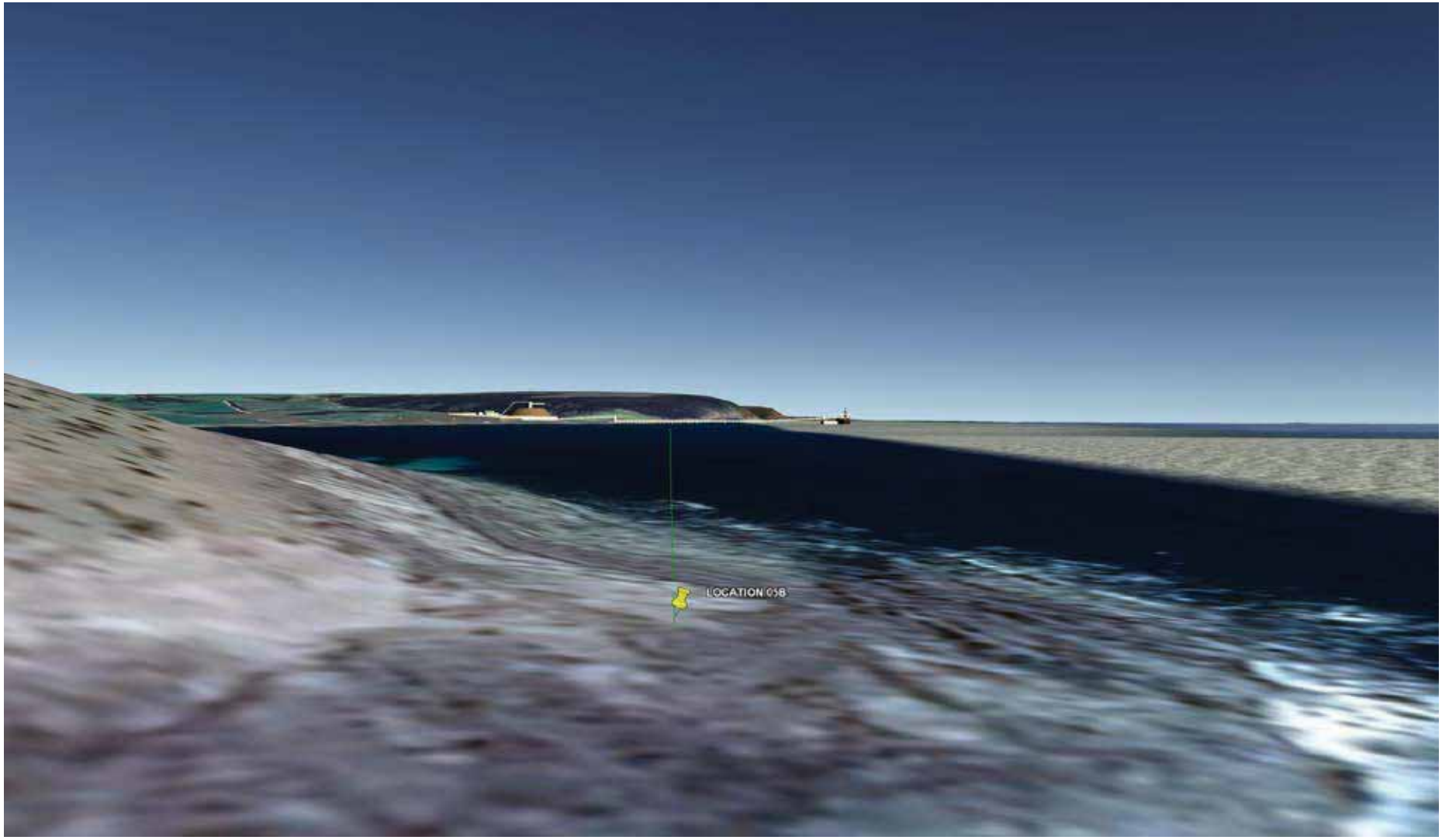

ECCAT ON 01A

Attachment 1.2

Location 05b-Comparative Line of Sight

(Original/Updated)

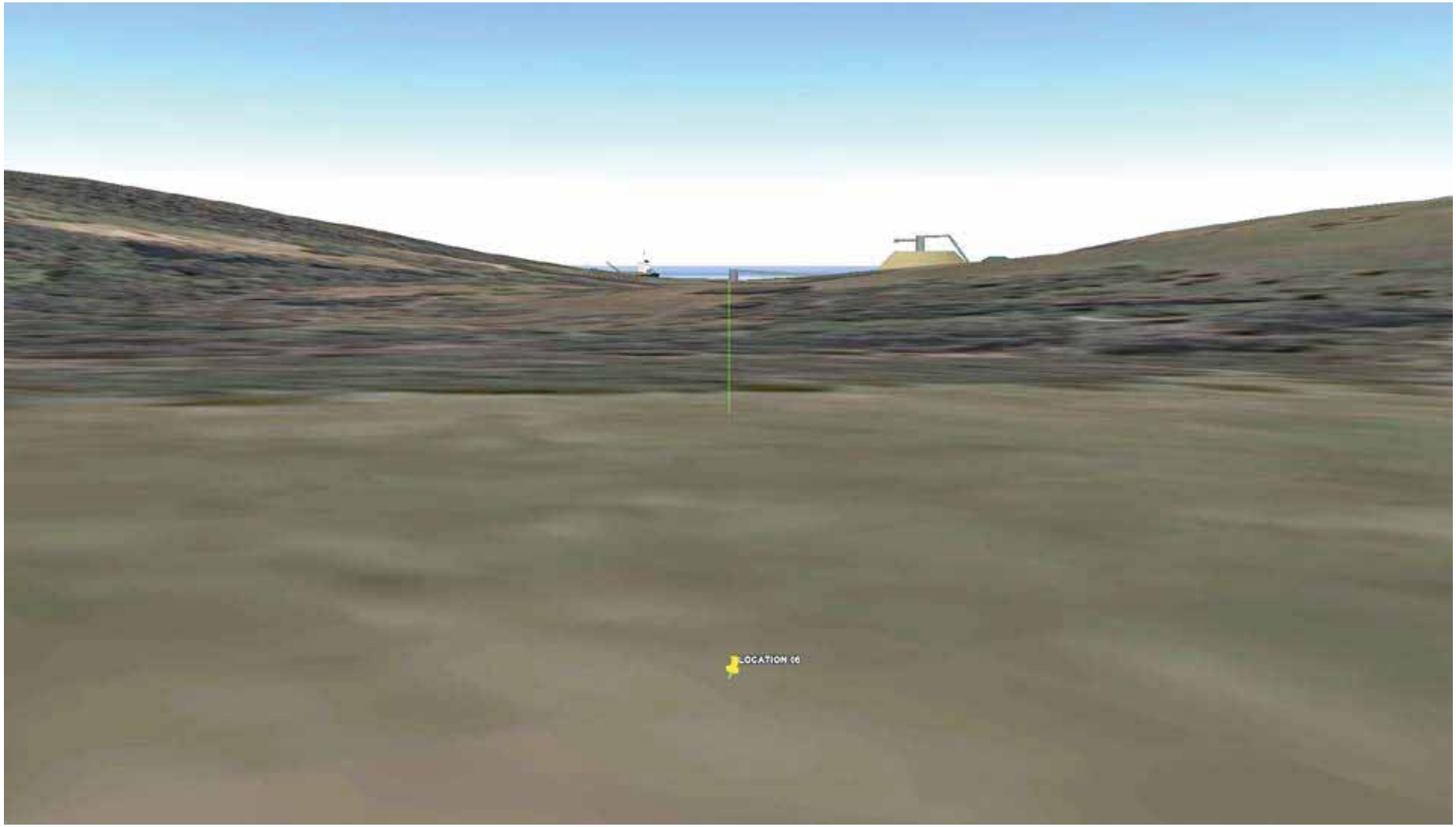

LOCATION 5B


LOCATION 05B

Attachment 1.3

Location 06-Comparative Line of Sight

(Original/Updated)

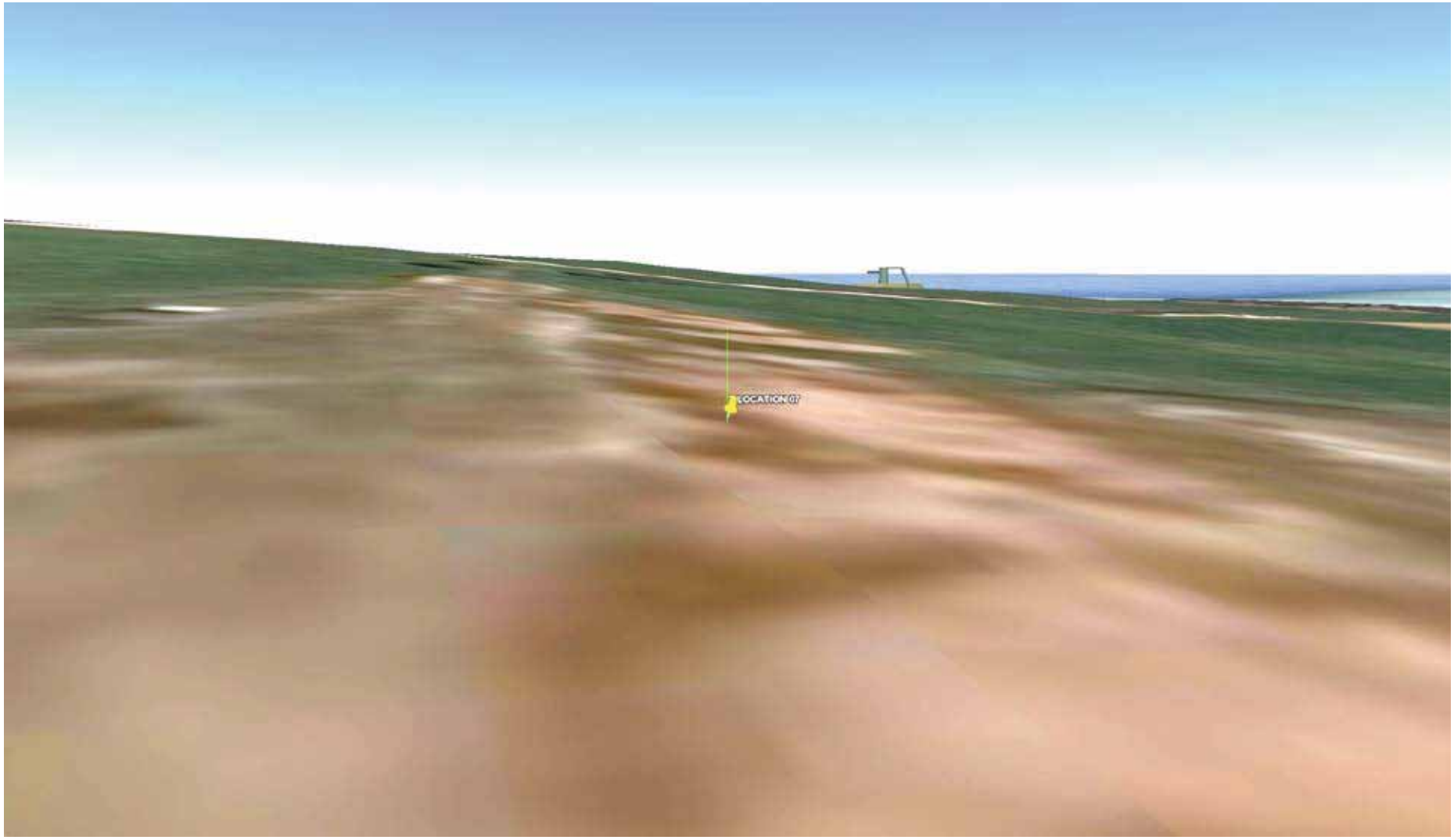

LOCATION 06

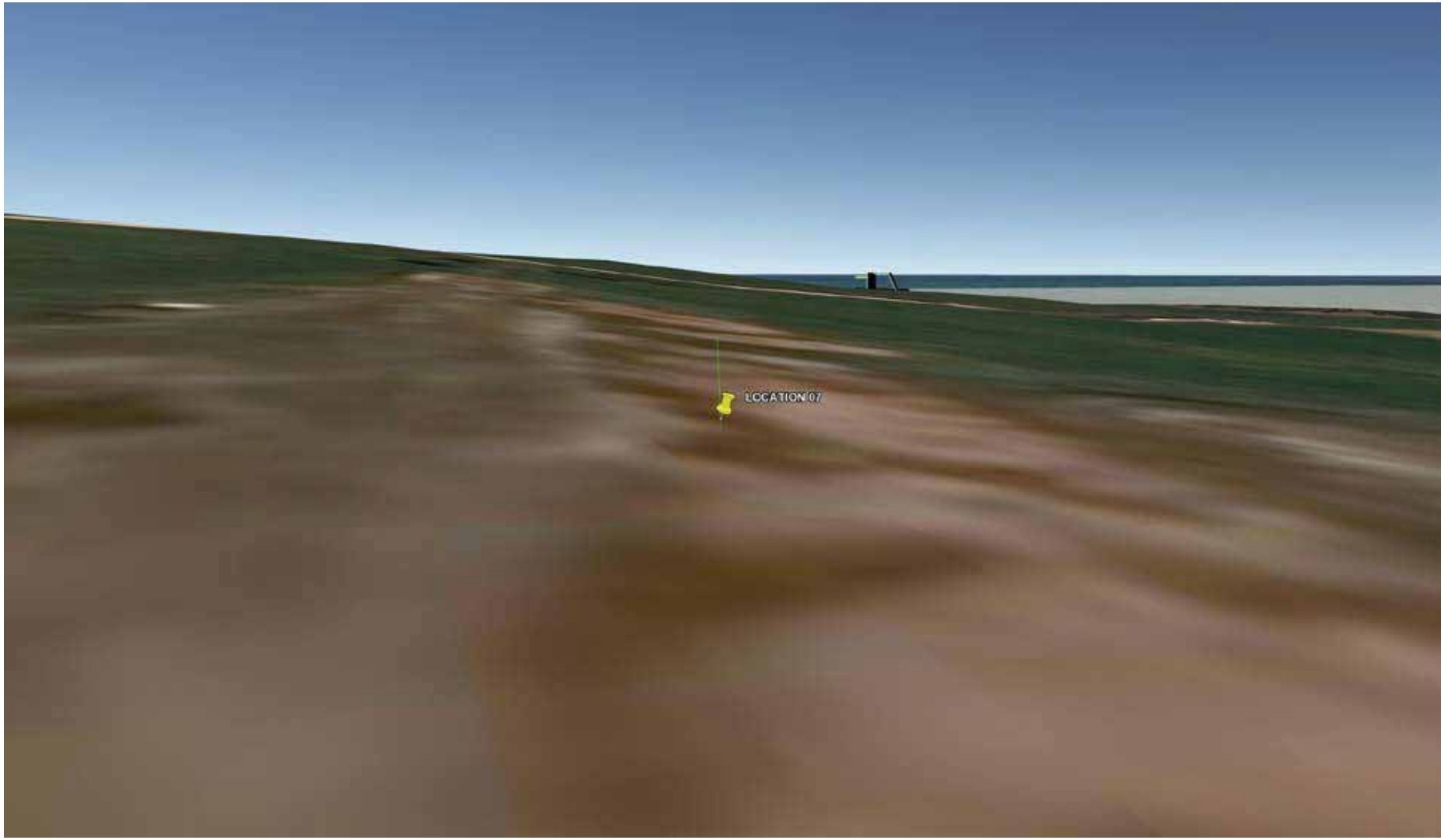

LOCATION 06

Attachment 1.4

Location 07-Comparative Line of Sight

(Original/Updated)

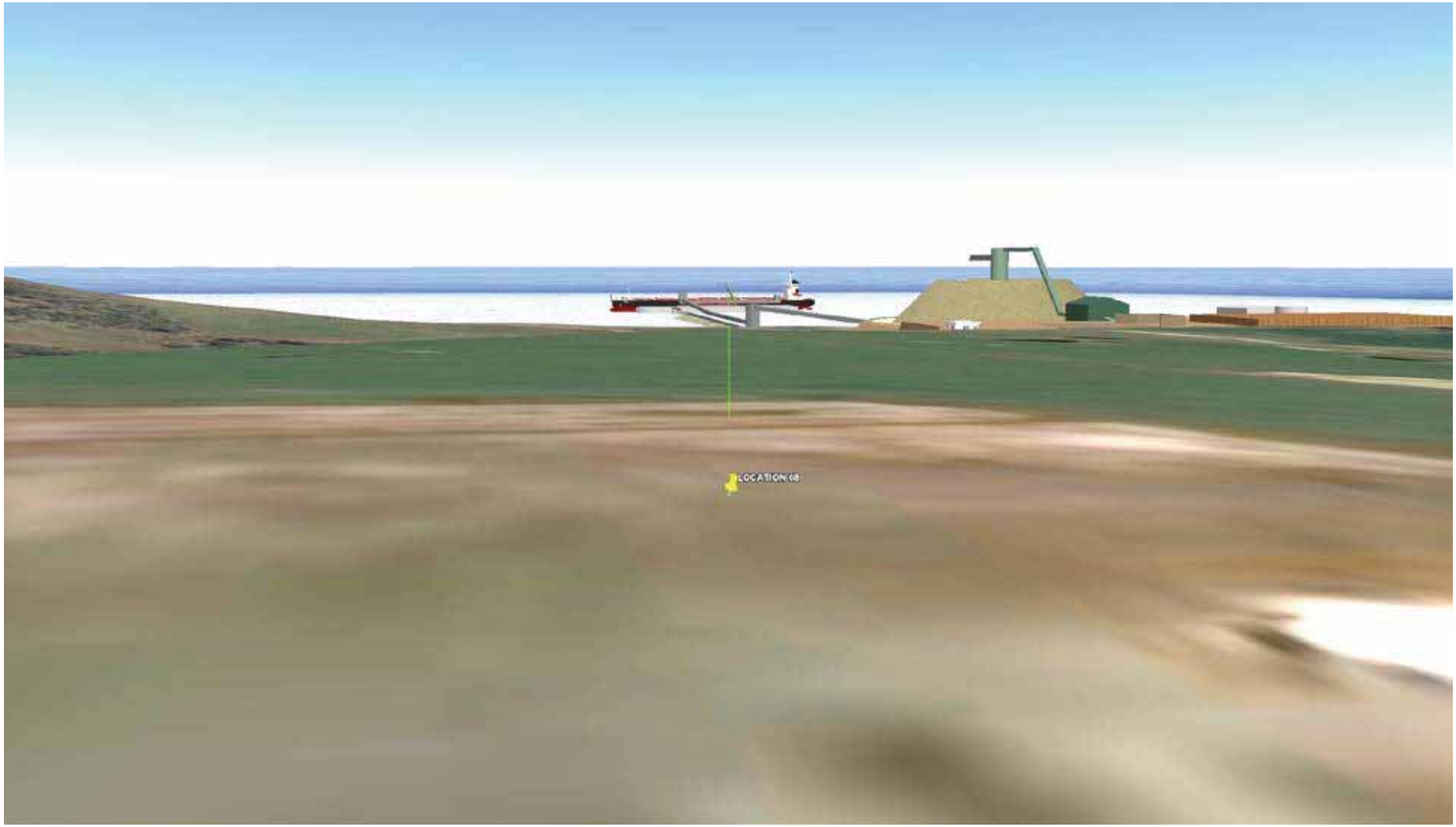

LOCATION 07


LOCATION 07

Attachment 1.5

Location 08-Comparative Line of Sight

(Original/Updated)

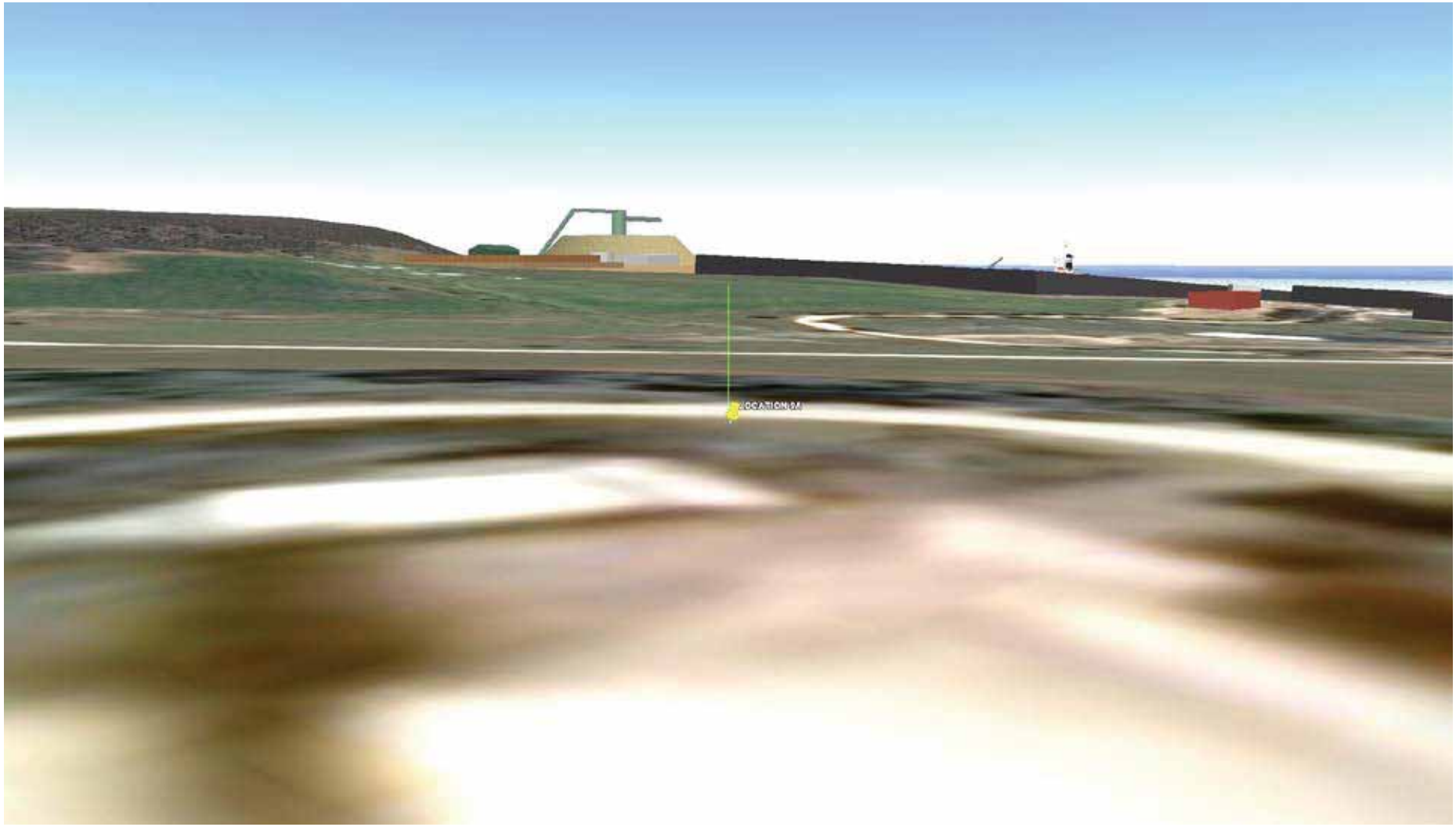

LOCATION 08

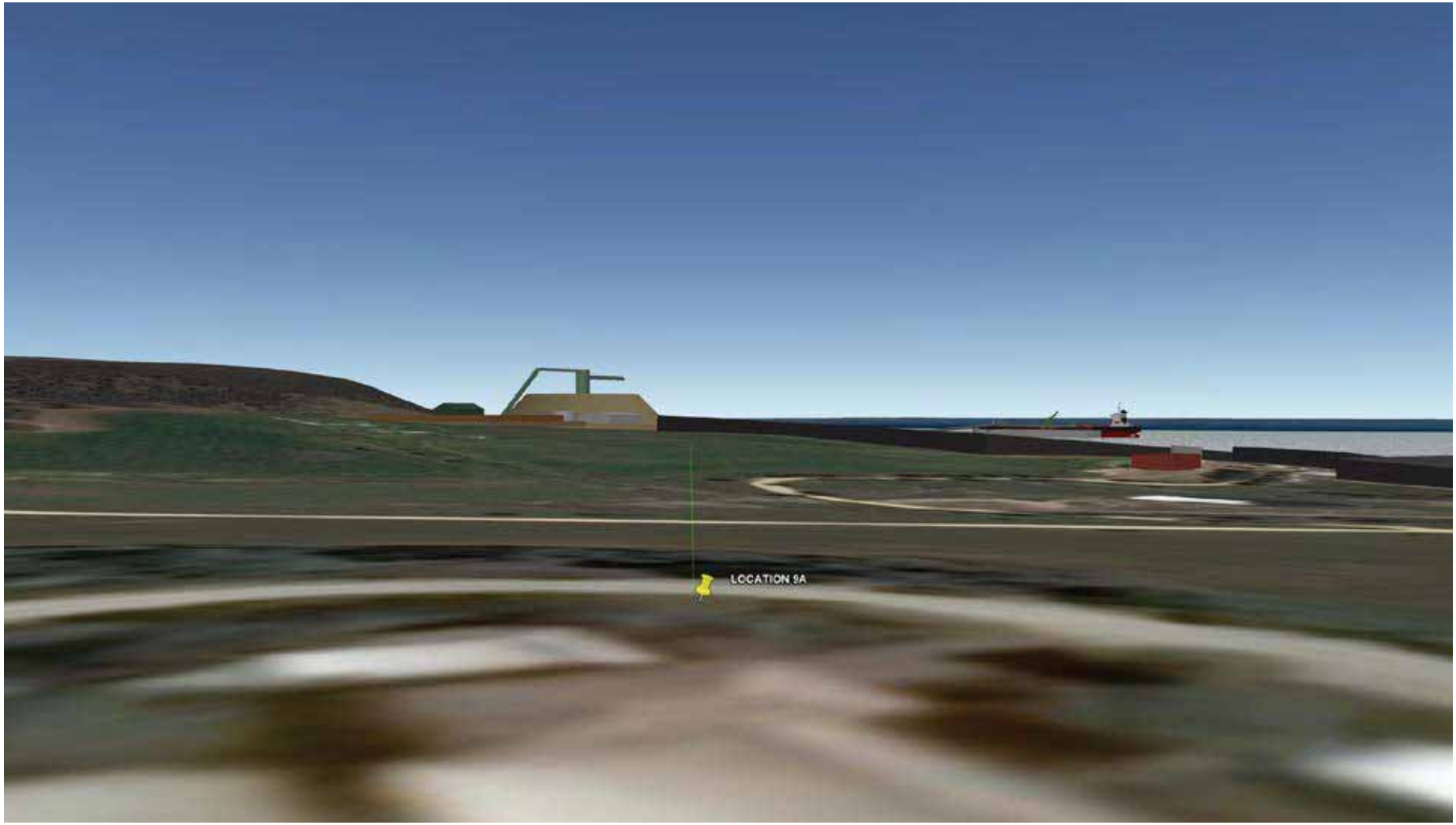

LOCATION 08

Attachment 1.6

Location 09a-Comparative Line of Sight

(Original/Updated)

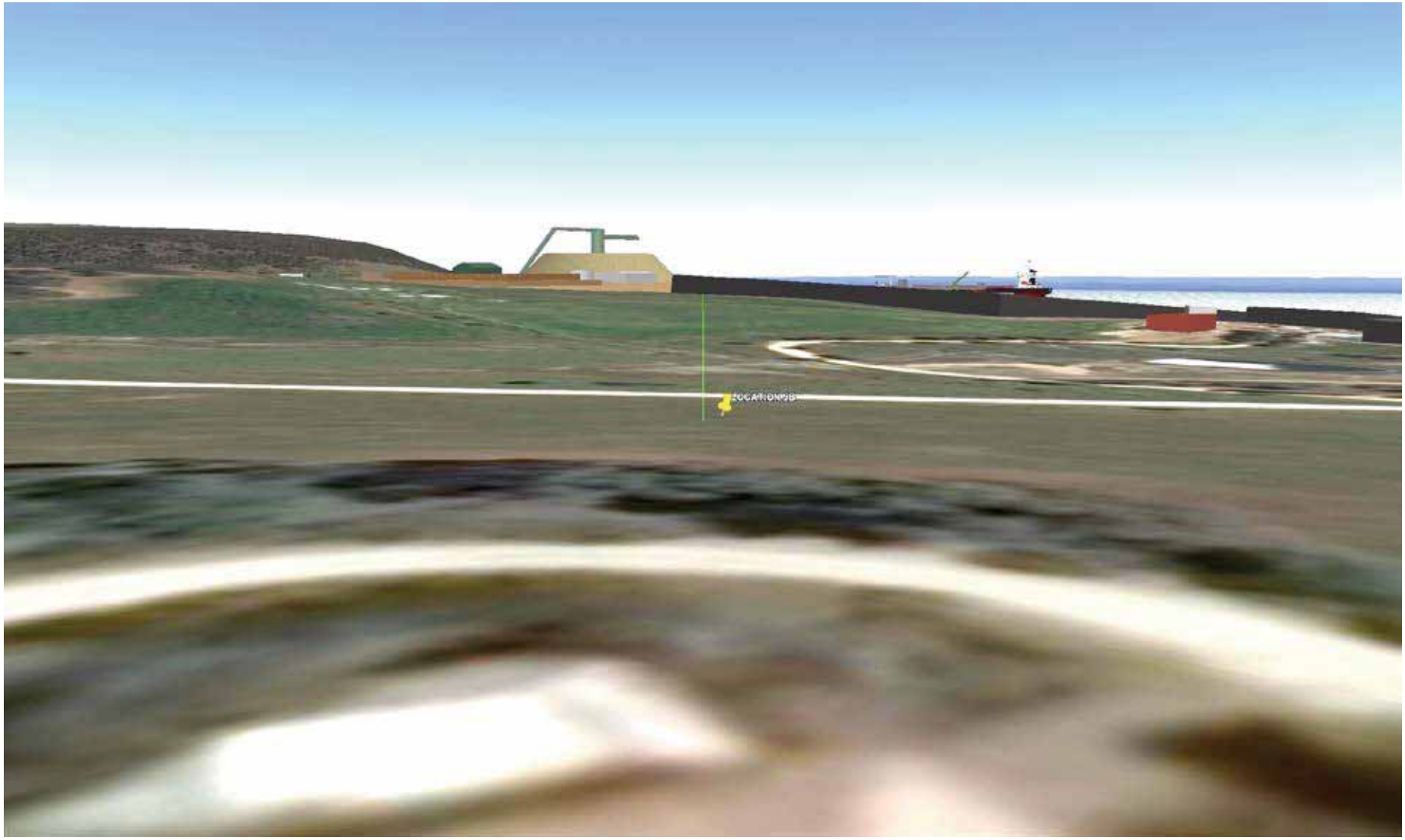


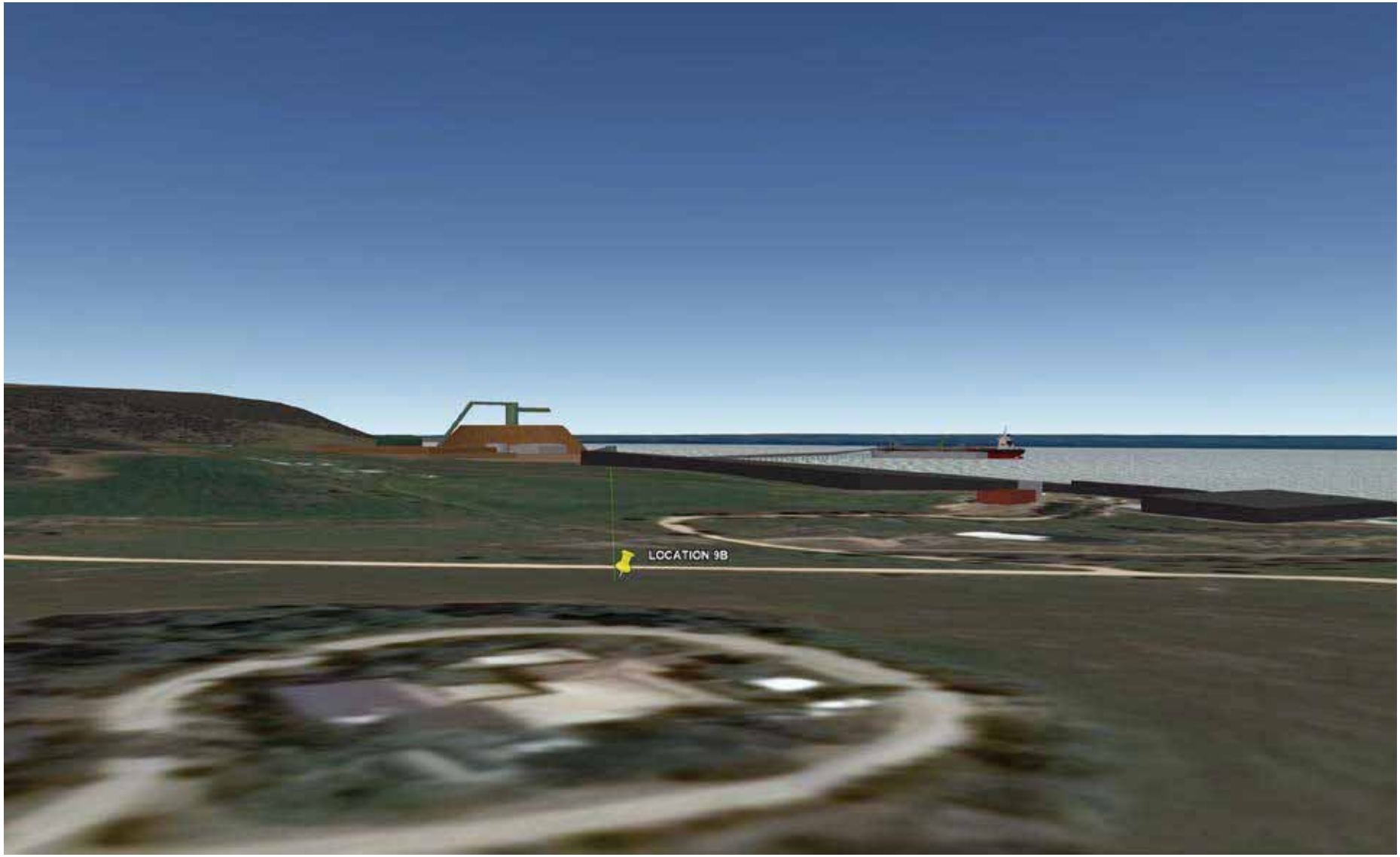

LOCATION 9A

Attachment 1.7

Location 9b-Comparative Line of Sight

(Original/Updated)

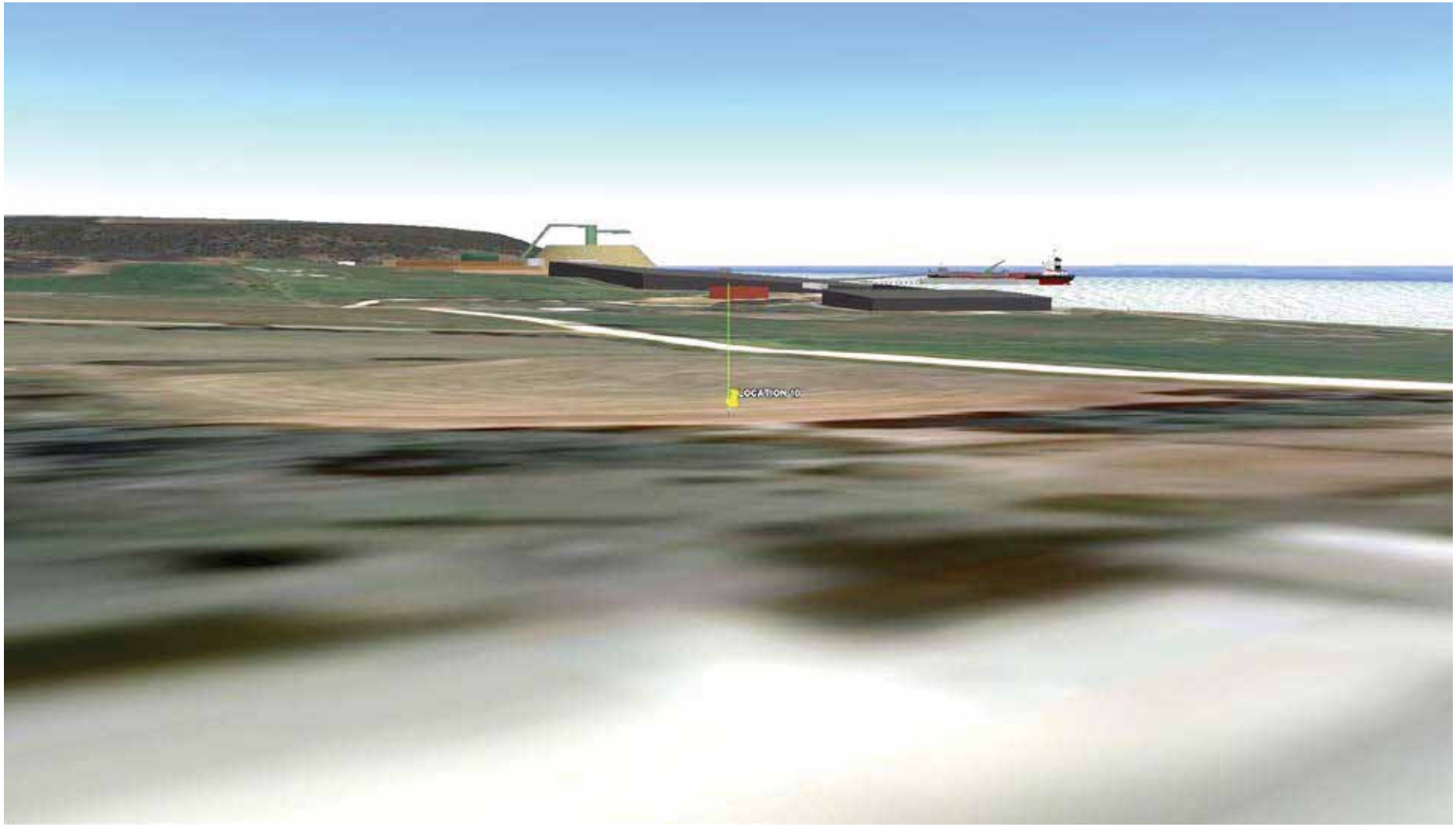

LOCATION 3B


LOCATION 9B

Attachment 1.8

Location 10-Comparative Line of Sight

(Original/Updated)




LOCATION 10

Attachment 1.9

Location 11a-Comparative Line of Sight

(Original/Updated)

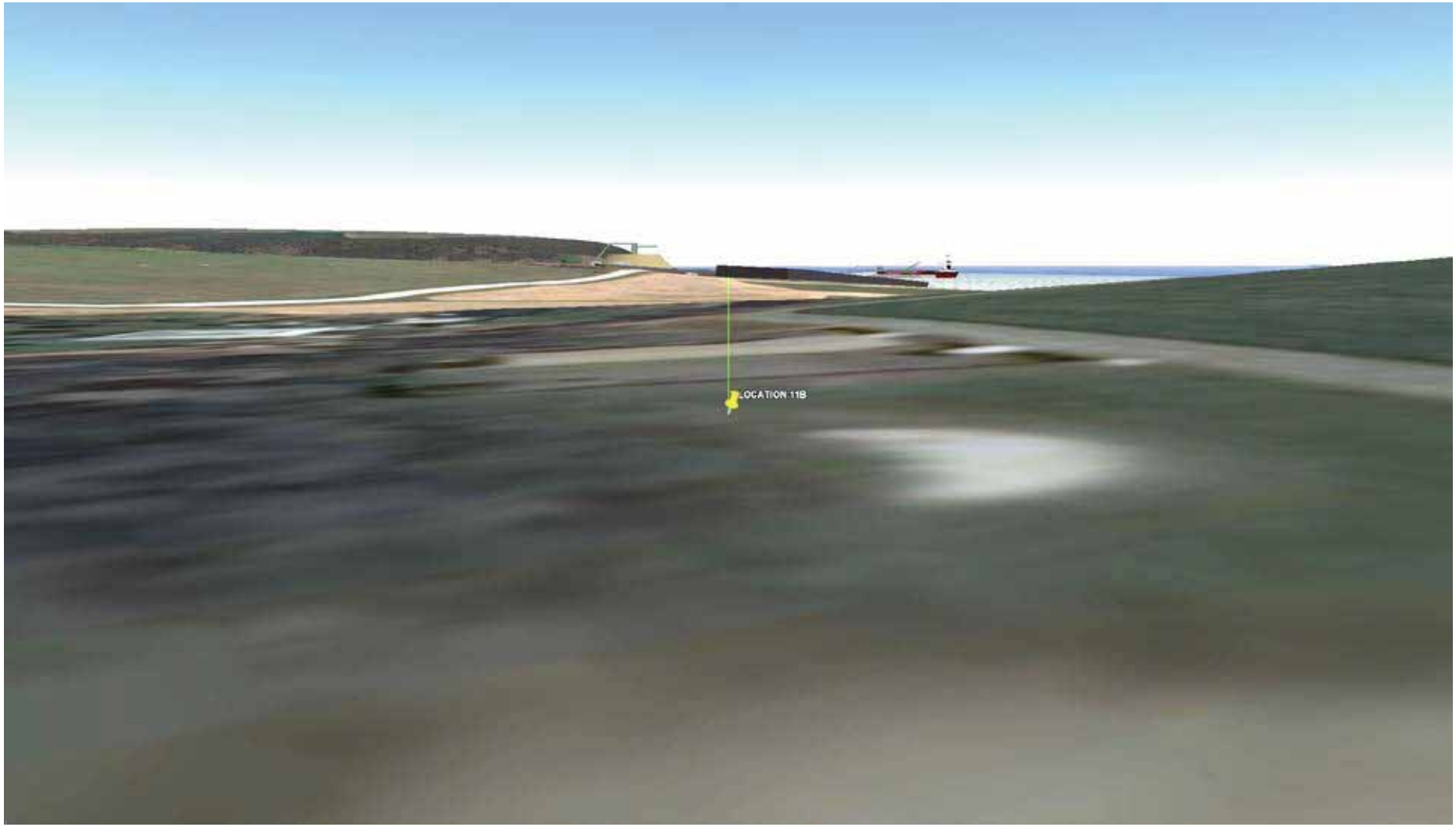

LOCATION 11A

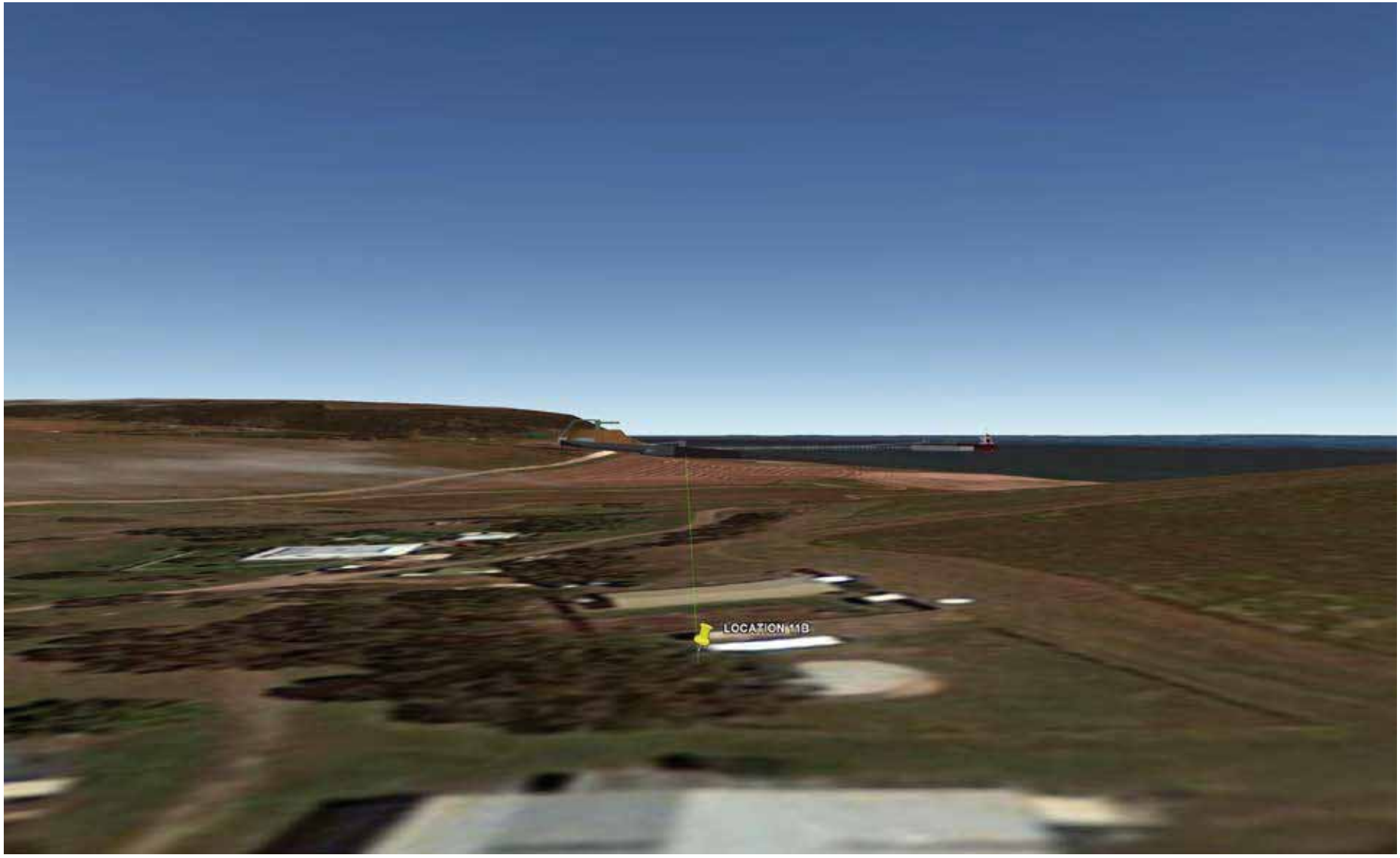

LOCATION 11A

Attachment 1.10

Location 11b-Comparative Line of Sight

(Original/Updated)

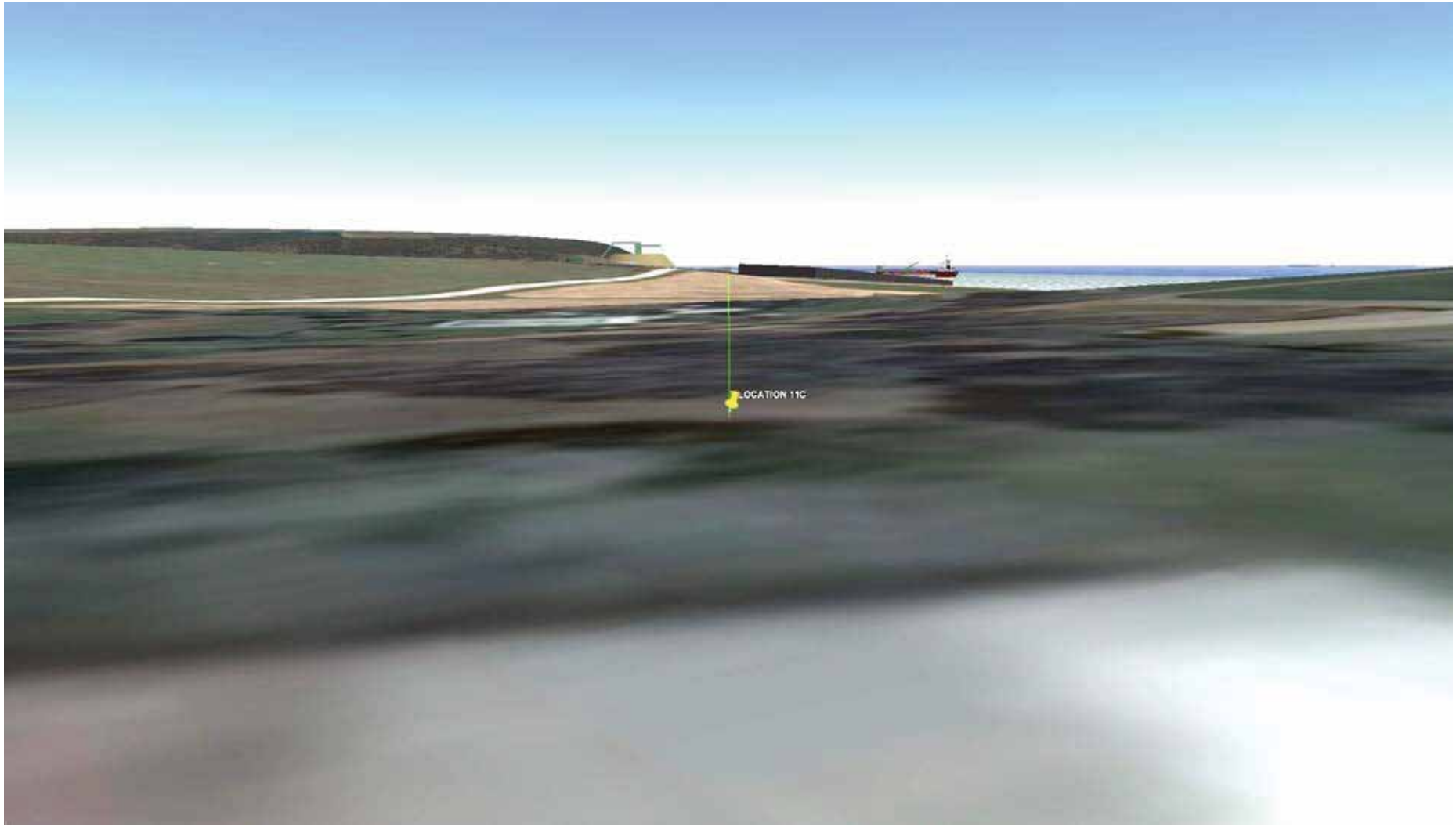

LOCATION 11B

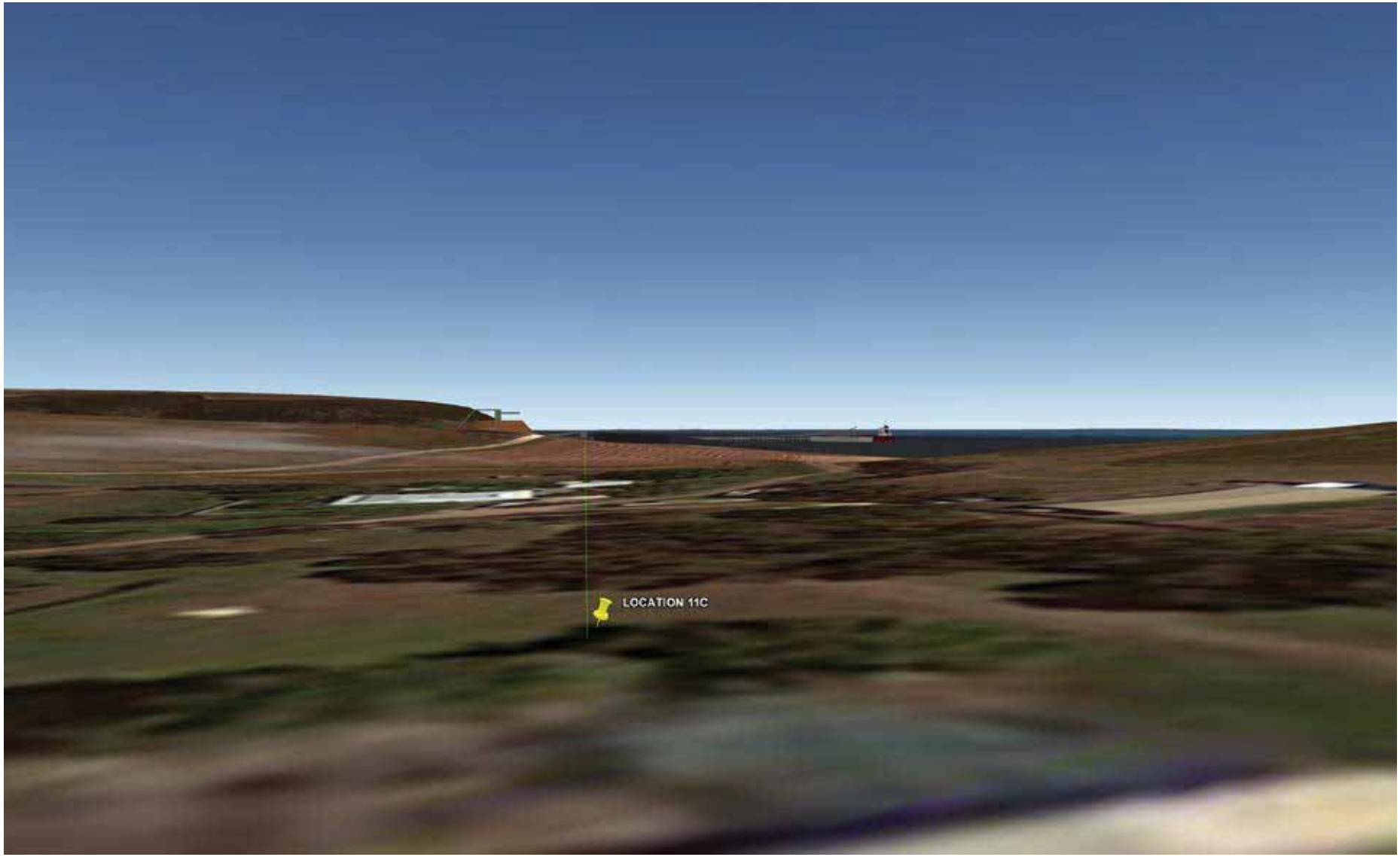

LOCATION 11B

Attachment 1.11

Location 11c-Comparative Line of Sight

(Original/Updated)

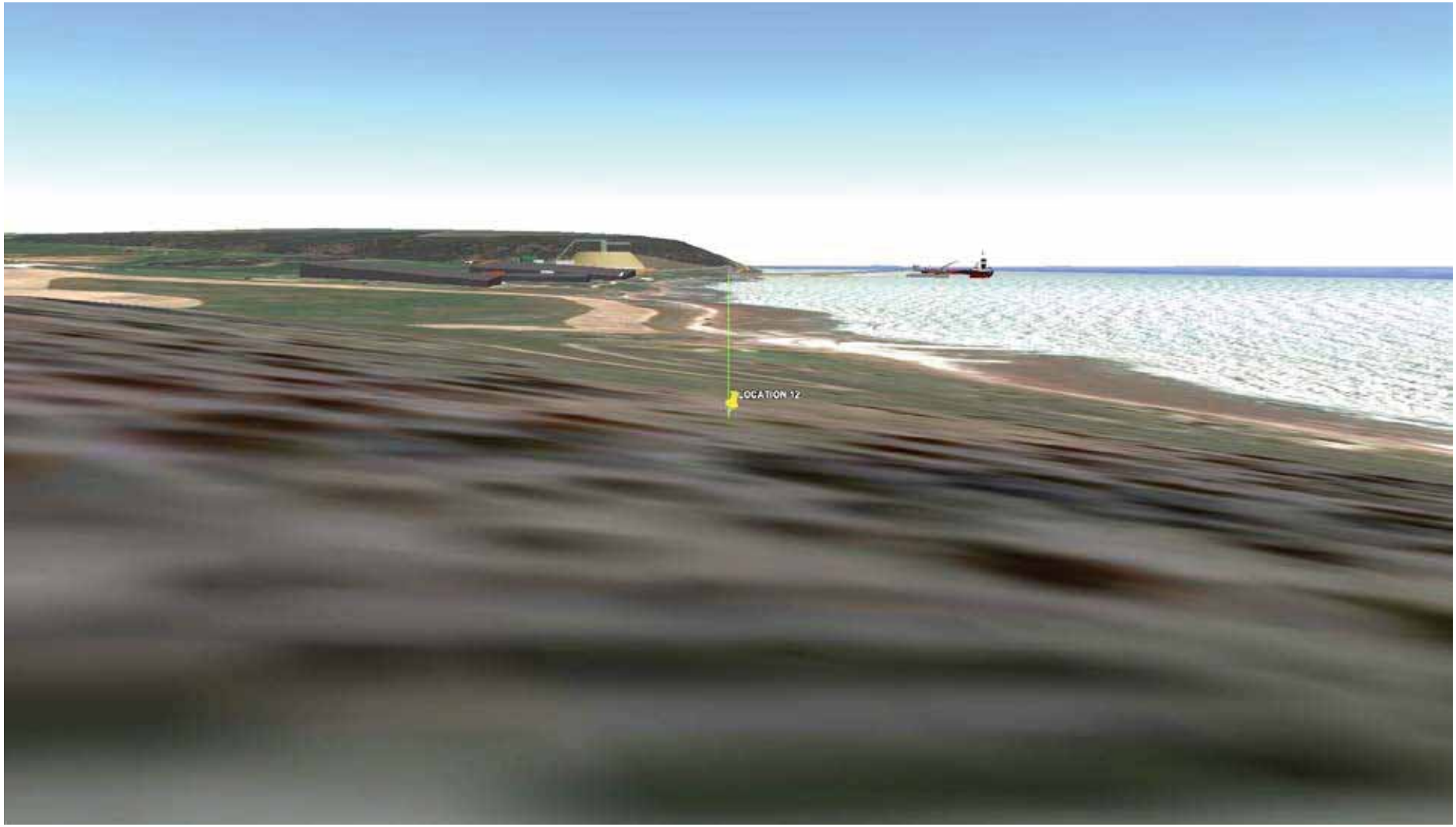

LOCATION 11C

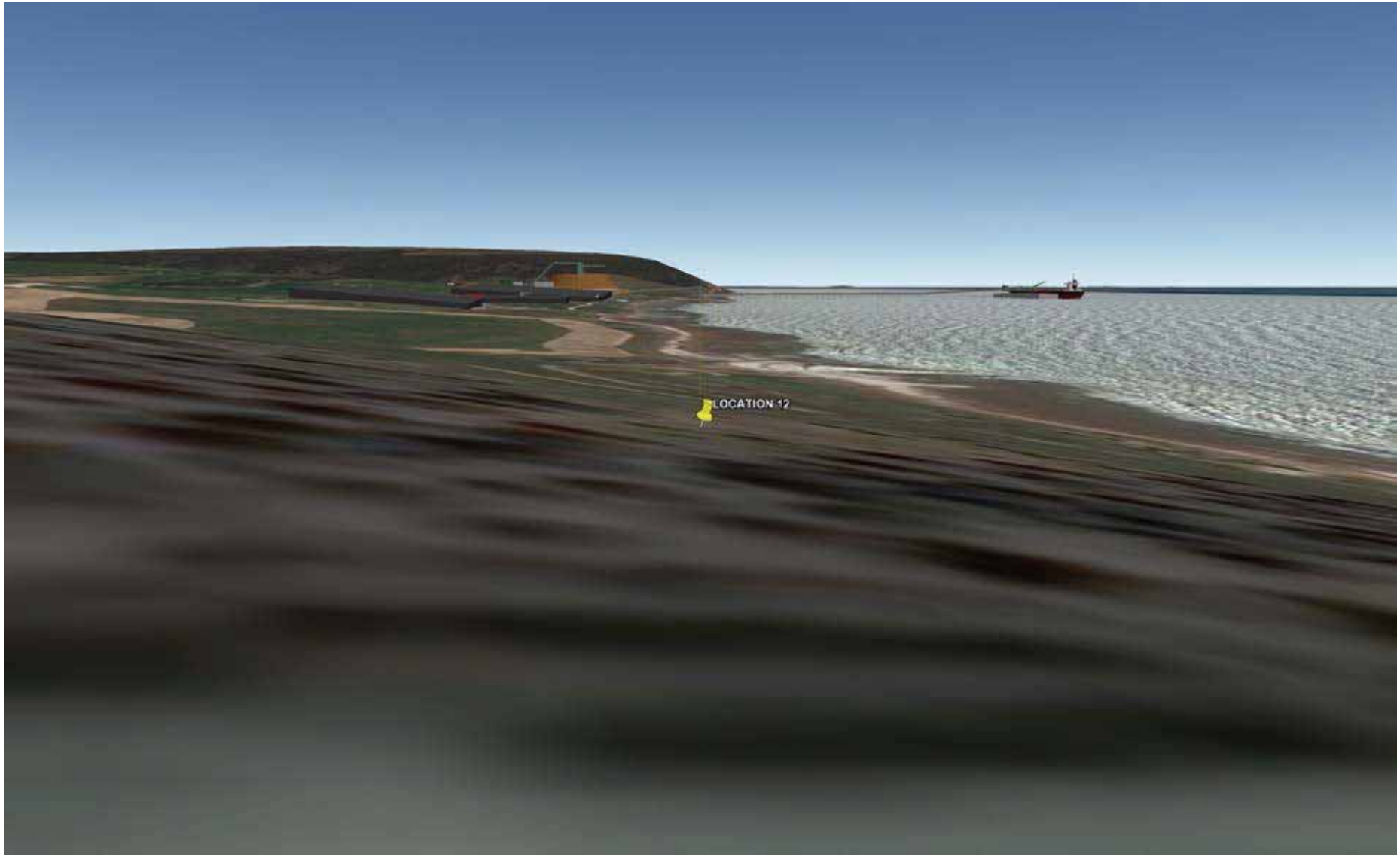

LOCATION 11C

Attachment 1.12

Location 12-Comparative Line of Sight

(Original/Updated)

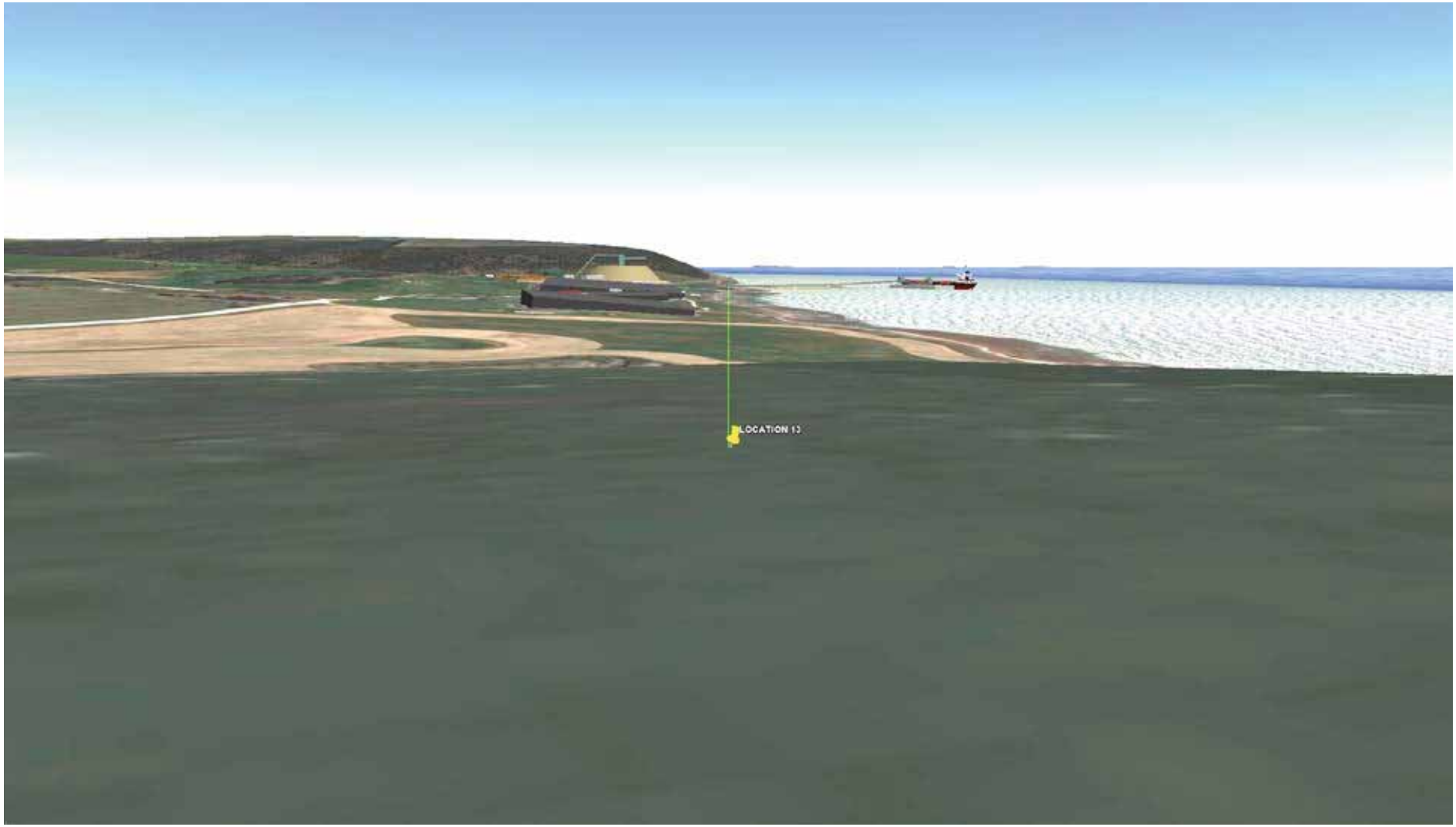

LOCATION 12

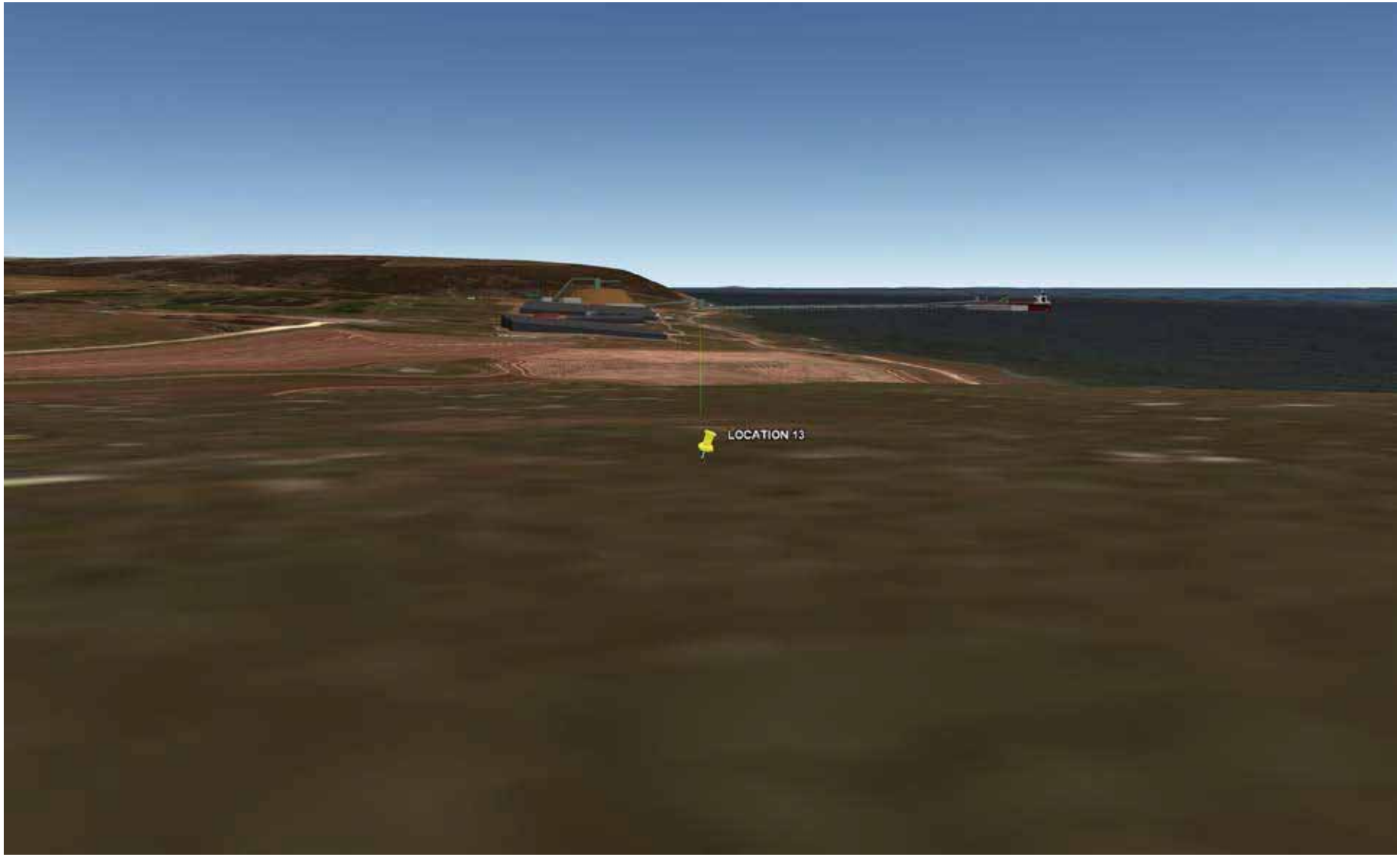

LOCATION 12

Attachment 1.13

Location 13-Comparative Line of Sight

(Original/Updated)

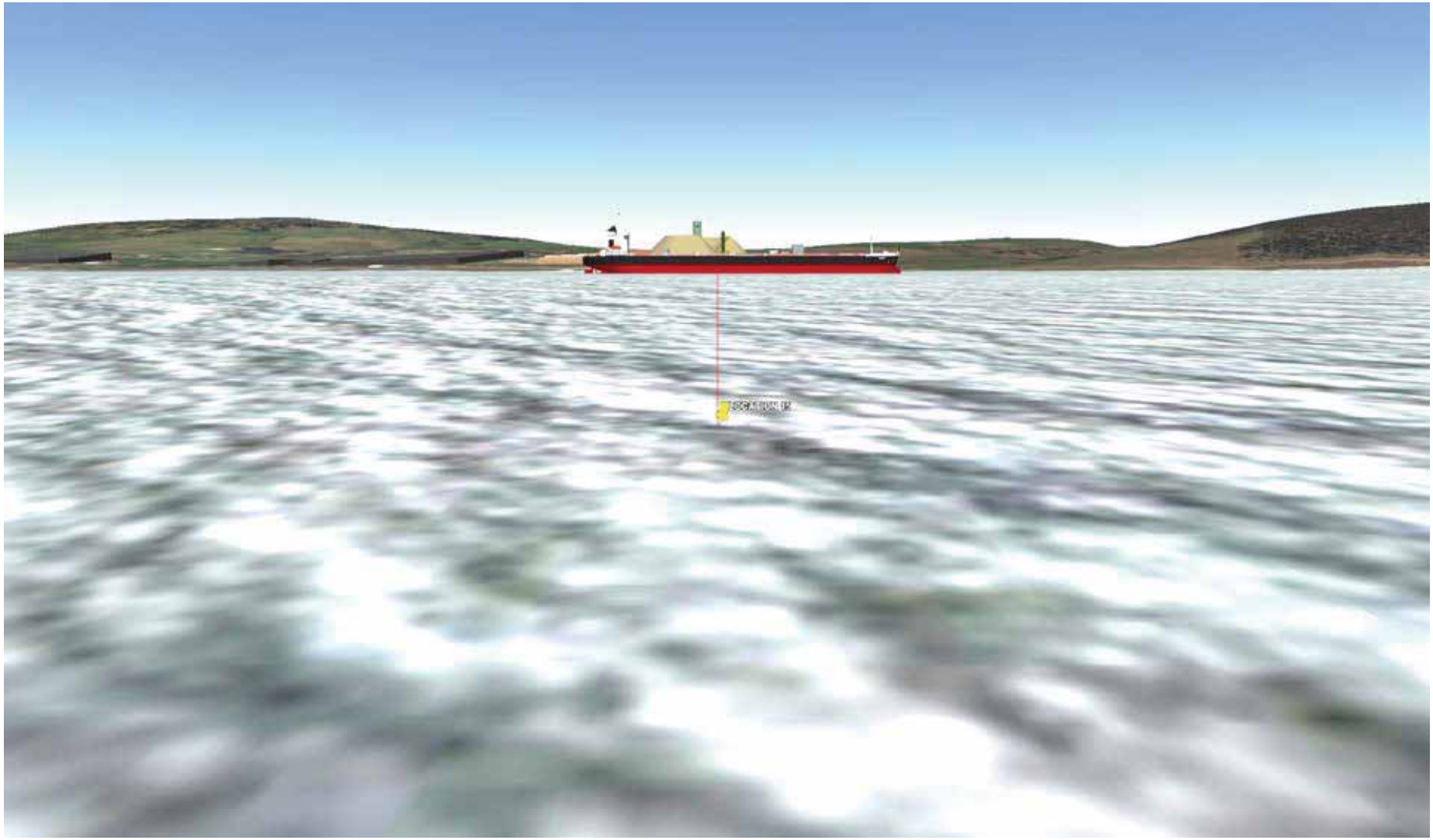

LOCATION 13

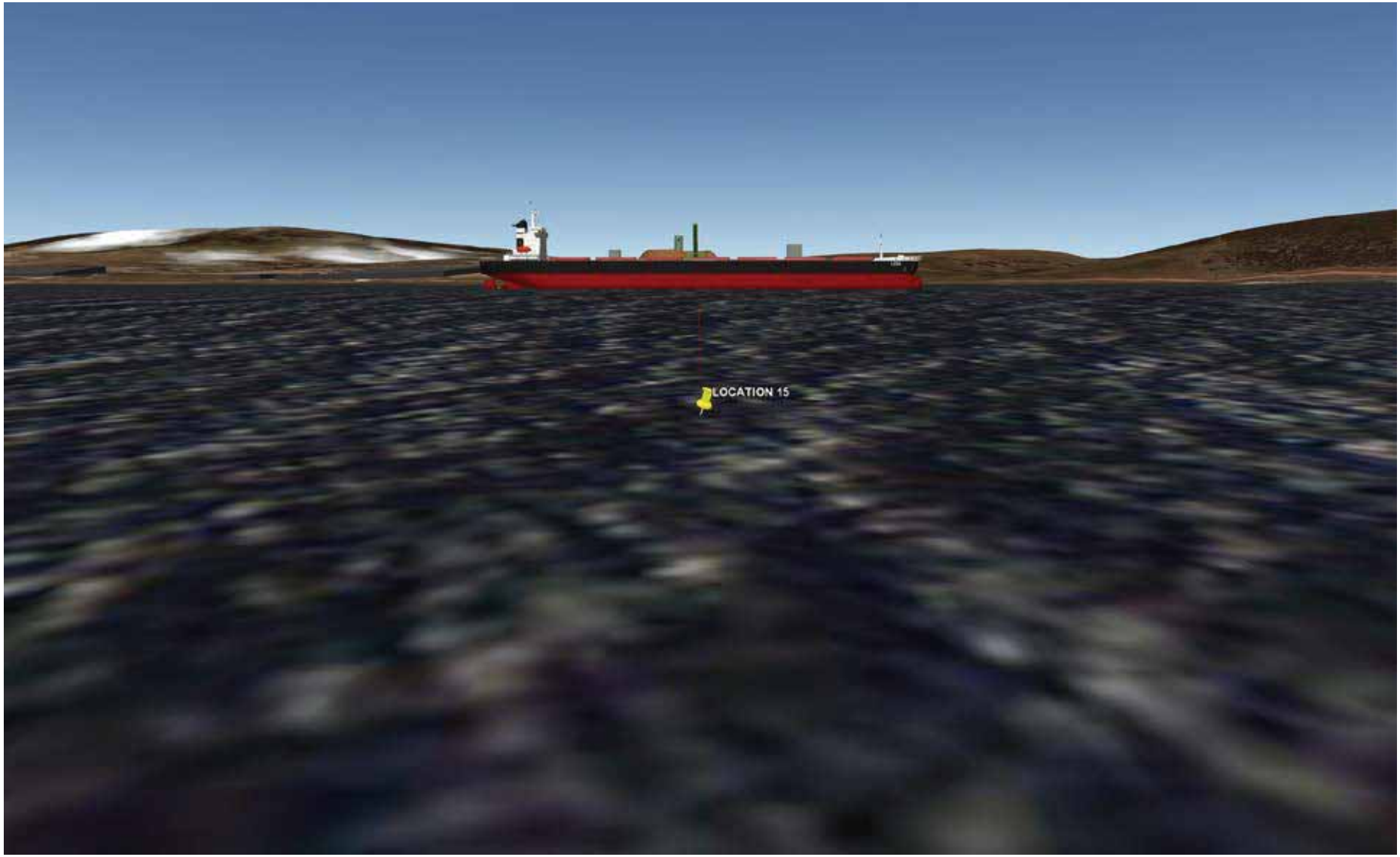

LOCATION 13

Attachment 1.14

Location 15-Comparative Line of Sight

(Original/Updated)




LOCATION 15

Appendix G – Updated Risk Assessment

Table 1-1: Updated risk assessment – Items 8, 11 and 40 (updating Appendix T of the Draft EIS)

Reference	Activity	Hazard (Environmental aspect)	Potential (pre-EIS) impact	Consequence	Likelihood	Inherent (or potential) risk level	EIS findings	Management measures	Consequence	Likelihood	Residual (or remaining) risk level
	Construction										
8	Construction jetty	Spill of fuel or hydraulic fluids	Impacts on marine communities	Moderate	Possible	Medium	The risk of fuel, oil or chemical spills will be minimised through mandated compliance with established fuel/oil storage and handling standards and protocols. With the adoption of appropriate management measures, fuel, oil and chemical spills during construction are likely to result in a temporary negligible risk to marine water quality.	CEMP to include established management procedures covering vessel maintenance, reporting of leaks and use of spill kits in the event of a spill.	Minor	Unlikely	Low
11	Pile driving	Underwater noise and vibration	Whales and dolphins in particular may be harmed by excessive underwater noise	Minor	Possible	Medium	Without mitigation, the overall risk of adverse noise effects on the relevant marine species is low, except for a medium level of risk associated with impact piling potentially resulting in hearing damage in southern right whales. 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.	Using alternative lower impact piling methods. Implementing a soft-start procedure when piling begins. Controlling the construction programme to avoid noise exposure, including scheduling piling to occur outside the months when whales may be present in the area. Establishing safety and shut-down zones, and using marine mammal observers to monitor the presence of relevant species.	Minor	Unlikely	Low

Table 1-1: Updated risk assessment – Items 8, 11 and 40 (updating Appendix T of the Draft EIS)

Reference	Activity	Hazard (Environmental aspect)	Potential (pre-EIS) impact	Consequence	Likelihood	Inherent (or potential) risk level	EIS findings	Management measures	Consequence	Likelihood	Residual (or remaining) risk level
11							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 noise. The study area is not near an aggregation area, so southern right whales are unlikely to be present during construction of the KI Seaport.				
	Operations										
40	Wharf operations	Presence of wharf, timber stockpiles and ships in Smith Bay	Lowering the visual amenity of Smith Bay	Minor	Possible	Medium	The proposed KI Seaport would extend the existing relatively disturbed, industrial-like character of that part of Smith Bay. The reduction in landscape quality for the study area and Smith Bay is not considered significant. However, the changes to visual amenity would be noticeable and are considered significant for the local neighbours and distant residents who are on elevated land with views to Smith Bay.	Mitigation measures which target design features and finishes, incorporate sympathetic design of elevated areas and use vegetation plantings to integrate the facility into the existing environment as much as is possible and practicable, would help soften and minimise visual impacts.	Minor	Unlikely	Low

Table 1-1: Updated risk assessment – Items 8, 11 and 40 (updating Appendix T of the Draft EIS)

Reference	Activity	Hazard (Environmental aspect)	Potential (pre-EIS) impact	Consequence	Likelihood	Inherent (or potential) risk level	EIS findings	Management measures	Consequence	Likelihood	Residual (or remaining) risk level
40							The design change could be considered an improvement to the overall visual amenity impact that the KI Seaport is expected to bring to Smith Bay as a result of the jetty and pontoon infrastructure becoming less conspicuous in the coastal environment than that of a rock armoured causeway closer to the shore.				

Key to overall risk

0 – Low	> Low risks will be maintained under review but it is expected that existing controls will be sufficient and no further action will be required to treat them unless they become more severe.
5 – Medium	> Medium risks can be expected to form part of routine operations but they will be explicitly assigned to relevant managers for action, maintained under review and reported upon at senior management level.
10 – High	> High risks demand attention at the most senior management level to ensure that they are mitigated and controlled as rapidly as possible. They are reported on at the executive level.
17 – Extreme	> Extreme risks demand urgent attention at the most senior (including executive) level and must be immediately controlled. Operations must cease if the risk cannot be controlled.

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