Cockatoo Island Multi Use Supply Base

Operational Environmental Management Plan (OEMP)

Kimberley Technology Solutions Pty Ltd

8 October 2024

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Abbreviations

Abbreviation	Definition
BCH	Benthic Communities and Habitats
BWMC	Ballast Water Management Certificate
BWMP	Ballast Water Management Plan
BWMS	Ballast Water Management System
DAFF	Department of Agriculture, Fisheries and Forestry
DCCEEW	Department of Climate Change, Energy, Environment and Water
DAWE	Department of Agriculture, Water and the Environment
DotE	Department of the Environment
EPA	Environmental Protection Authority
EPBC	Environment Protection and Biodiversity Conservation
EQC	Environmental Quality Criteria
EQG	Environmental Quality Guideline
EQMF	Environmental Quality Management Framework
EQP	Environmental Quality Objective
EQS	Environmental Quality Standard
EV	Environmental Value
g	Gram
ha	Hectare
HEPA	High Ecological Protection Area
HPU	Hydraulic Power Systems
IMS	Invasive Marine Species
IWOCS	Intervention Workover Control Systems
km	Kilometre
kV	Kilo Volt
KTS	Kimberley Technology Solutions
LCTV	Large Crew Transfer Vessel
LEP	Level of Ecological Protection
LEPA	Low Ecological Protection Area
m	metre
MARPOL	International Convention for the Prevention of Pollution from Ships
MARS	Maritime Arrivals Reporting System
MCP	Master Control Panels
MEPA	Moderate Ecological Protection Area
MEQ	Marine Environmental Quality
MEQMP	Marine Environmental Quality Monitoring Plan
MNES	Matters of National Environmental Significance
nm	Nautical Mile
OEMP	Operational Environmental Management Plan

Abbreviation	Definition
TSSC	Threatened Species Scientific Committee
WA	Western Australia

Executive Summary

<table>
<tr><td>Proposal name</td><td>Cockatoo Island Multi Use Supply Base</td></tr>
<tr><td>Proponent name</td><td>Kimberley Technology Solutions Pty Ltd (KTS)</td></tr>
<tr><td>Ministerial Statement number</td><td>N/A</td></tr>
<tr><td>Purpose of the EMP</td><td>This Operational Environmental Management Plan (OEMP) is submitted in support of KTS’s application to construct and operate the Cockatoo Island Multi Use Supply Base under the provisions of Section 38 of the Environmental Protection Act 1986. The OEMP has been developed according to the EPA’s objective-based provisions described in EPA (2021). It describes the management procedures and overarching strategies that will be implemented during the operational phase to prevent and/or minimise impacts to the EPA’s key environmental factors.</td></tr>
<tr><td>Key environmental factor/s, outcome/s and/or objectives</td><td>
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<tr><th>Key Environmental Factor</th><th>Environmental Objective</th></tr>
<tr><td>Marine Environmental Quality</td><td>To maintain the quality of water, sediment and biota so that environmental values are protected</td></tr>
<tr><td>Benthic Communities and Habitats</td><td>To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained</td></tr>
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<tr><td>Flora and Vegetation</td><td>To protect flora and vegetation so that biological diversity and ecological integrity are maintained.</td></tr>
<tr><td>Terrestrial Fauna</td><td>To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.</td></tr>
<tr><td>Terrestrial environmental quality</td><td>To maintain the quality of land and soils so that environmental values are protected.</td></tr>
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<tr><td>Condition clauses (if applicable)</td><td>N/A</td></tr>
<tr><td>Proposed construction date</td><td>January 2025</td></tr>
<tr><td>EMP required pre-construction?</td><td>Yes</td></tr>
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1. Context, scope and rationale

1.1 Proposal

1.1.1 Project description

Kimberley Technology Solutions Pty Ltd (KTS) proposes to construct and operate the Cockatoo Island Multi-User Supply Base (the Proposal) (Figure 1.1). The purpose of this supply base is to establish a multi-user supply chain and logistics hub comprising of an upgraded airfield, a wharf and an aftermarket subsea workshop as well as other related support infrastructure.

The Cockatoo Island Multi-User Supply Base would support the exploration, development and operation of oil and gas projects in the Browse Basin. It will also increase opportunities for other strategic industries such as Defence and Tourism in north-western Australia and may reduce the operating costs of mining on Cockatoo Island.

The Proposal complements services provided by mainland hubs, offering a closer multi-user supply base to the northern parts of Australia and the Indo-Pacific region. This distinctive service, combining all-tide access marine facilities with aerodrome operations, will be unparalleled in the region. The new facility is expected to attract business and trade to the broader Kimberley region, facilitating cost-effective logistics solutions and will be supported by mainland ports and airports of Broome and Derby to access the island.

1.1.2 On-shore developments

Cockatoo Island onshore developments will primarily consist of an expanded and upgraded airstrip for fixed wing aircraft and helicopters, airfield support facilities and site roads.

1.1.2.1 Airfield, laydown and roads

Airfield

The revised airfield, apron and support infrastructure footprint has been reduced to 7.37 ha (a reduction of 42.5 ha from the original proposed footprint). The revised design follows the alignment of the existing airstrip, incorporating an apron to the north of the airstrip, and utilises existing support infrastructure.

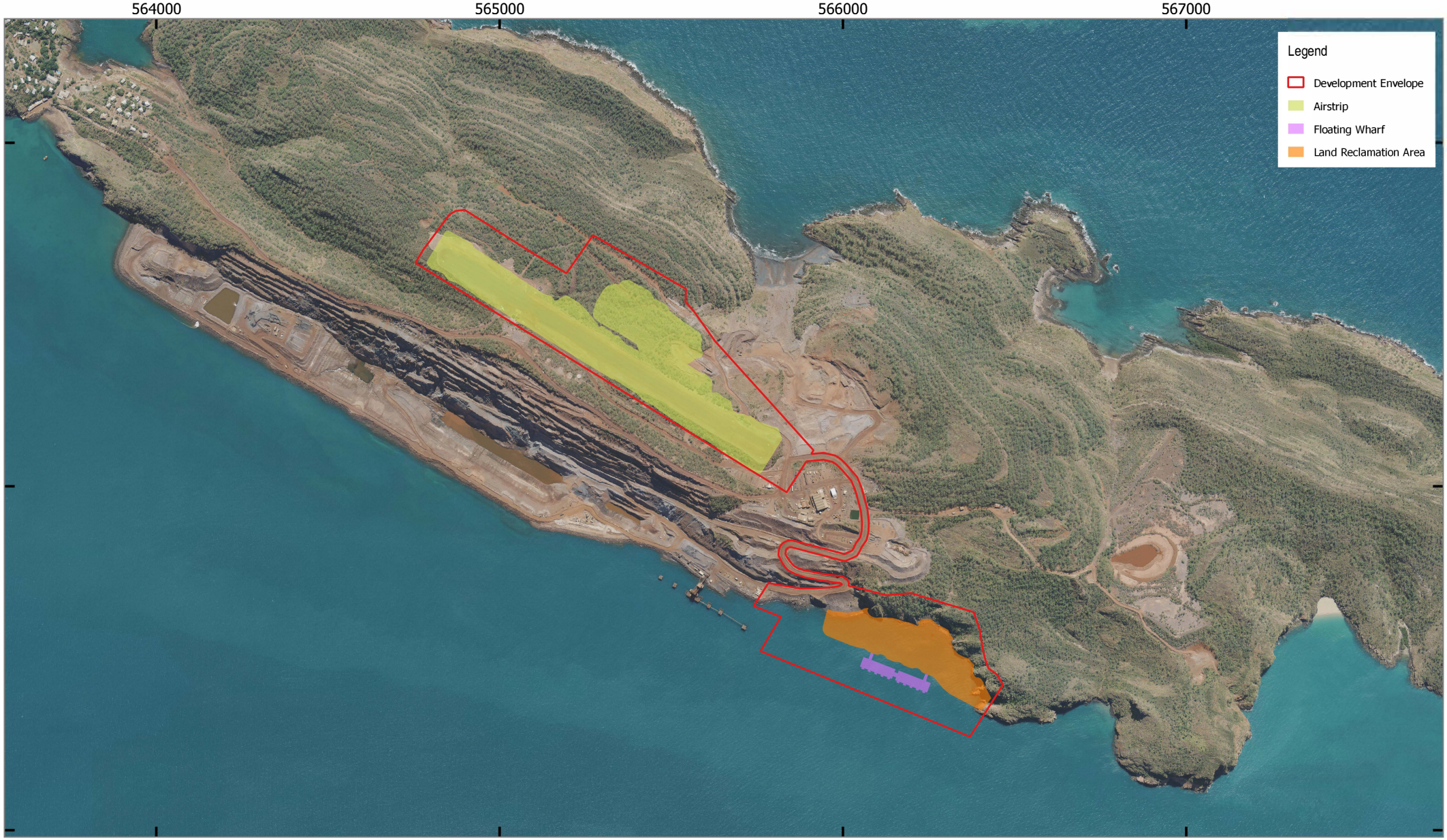
The design follows the alignment of the existing airstrip which reduces the disturbance footprint, makes use of existing mined waste material, uses locally mined rock and where possible, will make use of a locally based mining fleet and support system to reduce mobilisation/demobilisation.

Drainage from the airfield will be directed to table drains for infiltration on site. These will be designed and constructed to capture and infiltrate surface water runoff for a 1 in 100 ARI, preventing the mobilisation of contaminants.

Terminal and hangars

An aviation terminal will be constructed adjacent to the runway and the proposed structure will be approximately 50 m x 25 m.

The helipad will be designed to accommodate a 3-bay hangar.



Paper Size ISO A4

0 100 200 300 400

Metres

Map Projection: Mercator Auxillary Sphere
Horizontal Datum: GDA 1994
Grid: MGA Zone 51

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GHD

Kimberley Technology Solutions

Cockatoo Island Multi-User Supply Base

Layout of Proposal Elements

Project No. **12526793**
Revision No. **A**
Date. **30/11/2023**

FIGURE 1-1

Document Path:
Print Date: 30 November 2023

Data Source:WANow
Created By: Tristan Sleigh

Fuel storage

Jet A1 refuelling for helicopters will be undertaken. All fuel will be stored above-ground in self-bunded fuel tanks within an area adjacent to the helipad. Fuel will be transported to the island by barge in articulated trailer tanks that will be decanted and returned to the mainland for filling. The total capacity of the stored fuel will not exceed 100,000 L of Jet A1 (five pods). Filling of helicopters will be done by a dedicated fuel delivery system that will draw fuel from the pods.

Diesel for generators and mobile plant will be stored in a dedicated bunded area. Diesel will arrive by barge in drums, articulated trailer tanks or a fuel barge and will be transferred to the storage area for distribution when required.

Fuel storage areas will have appropriate spill response equipment.

Utilities

The proposed location of the apron and terminal are close to the existing Island bores. This supply will service the ablution facilities and will be filtered to provide potable water.

Sewage will be treated in a contained septic tank system.

Power will be provided to the terminal by a dedicated diesel genset (between 150 kV and 500 kV) with backup. Solar renewable energy power generation will likely form part of the power supply system.

Laydown and roads

Some land adjacent to the airfield and the wharf (Figure 1.1) will be used for:

– Laydown (overflow from the wharf) of pipe, umbilical reels, containers of spares and parts, drilling equipment and bulk materials
– Construction support
– Offices
– Workshop and warehousing.

Construction support will comprise a demountable site office and less than 20 accommodation units. These will be relocated or dismantled when not required. It is intended to make use of the permanent accommodation on the island for staff and occasional visitors.

Additional offices, warehouses and workshops will be developed in the future if demand exceeds available space at the wharf.

A road will link the airfield to the wharf (Figure 1.1). This makes use of an existing haul road to the mining tenement. A short extension, not shown on the figure, will be required to connect this haul road to the wharf.

1.1.2.2 Construction

Construction will disturb up to approximately 7.37 ha of land (Figure 1.1).

Clearing for the airfield and laydown areas will be undertaken by bulldozer, grader or similar. Cleared vegetation will be respread on areas being rehabilitated including those associated with the mine.

The geology of the area to be levelled indicates that bands of hard rock are present. Where rock excavation is required, ripping with a bulldozer and/or drill and blast will be the method used and loose rock will be moved by excavator and truck to areas requiring fill.

The airfield will be sealed with bitumen and a temporary bitumen plant will be mobilised.

Construction materials for buildings will be barged to the Island, offloaded and erected on-site.

Putrescible wastes will be disposed at the existing licensed landfill on the Island. There is also an existing metal dump for disposal of metal waste. Waste hydrocarbons will be removed from the Island for reprocessing. Wastes that cannot be disposed onsite will be transferred to the mainland by barge for disposal.

1.1.2.3 Operations

With a single client, air traffic will consist of five Regional Jets and eight to ten helicopter cycles (take-off and landing) per week. Where multiple clients use the facility, these numbers may increase. Typically, fixed wing aircraft will only operate during daylight hours with helicopters operating both day and night. There may be instances where fixed wing aircraft will use the facility at night such as emergency landing, but this is not expected to occur often.

Waste materials during operations will be disposed in a similar manner to construction wastes.

1.1.3 Marine developments

The bay to the east of the existing ship loader has a suitable profile for development of a wharf. The bay comprises a beach/mudflat at low tide with a drop off to between 10 and 20 m at Lowest Astronomical Tide. The port will be operated under a license issued by the Kimberley Ports Authority.

Wharf

The wharf will consist of a Roll On Roll Off (RORO) ramp to permit barge loading and unloading operations and has the capacity to cater for up to four floating wharf modules, each approximately 30m x 100m in plan that have a minimum freeboard of 2.5m and to the east, a subsea workshop.

The RORO ramp will form part of the infilled revetment and the wharf modules will be linked to the land via structural access trestles. The wharf furniture consists of bollards, floating fenders chained to the wharf berthing face, and safety ladders. Dolphins and mooring buoys may also be required to support safe mooring of vessels.

This design will allow for access at all stages of the tide, reduce the footprint on the seabed and reduce cost of construction (refer to Figure 1.2 that illustrates the location of two of the three wharfs).

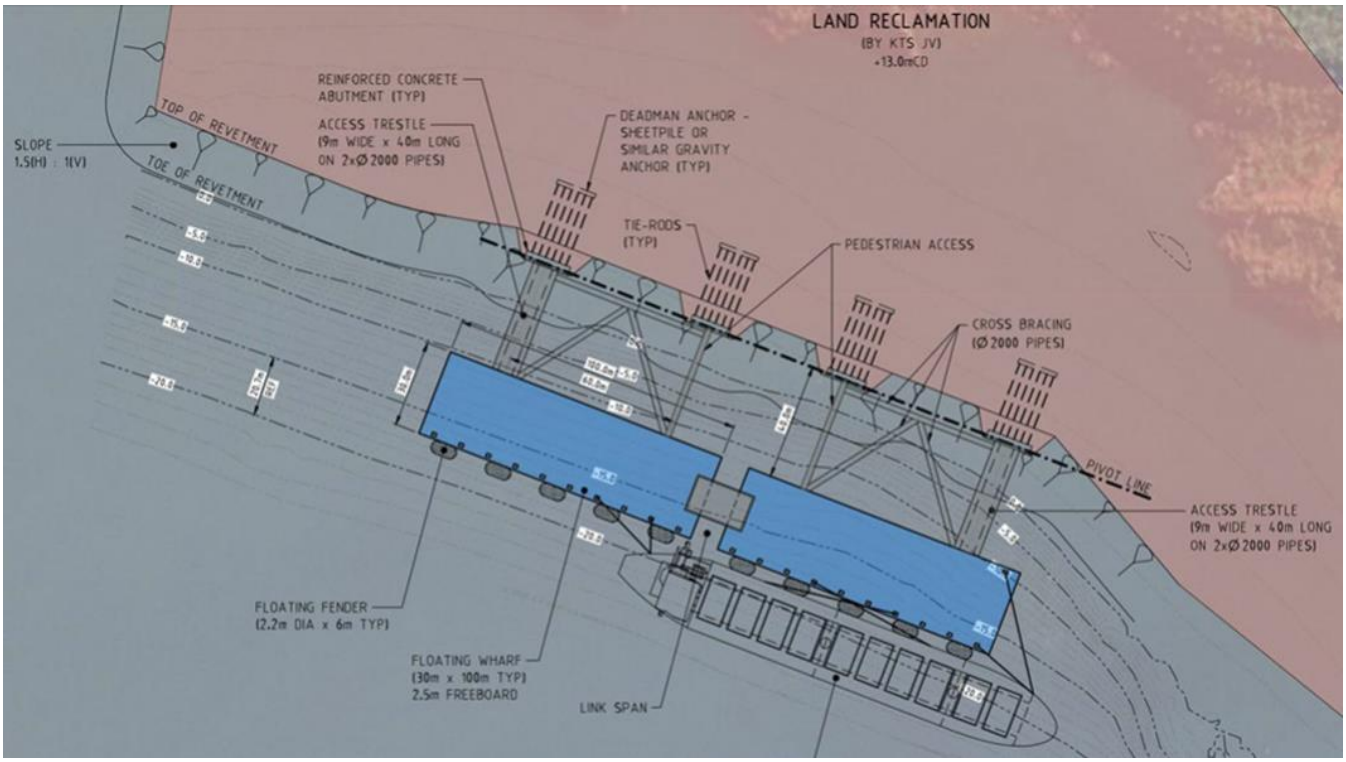


Figure 1.2 Schematic of proposed wharf

The access road to the wharf is shown in Figure 1.1.

The facility will provide fuel, water and cargo services to marine vessels, as well as facilitate crew change and waste disposal and includes the following facilities and equipment:

– Tanks – approximately 1 ML of marine gas oil in self-bunded tanks and approximately 0.5 ML of potable and/or drilling water. Final location will be subject to detailed design
– Warehouse – approximately 100 m x 40 m (Cyclone rated)
– Diesel and hydraulic fluids in drums within bunded and covered areas
– Laydown areas – demarcated on the wharf for pipe, umbilical reels, containers of spares and parts, drilling equipment and bulk materials
– Lighting to allow for night works
– Mobile Cranes – 80 t
– Generators, one operating and one on standby (between 150 kV and 500 kV)
– Contained grey and blackwater treatment plant.

Subsea workshop

The workshop will provide subsea aftermarket support such as:

– Receiving subsea components (trees)
– Systems Integration Testing (SIT)
– Factory Acceptance Testing (FAT)
– Control System servicing and testing and repair
– Storage of control modules such as Intervention Workover Control Systems (IWOCS), Master Control Panels (MCP) and Hydraulic Power Systems (HPU)
– Storage of tools and parts.

The workshop will be approximately 96 m x 50 m, of steel and Colourbond construction, and cyclone rated (Figure 1.3).

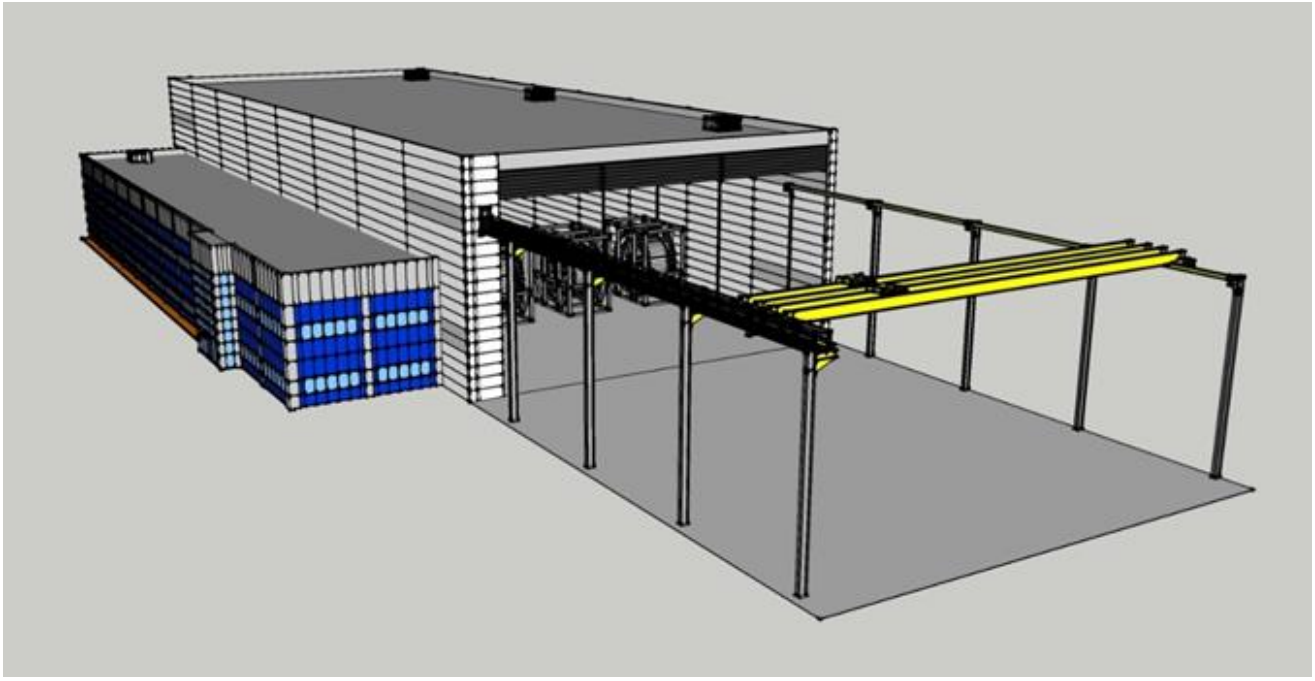


Figure 1.3 Schematic of proposed subsea workshop

The workshop will be integrated with a gantry crane that can access the quayside. The workshop portion will contain a test pit that can be flooded and discharged. The test pit will service equipment designed to operate on the seabed so there is minimal risk of water contamination within the pit and the discharge water. The test pit is isolated from the surrounding seawater.

Power will be supplied by 2 x 500 kV gensets, one active and one on standby.

Sewage will be collected in tanks and transferred to the septic tank system at the airstrip for disposal.

1.1.3.1 Construction

When the wharf is developed to its full extent, it has a land reclamation area of approximately 5.8Ha and will require approximately 700,000 m^3 of fill to raise the level of the platform to approximately 3m above high tide. The RORO ramp will be constructed to form part of the infilled revetment.

The topography of the seabed together with the tides experienced at Cockatoo favour the development of a deadman anchor or similar gravity anchor system that ties a floating wharf to the shore (refer to Figure 1.2). A steel bracing structure links the shore to the anchor system that also provides pedestrian and vehicle access from land to the wharf.

No dredging will be required.

A heavy lift crane will likely be mobilised to connect the floating wharf to the infilled revetment.

The floating wharves, structural steelwork and other construction materials for buildings, facilities and infrastructure will be barged to the Island, offloaded and erected on-site. Putrescible wastes will be disposed at the existing licenced landfill on the Island. There is also an existing metal dump for disposal of metal waste. Waste hydrocarbons will be removed from the island for reprocessing. Wastes that cannot be disposed onsite will be transferred to the mainland by barge for disposal.

1.1.3.2 Operations

Activity at the wharf will be dependent on client activity such as oil and gas operator drilling and construction campaigns, defence operations and therefore traffic will vary as a result. A single wharf has been designed to cater for 5-10 Platform Supply Vessels (PSV) (or similar) calls per week, two Large Carrier Tank (LCT) calls per week and one to two other industry calls per month (defence and tourism). Where multiple clients use the facility, these numbers may increase.

Operations will occur 24/7 as required.

Waste materials during operations will be disposed in a similar manner to construction waste.

1.2 Key Environmental Factors

The EPA's key environmental factors are listed in 'Statement of Environmental Principles, Factors and Objectives' (EPA 2021b). The factors and associated environmental objectives relevant to this OEMP are summarised in Table 1.1.

Table 1.1 EPA Environmental Factors and Objectives

EPA Theme	EPA Facto	Environmental Objective
Sea	Marine Environmental Quality	To maintain the quality of water, sediment and biota so that environmental values are protected
	Benthic Communities and Habitats	To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained
	Marine Fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained
Land	Flora and Vegetation	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.
	Terrestrial Fauna	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.
	Terrestrial environmental quality	To maintain the quality of land and soils so that environmental values are protected.

1.3 Condition Requirements

This OEMP is submitted in support of an application to construct and operate the proposal pursuant to the provisions of Section 38 of the Environmental Protection Act 1986.

1.4 Rationale and approach

1.4.1 Objective-based management framework

Objective-based provisions are used when outcome-based measures, comprising of triggers and thresholds are not practicable, but where management actions are still required to ensure the EPA's key environmental factors are protected. Objective-based EMPs are not prescriptive about management practices, allowing opportunities for proponents to be pragmatic and innovative about how to achieve environmental outcomes.

1.5 Rationale for choice of indicators and/or management actions

This objective-based OEMP was prepared according to the EPA's (2021a) Instructions for preparing Environmental Protection Act (1986) Part IV Environmental Management Plans (EMP). As an objective-based EMP, it includes a set of management targets, management actions, and monitoring and reporting requirements, which together form a holistic approach to protecting the marine and terrestrial environment during the operation phase. It provides high-level details of the types of monitoring and reporting that that will be implemented at the commencement of the operation phase.

2. Environmental management plan provisions

This OEMP will be utilised for the management of environmental commitments for the Proposal during operation. Communication during operation will occur on a daily, weekly and/or as-needed basis with relevant staff, project managers or external stakeholders.

2.1 Marine environmental quality

2.1.1 EPA objective

To maintain the quality of water, sediment and biota so that environmental values are protected.

2.1.2 Proposal specific objectives

To ensure that impacts to marine environmental quality (MEQ) are avoided and minimised as far as practicable during the operation of the Proposal.

2.1.3 Key environmental values

Large tidal variations and physical setting generates high currents (GHD, 2021), which combined with lack of mining and/or other anthropogenic contaminant generating activities likely maintains high water and sediment quality, thereby MEQ is of high standard.

2.1.4 Key impacts and risks

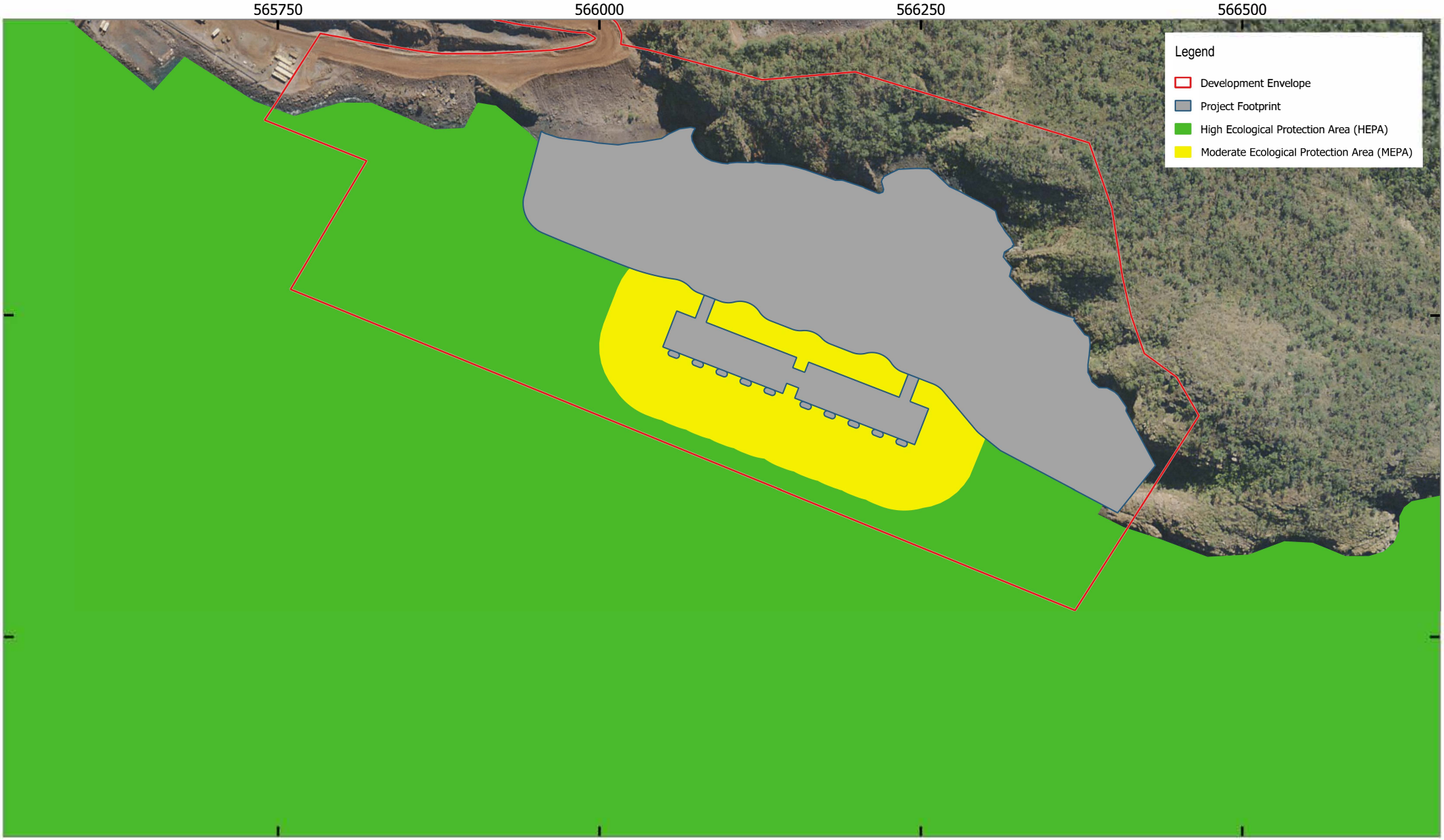
The future presence of the reclamation of the intertidal flat of Bay 1 has the potential to alter hydrodynamics and flushing, thereby potentially degrading MEQ in terms of water and sediment quality. GHD (2021) simulations predict the reclamation will have minimal impact on the hydrodynamics.

Potential impacts to MEQ during operations may occur. A number of solid and liquid wastes will be generated during operations on the wharf and visiting vessels, and hazardous materials will be stored on the wharf. These include marine gas oil, sewage, bilge waters, cooling waters, deck drainage, food wastes, lubricating oils, hydraulic oils and cleaning fluids. If released into the marine environment, hazardous and non-hazardous wastes and discharges could cause localised toxicity effects and reduction in MEQ. Control measures will be in place to reduce the likelihood and severity of unplanned releases of these materials to the marine environment from the wharf facility or operational vessels.

2.1.5 Management provisions

Table 2.1 outlines management provisions for the identified potential impacts and risks to MEQ.

Spatial delineation of operational zones of moderate (MEPA) and high (HEPA) ecological protection areas are based on a MEPA extent that incorporates the floating wharf with a buffer of 50 m with the HEPA outside of the extent. No low ecological protection area (LEPA) is established because no planned discharges are part of the proposal. The spatial representation of the MEPA and HEPA are illustrated in Figure 2.1. MEQ Environmental Quality Criteria (EQC) to be met for water and sediments are provided in the Marine Environmental Quality Monitoring Plan (MEQMP) in Appendix A.



Paper Size ISO A4

0 25 50 75 100

Metres

Map Projection: Mercator Auxillary Sphere
Horizontal Datum: GDA 1994
Grid: MGA Zone 51

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Kimberley Technology Solutions
Cockatoo Island Multi-User Supply Base

Ecological Protection Areas

Project No. **12526793**
Revision No. **A**
Date. **25/09/2024**

FIGURE 2-1

Document Path:
Print Date: 25 September 2024

Data Source:WANow
Created By: Tristan Sleigh

Table 2.1 Management provisions for MEQ

Management targets	Management actions	Monitoring	Timing/ frequency	Reporting
No unacceptable impacts to water and sediment quality in the MEPA and HEPA during operations	Water and sediment quality monitoring of MEPA and HEPA as per MEQMP where: – If guideline values exceeded ascertain cause (i.e. natural, operational activity) – If operational activity cause then notify DWER (reportable incident) and agree on management action(s)	Water and sediment quality monitoring at MEPA, HEPA and reference sites as per MEQMP)	Water and sediment quality monitoring at MEPA, HEPA and reference sites as per MEQMP) where: – Semi-annual WQ monitoring during the wet (Jan.) and dry (Jul.) seasons – Sediment quality monitoring every 2nd year	– Proponent to provide MEQMP Sampling and Analysis Plan (SAP) as Appendix in OEMP on basis of EPA (2017) with modifications for health and safety site requirements and submit for DWER approval at least 4 months prior to marine construction activities. – Annual Operational Report submitted to DWER for the previous year by 1 April that summarises water and/or sediment quality monitoring and management (if any) – If Environmental Quality Standard non-compliance notify DWER within 1 month of identification
No unplanned releases of solid or liquid wastes to the marine environment from construction vessels	– Follow relevant Australian and international regulations, including MARPOL Marine Orders and Sewage Prevention Pollution Certificate. – All hazardous materials will be stored with secondary containment, with continuous bunding or drip trays around machinery or equipment with the potential to leak hazardous materials – Operational vessels will have current MARPOL-compliant Shipboard Oil Pollution Emergency Plan (SOPEP) and Shipboard Marine Pollution Emergency Plan (SMPEP – for noxious liquids) – Have Planned Maintenance System for equipment and machinery to avoid any unplanned discharges to the marine environment – No discharge of untreated sewage or unmacerated food wastes – Where possible, non-toxic chemicals will be used – Store all wastes on-board and transfer to the mainland for disposal at a licensed facility as per the construction vessel's Waste Management Plan – Have waste containers (bins etc.) for waste containment that are clearly marked and suitably covered to prevent material being blown overboard – Implement procedures to maintain clean and tidy work areas, including the safe storage of all potentially hazardous substances. – Vessel crew have access to and training in use of hydrocarbon spill kits.	– Inspection of waste containers and hazardous material storage tanks on the vessels – In the event of a spill, the contractor and/or proponent shall document the spatial extent of the hydrocarbon spill using visual cues and GPS.	– Ensure operational vessels have SOPEP and SMPEP – Sub-daily tracking of slick in the event of a spill	– In the event of a spill to the marine environment from the vessel, the contractor shall submit a Spill Incident Report to DWER documenting the spatial extent of the spill, and the outcomes of the management response within 1 month of the incident. – Annual Operational Report submitted to DWER for the previous year by 1 April that summarises unplanned liquid/solids releases from operational vessels and management measures/corrective actions
No unplanned releases of solid or liquid wastes to the marine environment from construction activities on land (i.e. wharf footprint)	– Spill Contingency Plan (SCP) that documents responses / management actions from the wharf in the event of a spill to the marine environment – Waste containers on the wharf (bins etc.) will be clearly marked and suitably covered to prevent material being blown into the marine environment. – Wastes will be appropriately disposed of on the Island or transferred to the mainland for disposal at a licenced facility – Hazardous materials stored on the wharf (e.g. marine gas oil, diesel, hydraulic fluids etc.) will be stored in self bunded tanks or in drums within bunded and covered areas. – Putrescible wastes will be disposed to the current licenced landfill – Waste hydrocarbons will be removed from the Island for reprocessing. – Wastes that cannot be disposed onsite will be transferred to the mainland by barge for disposal.	– Inspection of waste containers and hazardous material storage tanks on the wharf – In the event of a spill, the proponent shall document the spatial extent of the hydrocarbon spill using visual cues and GPS.	– Weekly inspections of wharf control measures to prevent spills to marine environment – Sub-daily tracking of slick in the event of a spill	– In the event of a spill to the marine environment from the wharf, the proponent shall submit a Spill Incident Report to DWER documenting the spatial extent of the spill, and the outcomes of the management response within 1 month of the incident. – Proponent to update construction SCP for operational activities. Updated operations SCP to be submitted to DWER at least 4 months prior to the onset of marine operational activities – Annual Operational Report submitted to DWER for the previous year by 1 April that summarises unplanned liquid/solids releases from the wharf and management measures/corrective actions

2.2 Benthic communities and habitats

2.2.1 EPA objective

To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained.

2.2.2 Proposal specific objectives

To ensure that impacts to benthic communities and habitats (BCH) are avoided and minimised as far as practicable during the operation of the Proposal.

2.2.3 Key environmental values

Direct impacts include approximately 5.75 ha of benthic habitat comprising:

– 5.21 ha of bare rock, sand and pebbles
– 0.54 ha of area with hard coral and algae

No significant benthic communities or habitats identified within the development area.

Quality of BCH determined to be low within the development area, with more valuable habitats occurring in the two adjacent bays to the east (GHD, 2017) and along the drop-off between the intertidal and subtidal zones.

2.2.4 Key impacts and risks

Potential impacts to BCH during operations may occur. The floating pontoon and any moored vessels at the pontoon will reduce light reaching the seabed beneath. Any photosynthetic benthic communities such as hard coral or algae may be affected by the reduced light climate.

No anchoring of vessels within the Development Envelope during operations is anticipated as vessels will moor alongside the floating wharf. If wharf at capacity, moorings will be available for operational vessels to prevent anchoring and BCH impacts.

Liquid (chemical/hydrocarbon) and solid releases/spills may lead to contamination events to the marine environment with reduced water and/or sediment quality that may impact BCH. Monitoring and management of hydrocarbon/chemical releases/spills are addressed for KEF MEQ in Sectio 2.1.

Operational vessels may carry IMS in ballast tanks, biofouling on the hull and internal systems, and in sediments collected around marine equipment. A successful translocation of an invasive marine species (IMS) could potentially out-compete/displace the existing BCH. Monitoring and management IMS is addressed for KEF Marine Fauna in Section 2.3.

The effects of the warming climate on water temperatures are increasing the frequency and severity of coral bleaching events that may mask any small effect the wharf may have on BCH. It is therefore essential that continuous water temperature measurements are carried out to understand the cause of any potential BCH trends (e.g. climate change, project effect, IMP colonisation).

2.2.5 Management provisions

Table 2.1 outlines management provisions for the identified potential impacts and risks to BCH.

Table 2.2 Management provisions for BCH

Management targets	Management actions	Monitoring	Timing/ frequency	Reporting
During operations no irreversible impacts to BCH in the two bays to the east of the proposal and along the drop-off between the intertidal and subtidal zones	Track hard coral and macroalgae cover in the two bays to the east of the reclamation area and along the drop-off between the intertidal and sub-tidal zones biennially during operations where: – If substantive decrease in cover ascertain cause (e.g. bleaching, heat stress, cyclone) – If natural cause then report in annual report (recordable incident) – If caused by operations (e.g. contamination) then notify DWER (reportable incident) and agree on management action	– BCH surveys of operations to track changes in hard coral and macroalgae cover relative to previous surveys – Continuous measurements of seawater temperatures	– BCH survey every 2nd year during operations – Continuous measurements of seawater temperatures	– Proponent to provide BCH operational monitoring methodology to be aligned with GHD (2017) and pre-/post-construction surveys as an Appendix in OEMP and submit for DWER approval at least 4 months prior to marine operational activities. – Annual Operational Report submitted to DWER for the previous year by 1 April that summaries BCH monitoring (if any) – Reportable incident of project-related BCH impacts submitted to DWER within 1 month of identification
No BCH impacts from anchoring	– Installation of permanent moorings for operational vessels to be used when wharf at capacity	– Records of mooring use	– Installation prior to operations (alternatively re-purpose construction vessel moorings)	– Annual Operational Report submitted to DWER for the previous year by 1 April that summaries operational vessel mooring use

2.3 Marine fauna

2.3.1 EPA objective

To protect marine fauna so that biological diversity and ecological integrity are maintained.

2.3.2 Proposal specific objectives

To ensure that impacts to significant marine fauna are avoided and minimised as far as practicable during the operation of the Proposal.

2.3.3 Key environmental values

– There are no known turtle nesting beaches on the island.
– There are no known critical habitats for any conservation significant marine fauna within the bay.
– Seven EPBC Act listed threatened marine species were determined as likely or possible to occur within the Proposal area based on the presence of suitable habitat and nearby records (GHD, 2017) including:
    - Northern Rver Shark (*Glyphis garricki)* – Endangered
    - Largetooth Sawfish (*Pristis pristis*) - Vulnerable
    - Green Sawfish (*Pristis zijsron*) – Vulnerable
    - Green Turtle (*Chelonia mydas*) – Vulnerable
    - Flatback Turtle (*Natator depressu*s) – Vulnerable
    - Hawksbill Turtle (*Eretmochelys imbricata*) – Vulnerable
    - Olive Ridley Turtle (*Lepidochelys olivacea*)
– Six EPBC Act listed migratory marine species determined as likely or possible to occur within the Proposal area including:
    - Australian Humpback dolphin (*Sousa sahulensis*)
    - Spotted bottlenose dolphin (*Tursiops aduncus*)
    - Saltwater crocodile (*Crocodylus porosus*)
    - Narrow Sawfish (*Anoxypristis cuspida*ta)
    - Reef Manta Ray (*Manta alfredii*)
    - Giant Manta Ray (*Manta birostris*)

2.3.4 Key impacts and risks

– A number of solid and liquid wastes will be generated during operations on the wharf and visiting vessels, and hazardous materials will be stored on the wharf. These include marine gas oil, sewage, bilge waters, cooling waters, deck drainage, food wastes, lubricating oils, hydraulic oils and cleaning fluids. If released into the marine environment, hazardous and non-hazardous wastes and discharges could affect marine fauna through direct toxicity, ingestion or entanglement. Note monitoring and management of hazardous/non-hazardous materials addressed for KEF MEQ in Section 2.1.
– Operations could occur 24 hours a day and navigational and safety lighting will be required that may affect marine fauna behaviour. Continuous lighting in the same location for an extended period may result in alterations to normal marine fauna behaviour.
– Vessel movements have the potential to cause behavioural effects (e.g. changes in surfacing patterns, swimming speed, duration underwater) to injury (e.g. propeller lacerations) or mortality (e.g. vessel strike) to marine fauna. During operations, underwater noise may be generated by the vessel operations and workshop activities. Underwater noise may impact marine fauna by:
    - Causing behavioural changes including displacement from biologically important habitat areas (such as feeding, resting, breeding, calving and nursery sites)

- Masking or interference with other biologically important sounds such as communication or echolocation systems used by certain cetaceans for navigation and location of prey
- Causing physical injury to hearing and other internal organs
- Indirectly impacting predator or prey species.

– Construction vessels can potentially introduce invasive marine species (IMS) that may impact the local marine fauna.

2.3.5 Management provisions

Table 2.3 outlines management provisions for the identified potential impacts and risk to marine fauna. Specifically it addresses impacts from underwater noise emissions and vessel strikes on marine fauna, and introduction of IMS from operational vessels.

Table 2.3 Management provisions for marine fauna

Management targets	Management actions	Monitoring	Timing/ frequency	Reporting
No incidences of marine fauna injury or death from vessel strike during operations.	– Compliance with EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with Cetaceans. – Within Caution Zone, vessels will not drift or approach closer than 100 m for a whale, 50 m for a dolphin known to be in the area – Vessels will not change course or speed suddenly and must move at a constant slow speed away from a whale if it approaches the vessel or comes within 150 m, 50 m for a dolphin. – All vessels must travel at less than 6 knots and minimise noise within the caution zone of a cetacean (150 m radius for dolphins, 300 m for whales) known to be in the area – Environmental awareness induction will be provided to vessel crew that include marine fauna interaction requirements.	– Compliance throughout operations.	– Continuous during vessel movements	– Maintain accurate recording and log sheets for marine fauna spotting or interactions. – Annual Operational Report submitted to DWER for the previous year by 1 April that summaries marine fauna observations and interactions during previous year's operations
Minimise direct light spill into marine environment	– Lighting will be designed in accordance with AS 4282-1997: Control of Obtrusive Effects of Outdoor Lighting Guidelines, as described in the Wharf Lighting Plan (Appendix B). – Lighting will be used only for required operational areas, all light sources will be aimed towards specific work areas requiring light for safe operation, with a low vertical angle, and light shields will be placed on large equipment to minimise light spill over. – Where possible, lighting will be the minimum wattage, whilst not compromising safety or OH&S requirements	– Review of lighting on completion of installation	– Start of operations assessment	– Post-construction report submitted to DWER within 4 months of completion of marine construction activities with evaluation of as-built wharf lighting with the Wharf Lighting Plan (Appendix B)
No introduction and/ or spread of IMS during operations	– IMS surveys during operations every 2nd year – IMS risk reduction documentation for operational vessels: • Use of local operational vessels to reduce the likelihood of translocating IMS from high risk geographical areas. • Ensure that operational vessels regularly carry out best-practice cleaning and inspections. • All vessels maintain a current anti-fouling coating that complies with requirements of Annex 1 of the International Convention on the Control of Harmful Anti-fouling Systems on Ships (2001), the requirements of the Protection of the Sea (Harmful Antifouling Systems) Act 2006, and Marine Order 98 (Marine pollution – antifouling systems) 2013. • Vessels arriving from international locations must demonstrate compliance with the Department of Agriculture, Fisheries and Forestry (DAFF) Australian Biofouling Management Requirements (version 2, 2023) through the Maritime and Aircraft Reporting System (MARS) at least 12 hours but no earlier than 96 hours if the wharf is the first port of arrival in Australian territory. • Vessels arriving from international locations will obtain clearance from DAFF by submitting a Ballast Water Report through MARS. • Vessels will have Ballast Water Management Plan (BWMP) and Ballast Water Management Certificate (BWMC). • Vessels will maintain and complete records of all ballast water management in compliance with Regulation B-2 of the Annex to the Ballast Water Convention. • Vessels will manage ballast water exchange following approved methods of the Australian Ballast Water Management Requirements (DAWE, 2020). • An approved Ballast Water Management System (BWMS). • Use of low risk ballast water, defined as: – Fresh potable water – Water taken up on the high seas (>12 nm from any land mass and >50 m deep) – Water taken up and discharged in the same place. – Retention of high-risk ballast water; or – Discharge in an approved ballast water reception facility.	– IMS operational surveys – IMS risk reduction documentation monitoring: • Procurement/ contractual documents indicate local operational vessels (e.g. supplies, waste, maintenance tasks). • Provision of cleaning/ inspection reports demonstrate regular cleaning regimen. • Audit verifies vessels have a current international Anti-fouling System certificate or a Declaration on Anti-fouling Systems. • If wharf is a vessel's first Australian port of arrival from international waters then confirm DAFF biofouling compliance via MARS • Ballast Water Report. • Audit verifies BWMP and BWMC on vessels. • Ballast Water Record System (electronic or hard copy) • Audit verifies valid BWMS Type Approval certificate available onboard.	– Operational IMS surveys every 2nd year – IMS risk reduction documentation monitoring checked and acceptable prior to construction and/or operations vessels arriving onsite.	– Proponent to provide IMS operational monitoring methodology to be aligned with pre-/post-construction surveys as an Appendix in OEMP and submit for DWER approval at least 4 months prior to marine operational activities. – Maintain accurate documentation and reporting for audits and inspections to display management actions have been complied with as required.

2.4 Flora and vegetation

2.4.1 EPA objective

To protect flora and vegetation so that biological diversity and ecological integrity are maintained.

2.4.2 Proposal specific objectives

To ensure that impacts to significant flora and vegetation are avoided and minimised as far as practicable during the operation of the Proposal.

2.4.3 Key environmental values

– No Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) were identified on the island.

– No flora taxa listed under the EPBC Act or *Wildlife Conservation Act 1986* (WC Act) were identified on the island, however one Priority 1 species, *Triodia* sp., has been identified within the survey area. A total of 1,300 individuals were identified, however they all lie outside the DE.

– One significant flora species, *Flemingia parviflora,* was identified within the survey area but was outside the DE.

2.4.4 Key impacts and risks

– Introduction and/or spread of invasive weed species

– Changes in local hydrology due to alteration of surface water flows

2.4.5 Management provisions

Table 2.4 outlines management provisions for the identified potential impacts and risk to flora and vegetation. Specifically it addresses impacts from increased surface water flow and weed spread.

Table 2.4 Flora and Vegetation Management and Reporting

Management targets	Management actions	Monitoring and Timing	Reporting
Vegetation Clearing			
No increase of surface water flows to native vegetation	– Maintain water management structures that have been constructed to minimise the degradation of water quality by sedimentation, erosion or chemical pollutants	– Inspections of drains to ensure design capacity is maintained – Remove debris or sediment should design capacity be reduced	Monthly (daily during periods of rainfall) Within 24 hrs of inspection
Weed Spread			
The number and extent of weed species does not exceed baseline levels.	– The Proponent will undertake a baseline weed survey of the Proposed clearing area, and within a 100 m buffer prior to construction to determine species presence, extent and cover. – The Proponent will develop a weed management procedure with particular focus on Declared Pests and WoNS following establishment of baseline weed presence, to ensure that weed species' extent and cover do not increase compared to baseline. The procedure will include: • Management of clearing activities, • Frequency and type of weed control (spraying and/or manual removal) and monitoring; • Establishment of reference sites; and • Potential thresholds criterion and contingency measures.	– Weed monitoring will be undertaken two years post-construction following the wet season.	– Annual weed monitoring report. – CAR

2.5 Terrestrial fauna

2.5.1 EPA objective

To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.

2.5.2 Proposal specific objectives

To ensure that impacts to significant terrestrial fauna are avoided and minimised as far as practicable during the construction of the Proposal.

2.5.3 Key environmental values

- A total of 177 fauna species were recorded on the island: five mammals, 13 reptiles, 157 birds and two amphibian species.
- Five conservation significant fauna species were identified on the island.
- Three species listed as Migratory under the EPBC Act and/or under Schedule 5 of the WC Act were recorded within the survey area.
- No recorded species were identified as short range endemic (SRE) fauna, however three likely and 15 potential SRE species were recorded.

2.5.4 Key impacts and risks

- Increased risk of vehicle strike during operations.

2.5.5 Management provisions

Table 2.5 outlines management provisions for the identified potential impacts and risk to terrestrial fauna.

Table 2.5 Terrestrial Fauna Management and Reporting

Management targets	Management actions	Monitoring and Timing	Reporting
Vehicle Movement			
No incidents of conservation significant fauna injury or death.	– All vehicles to adhere to traffic management rules including: • Reduced speed limits on internal roads. • No off-road driving (unless authorised for exploration and land clearing). – Native fauna encounters (including all fauna injuries and deaths) will be recorded.	– Native fauna encounters (including all fauna injuries and deaths) recorded.	– Implement and maintain a Fauna Register (including encounters, injuries and deaths). – CAR

2.6 Terrestrial environmental quality

2.6.1 EPA objective

To maintain the quality of land and soils so that environmental values are protected.

2.6.2 Proposal specific objectives

To ensure that impacts to terrestrial environmental quality are avoided and minimised as far as practicable during operation of the Proposal.

2.6.3 Key environmental values

Soils that support native vegetation which constitute potential habitat for conservation significant fauna species.

2.6.4 Key impacts and risks

– Contamination of soils from operation activities associated with storage of chemicals and potential spills
– Erosion of soils and mobilisation of potential contaminants throughout the Proposal area.

2.6.5 Management provisions

Table 2.6 outlines management provisions for the identified potential impacts and risk to terrestrial environmental quality. Specifically, it addresses impacts from spills and erosion.

Table 2.6 Terrestrial environmental quality monitoring and reporting

Management actions	Management targets	Monitoring/ timing	Reporting
Spills			
No impacts to land, surface water or ground water resulting from chemical storage or use	– All chemicals are to be stored in accordance with relevant Australian standards, including: • AS1940: The Storage and Handling of Flammable and Combustible Liquids – Spill kits are to be readily available at chemical storage locations and during maintenance, refuelling or transfer of chemicals. – All refuelling and servicing of plant, vehicles and equipment is to occur on a bunded area. – All on-site maintenance of plant, equipment and vehicles must be in designated, bunded areas.	The contractor to record all spills and the management of the spill in a register maintained on site Inspect project area daily to ensure correct storage of chemicals and hydrocarbons	Immediately following containment of spills. Daily
Erosion and surface water management			
No erosion of soils or mobilisation of potential contaminants throughout the proposal area.	– Maintain water management structures that have been constructed to minimise the degradation of water quality by sedimentation, erosion or chemical pollutants	– Inspections of drains to ensure design capacity is maintained – Remove debris or sediment should design capacity be reduced	Monthly (daily during periods of rainfall) Within 24 hrs of inspection

3. Matters of National Environmental Significance

3.1 Controlling provisions

The proposed action was determined a controlled action, with the following relevant controlling provisions:

– National Heritage places (sections 15B & 15C)
– Listed threatened species and communities (sections 18 & 18A)
– Listed migratory species (sections 20 & 20A)
– Commonwealth marine area (sections 23 & 24A)

3.2 Potential impacts

This section provides a summary of potential impacts to MNES from the Proposed Action operation activities, based on the detailed assessment of impacts from GHD (2017). As stated in GHD (2017), the impact to each of the below MNES are unlikely to be significant.

3.2.1 Indirect impacts

Reduction in marine environmental quality

During operation, a number of solid and liquid wastes will be generated on both land and any vessels, including sewage, bilge waters, cooling waters, deck drainage, food waste, lubricating oils and hydraulic oils. If released into the marine environment, hazardous and non-hazardous wastes and discharges could affect marine fauna through direct toxicity, ingestion or entanglement.

Marine fauna interactions

The physical presence and movement of operational vessels has the potential to impact marine fauna. Impacts may range from behavioural (e.g. changes in surfacing patterns, swimming speed, duration underwater) to injury (e.g. propeller lacerations) or mortality (e.g. vessel strike) to marine fauna.

Light emissions

Operations could occur 24 hours a day and navigation and safety lighting will be required that may affect marine fauna behaviour. Continuous lighting in the same location for an extended period may result in alterations to normal marine fauna behaviour such as:

– Disorientation of turtle hatchings (Environment Protection Authority 2010)
– Disorientation of nesting turtles (Environment Protection Authority 2010)
– Attraction of some seabirds to illuminated structures or the attracted food sources (Marquennie *et al*. 2008)

Migratory Terrestrial species

For the six migratory bird species previously recorded on Cockatoo Island, there is no important habitat that occurs within the Proposal area or which is likely to be impacted by the Proposal.

The Whimbrel, Common Greenshank and Gull-billed Tern are wading and open water species, and much of the available habitat to wading and shorebird species is restricted to the northern side of the island and will not be impacted by the proposed works. In addition, the Eastern Osprey and Lesser Frigatebird are highly mobile and would opportunistically utilise the Proposal area for foraging. No suitable nesting habitat for these species will be impacted by the proposed works.

None of the species discussed are likely to rely on the habitats present within the Proposal area implementation of habitat for the Proposal is unlikely to significantly impact a population of these species.

Migratory Marine species

The Reef and Giant Manta Rays occur along the majority of Australian coastlines, and may occasionally occur in the Proposal area, although there are no areas of important habitat present for these species. Irrawaddy/Australian Snubfin and Indo-Pacific Humpback Dolphins are both widely distributed species, which may opportunistically use the area of the proposed wharf for foraging. All four of these species are unlikely to rely on the habitat present within the Proposal area and disturbance of the marine habitat is unlikely to significantly impact a population of these species.

3.3 Risk assessment

A risk assessment has been undertaken of the potential impacts identified for the Proposed Action operational activities, in accordance with the EMP Guidelines. The risk assessment adopts likelihood and consequence criteria and a risk matrix, presented in Table 3.1, Table 3.2 and Table 3.3.

Table 3.4 presents the risk assessment results, incorporating management objectives and measures to generate a residual risk outcome for each identified risk. It also provides implementation details for the associated management objectives and measures.

Table 3.1 Likelihood criteria

Likelihood	Criteria
Highly likely	Is expected to occur during the operation period
Likely	Will probably occur during the operation period
Possible	Might occur during the operation period
Unlikely	Could occur during the operation period
Rare	May occur in exceptional circumstances

Table 3.2 Consequence criteria

Consequence	Criteria
Minor	Minor environmental impact that can be reversed
Moderate	Isolated but substantial environmental impact that could be reversed with intensive efforts
High	Substantial environmental impact that could be reversed with intensive efforts
Major	Major loss of environmental value and real danger of continuing
Critical	Severe widespread loss of environmental value and irrecoverable environmental damage

Table 3.3 Risk ranking matrix

Likelihood	Consequence				
	Minor	Moderate	High	Major	Critical
Highly likely	Medium	High	High	Severe	Severe
Likely	Low	Medium	High	High	Severe
Possible	Low	Medium	Medium	High	Severe
Unlikely	Low	Low	Medium	High	High
Rare	Low	Low	Low	Medium	High

Table 3.4 Risk assessment of Proposed Action operation activities to MNES

Management objective / desired outcome	Risk	Cause	Management measures	Residual risk		
				Likelihood	Consequence	Risk rating
To avoid edge impacts into adjacent areas of terrestrial habitat outside the Proposal Area	Degradation in condition of foraging and potential breeding habitat for Ghost Bat and Masked Owl	Operational equipment introducing or spreading weeds to uninfested vegetation Unauthorised site access introducing or spreading weeds to uninfested vegetation	– Vehicles to be maintained and cleaned to reduce the spread of weeds. – Vehicles shall avoid driving over, or parking on native vegetation as far as practicable – Vehicles to be restricted to designated access roads.	Unlikely	Moderate	Low
To avoid impacts from light spill affecting marine fauna behaviour	Disorientation of marine fauna	Light spill into marine environment	– Lighting to be designed in accordance with AS 4282-1997: Control of Obtrusive Effects of Outdoor Lighting Guidelines, as outlined in the Wharf lighting plan (Appendix B). – Lighting to be used only for required operational areas, all light sources will be aimed towards specific work areas requiring light for safe operation, with a low vertical angle, and light shields will be placed on large equipment to minimise light spill over. – Where possible, lighting will be the minimum wattage, whilst not compromising safety or OH&S requirements	Unlikely	Moderate	Low
To avoid injury or mortality to cetaceans during vessel movement	Marine fauna mortality during vessel movement	Ship/vehicle strike to marine fauna operational vessel movement	– Compliance with EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with Cetaceans. – Within Caution Zone, vessels will not drift or approach closer than 100 m for a whale, 50 m for a dolphin known to be in the area – Vessels will not change course or speed suddenly and must move at a constant slow speed away from a whale if it approaches the vessel or comes within 150 m, 50 m for a dolphin. – all vessels must travel at less than 6 knots and minimise noise within the	Unlikely	Moderate	Low

Management objective / desired outcome	Risk	Cause	Management measures	Residual risk		
				Likelihood	Consequence	Risk rating
			caution zone of a cetacean (150 m radius for dolphins, 300 m for whales) known to be in the areaEnvironmental awareness induction will be provided to vessel crew that include marine fauna interaction requirements.			
To avoid impacts to marine habitat outside the Proposal Area	Degradation in condition of foraging and potential breeding habitat for cetaceans and other protected marine species	Hydrocarbon spill	– Prior to the commencement of the operational activities, the Operations Manager shall prepare a Emergency Spill ResponsePlan, documenting the agreed responses / management actions in the event of a spill. – All vessels to have current MARPOL-compliant Shipboard Oil Pollution Emergency Plan (SOPEP) and Shipboard Marine Pollution Emergency Plan (SMPEP – for noxious liquids) – In the event of an unplanned spill, implement an appropriate management response to minimise impacts to the marine environment – Implement procedures to maintain clean and tidy work areas, including the safe storage of all potentially hazardous substances. – Ensure operators have access to and know how to use hydrocarbon spill kits; and maintain access to all necessary materials for mitigation of accidental spill events. – Waste containers on the wharf (bins etc.) will be clearly marked and suitably covered to prevent material being blown into the marine environment. Wastes will be appropriately disposed of on the Island or transferred to the mainland for disposal at a licenced facility – Hazardous materials stored on the wharf (e.g. marine gas oil, diesel, hydraulic fluids etc.) will be stored in self bunded	Unlikely	High	Medium

Management objective / desired outcome	Risk	Cause	Management measures	Residual risk		
				Likelihood	Consequence	Risk rating
			tanks or in drums within bunded and covered areas.			

3.4 Environmental Management Measures

SMART performance standards have been developed for this OEMP to address the requirements of both the EPA (Environmental Management Plans EPA (2018)) and DCCEEW (DoEE (2019) Action Management Plan Criteria). Relevant terminology from both formats is included where relevant. SMART performance standards are intended to relate to measurable (numerical) values, which can be applied to a Proposed Action (rather than qualitatively measured management / monitoring actions), and can include measurements such as 'performance indicators', 'corrective actions' and 'completion criteria'. Terms used in the SMART performance standards in this plan are defined in Table 3.5.

Table 3.5 SMART performance standard term definitions

Term	Definition
Performance target / outcome	Proposed Action-specific measurable target defined to assess whether the management actions are effective in achieving the environmental objective
Performance indicator	The aspect of monitoring that provides a quantifiable parameter to measure performance over time to assess whether the target/outcome will be achieved/has been maintained.
Trigger / early warning indicator	Values specified for the performance indicator that provide for early warning of potential impacts or plan not meeting plan objective/s (reach of which is determined through monitoring)
Contingency / corrective action	Actions to be undertaken should a trigger value be reached or exceeded
Completion criteria	Proposed Action-specific indicators designed to demonstrate the environmental objective is being or has been met (criteria for success)

3.4.1 Implementation

Table 3.6 and Table 3.7 provides detail of the management measures to be put in place to achieve the outcomes identified in the risk assessment, including performance targets/completion criteria, implementation timing, monitoring, reporting and corrective action.

Table 3.6 SMART performance standards for terrestrial fauna

Environmental objective:				
Performance target / outcome	**Trigger / early warning indicator**	**Performance indicator**	**Corrective actions**	**Completion criteria**
To minimise and manage impacts from weeds to terrestrial fauna habitat beyond that approved	Vehicles/ equipment failing inspection post clean down	Presence of weeds on site equipment	Review clean down procedure. Implement additional workforce training.	No more than 7.37 ha cleared
Minimise terrestrial fauna fatalities during operations	Vehicle fauna strikes	No of vehicle strikes including near misses	Review onsite vehicle speed limits	No threatened fauna fatalities during operations.

Table 3.7 SMART performance standards for marine fauna

Environmental objective:				
Performance target / outcome	**Trigger / early warning indicator**	**Performance indicator**	**Corrective actions**	**Completion criteria**
To minimise and manage injury or mortality to cetaceans during operation vessel movement	Injured cetaceans within the Proposal Area with injury suspected to be a consequence of operational vessel movement Reported marine fauna strike	Number of cetaceans injured or killed	Immediate inspection of injured cetacean Review of current vessel movement speed restrictions	No cetacean mortalities as a consequence of operational vessel movements.
To minimise the impact from a hydrocarbon spill.	Uncontained/ incorrectly stored hydrocarbons within Proposal Area.	Inspection recording incorrect storage and handling.	Immediate securance and containment of hydrocarbon source. Review handling procedures. Implement additional inspections.	No no-compliance with hydrocarbon storage procedures.

4. Stakeholder consultation

KTS has completed an extensive stakeholder engagement program outlining the Proposal to the following government departments and stakeholder groups:

– Department of State Development
– Department of Mines and Petroleum
– Department of Lands
– Department of Premier and Cabinet
– Department of Transport
– Kimberley Ports Authority
– Shire of Derby/West Kimberley
– Office of the Environmental Protection Authority
– Dambimangari Aboriginal Corporation (Dambimangari)
– Djarindjin Aboriginal Corporation
– Lombadina Aboriginal Corporation
– Ardyloon/One Arm Point Aboriginal Corporation
– Pelican Resources Limited
– Pluton Resources Limited
– Cockatoo Iron Mining Pty Ltd
– Pearl Gull Iron Pty Ltd
– NK5 Group and Cockatoo Is Pty Ltd

There is engagement and ongoing dialogue with Cockatoo Iron Mining Pty Ltd, Pearl Gull Iron Pty Ltd (mining lease holders on Cockatoo Island) and the Traditional Owners and Native Title holders of Cockatoo Island, the Dambimangari.

5. OEMP implementation and review

5.1 Roles and responsibilities

The overarching responsibility for the implementation of this OEMP lies with the Operations Manager. This OEMP has been prepared for all personnel involved in the operation of the marine developments of the Proposal including:

– Operations Manager
– Environmental Manager
– Contractors
– Sub-contractors

All project personnel, including sub-contractors/sub-consultants, are responsible for complying with applicable Commonwealth and state legislation, local government requirements and the conditions of all licences, permits and approvals. The roles and responsibilities of organisations or individuals in relation to the management targets during operation are described in Table 5.1.

Table 5.1 Roles and responsibilities

Title	Roles and responsibilities
Operations Manager	– The Operations Manager has the ultimate responsibility for the operation of the Proposal. This may include but not be limited to the following: – Provision of competent person to investigate management targets and/ or management actions that are unmet and initiate corrective actions. – Provision of adequate resources for effective environmental management. – Assessing and reviewing employee abilities to comply with environmental management requirements. – Confirmation of adherence to the OEMP requirements. – Ensuring adequate instruction and training is provided for all employees. – Ensure adequate monitoring of employees with regard to implementation of this plan during operation.
Environmental Manager	– Promoting and maintaining management targets and management actions with the aim of preventing environmental impacts – Monitoring compliance with environmental legislation – Notification to employees of potential environmental issues. –
Employees and sub-contractors	– Employees and sub-contractors shall: – Comply with and adhere to the OEMP and relevant procedures. – Perform their work in accordance with training and instructions provided. – Report all environmental hazards, incidents and “near misses” that occur to the Operations Manager or appointed representative immediately. – Actively promote participation and involvement of all personnel to support a Project culture where HSE has prevailing status. – Read and sign the OEMP.

5.2 Inspections, audits and reporting

5.2.1 Site inspections and audits

The Operations Manager will undertake monthly inspection of the entire worksite against this OEMP for the duration of project. Where any High or Severe risks are identified, inspections in the areas to which these apply will be undertaken on a weekly basis by the Environment Manager. An audit of this OEMP will be undertaken by the Environment Manager within five weeks of the commencement of proposal and annually thereafter.

5.2.2 Incident reporting

This procedure provides a process for the reporting, investigation and management of environment or heritage incidents.

Where an environmental incident occurs, the following will be actioned:

– Immediate remedial action: where safe to do so the observer of an incident should undertake any immediate actions to stop, control or contain the incident to prevent further damage
– Determine the environmental incident category (i.e. minor, significant or major)
– Assessment and investigation into the environmental incident, including cause, environmental impact and mitigation/remediation
– Incident report: Environmental Incident Report Forms will be used to record environmental incidents associated with the Project
– Corrective and preventative actions – the Operations Manager will track the progress of agreed corrective and preventative actions
– All environmental incidents are to be reported to the Operations Manager

Corrective actions may also arise from audits, inspections, and management reviews. Correction actions are to be reviewed and endorsed by KTS before the action is implemented. Audits will follow to confirm satisfactory completion.

5.3 Site environmental induction and training

Personnel involved in the operation of the Proposal will be suitably trained to ensure that they are competent to carry out their work in an environmentally acceptable manner. A site induction will be carried out prior to commencement of operation activities. Records of induction attendees will be maintained for the duration of the operation of the Proposal and will include the date of the induction, name of the person conducting the induction and a summary of what was discussed during the induction.

Project staff (including contractors and sub-contractors) will be provided with the following environmental information:

– Environmental policies.
– Information within the OEMP and related documents, including significant project aspects, impacts, management targets and management actions.
– Identification of key environmental factors that may be present within the development area and any relevant MNES.
– Environmental objectives for the operation of the Proposal.
– Project regulatory requirements and staff responsibilities.
– Environmental incident emergency response procedures.

Additionally, on-going instructions will be provided during regular toolbox meetings, where issues arising from the activity will be discussed. Environmental management requirements of this OEMP are to be discussed during the toolbox meetings. Environmental incidences that occur will be discussed during the toolbox meetings together with precautions to prevent it from reoccurring. Record of toolbox meetings will be maintained for the duration of the operation of the Proposal and will include the list of attendees, date of the meetings, name of the person leading the meeting and a summary of what was discussed during the meeting.

5.4 Emergency response

KTS will prepare a Proposal specific Emergency Response Plan, which will detail how emergencies will be responded to within the Proposal Area and where relevant, take into account individual components of the Proposal.

5.5 Review

5.5.1 Risk Review

The risk assessment will be reviewed annually to confirm it remains relevant and captures all risks to MNES. Review triggers are:

– Changes to project/OEMP scope
– Following significant environmental incidents
– Where corrective actions or contingency management measures are implemented
– When new information regarding MNES becomes available.

5.5.2 OEMP review

Throughout the life of the EPBC Act approval the OEMP will be reviewed and updated as required. The review will include an evaluation of the effectiveness of the plan and incorporate new data or information.

Review triggers are as follows:

– Annually on the anniversary of the approval of the OEMP
– Following significant incidents
– Anticipated changes to scope and new risks
– Following community or stakeholder complaints
– Identification of non-compliance with environmental approval conditions
– Monitoring results, inspections or audits indicate performance targets or completion criteria may not be achieved or maintained
– Monitoring results, inspections or audits indicate completion criteria have been achieved.

The OEMP will be updated by the KTS Environmental Manager or suitably qualified delegate and approved by the KTS Project Director.

Changes to the OEMP will be communicated to all project personnel, contractors and sub consultants via the regular pre-start and toolbox meetings. KTS will inform DCCEEW of any changes to the OEMP.

6. Data management

Records will be kept to demonstrate compliance with this OEMP. These records include, but are not limited to:

– Risk assessments
– Audit results and reports, including the timing, location and spatial delineation of clearing, and periodic reconciliation against approved disturbance limits
– Monthly and weekly inspection results
– Environmental incident reports
– Monitoring data, results and reports
– Landscaping design and species mix approved for use
– Records of landscaping activities including dates, location and area of landscaping, species mixes used and quantities
– Induction records
– Pre-start and Toolbox meeting minutes
– Correspondence in relation to the requirements of this OEMP between KTS, operation contractors and/or regulators.

7. References

ANZECC (2000) Australian and New Zealand Guideline for Fresh and Marine Water Quality. October 2000.

ANZG (2018) Australian and New Zealand Guideline for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at ww.waterquality.gov.au/anz-guidelines

(EPA 2010) Environmental Protection Authority 2010. Environmental Assessment Guidelines: No. 5 Environmental Assessment Guideline for Protecting Marine Turtles from Light Impacts. Perth, WA.

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Appendices

Appendix A

MEQMP

A-1 Environmental Quality Management Framework

This MEQMP adopts the environmental quality management framework (EQMF) of EPA (2016) for Western Australian marine waters as illustrated in Figure A.1.

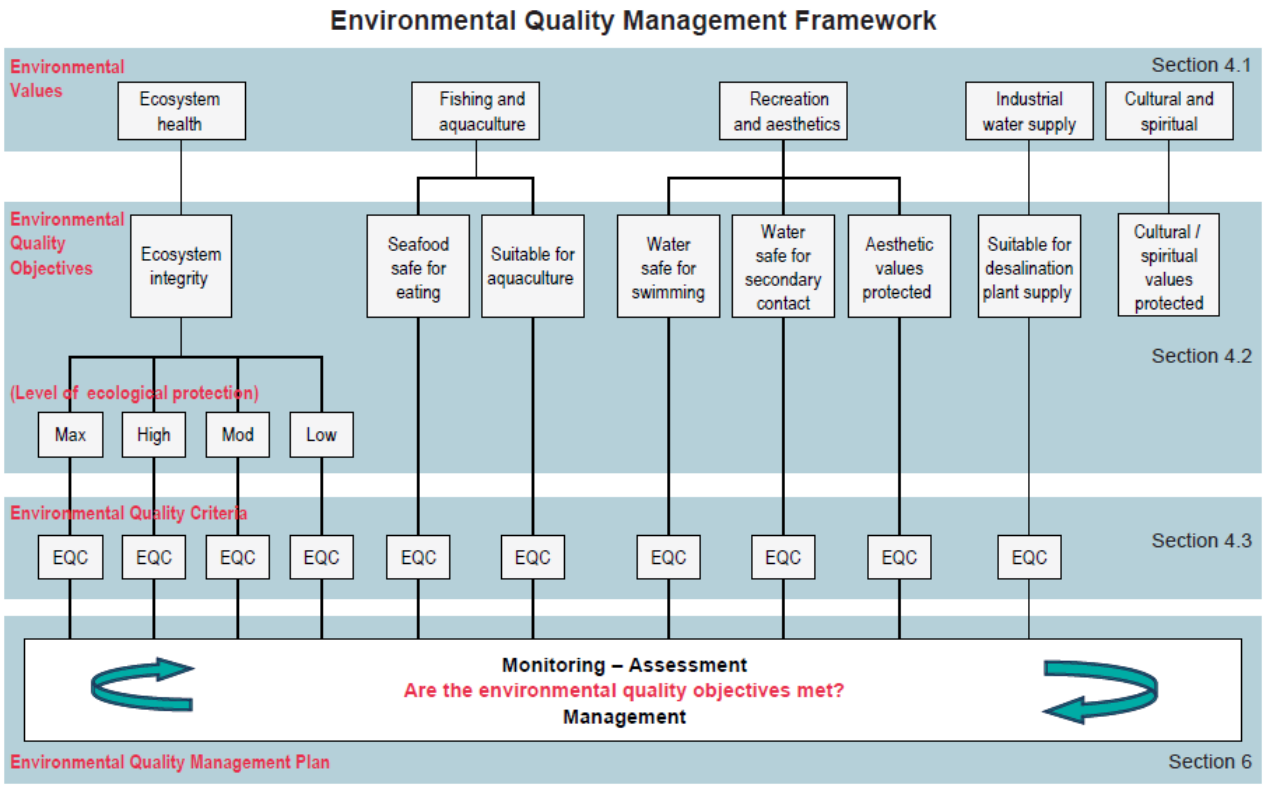

Figure A.1 EQMF for Western Australian marine waters (EPA 2016)

The key elements of the EQMF are environmental values (EVs), environmental quality objectives (EQOs) and environmental quality criteria (EQC) as described in Table A.1.

Table A.1 Framework for target setting

Element	Description
Environmental Value (EV)	Establish a broad area of ecological or social importance to the stakeholders
Environmental Quality Objective (EQO)	Specify the stakeholder aspirations for specific management objectives for each value
Environmental Quality Criteria (EQC)	Benchmarks that indicate level of performance in meeting objectives as monitored outputs or measured inputs

This MEQMP explicitly identifies different areas of ecological protection, specifically the EV of ecosystem health and the EQO of maintenance of ecosystem integrity (Table A.2. Another relevant EV (Cultural and Spiritual, see Table A.2) will be protected everywhere outside of the moderate ecological protection area (MEPA, refer to Section 2.3.

Table A.2 EVs and EQOs for proposal waters

EVs	EQOs and Descriptions
Ecosystem Health	**Maintenance of ecosystem integrity** Marine ecosystem integrity is considered in terms of structure (e.g. the biodiversity, biomass and abundance of biota) and function (e.g. food chains and nutrient cycles) to an appropriate level.
Cultural and Spiritual	**Cultural and spiritual values of the marine environment are protected** Indigenous cultural and spiritual values are not compromised.

While the EQOs are qualitative with narrative descriptions, the EQC are quantitative and provide a basis to measure environmental quality performance. The EQC define the limits of acceptable change to environmental quality (expressed narratively as the EQOs), whereby EQC compliance assumes EQO achievement. The two types of EQC are:

– **Environmental Quality Guideline (EQG)**: Threshold numerical value(s) or narrative statement(s) when satisfied indicate a high degree of certainty that the associated EQO is achieved. If not satisfied then assessment against an environmental quality standard(s) (EQS) is triggered because of uncertainty as to whether the associated EQO has been achieved.
– **Environmental Quality Standard (EQS)**: Threshold numerical value(s) or narrative statement(s) when not satisfied indicate a significant risk that the associated EQO is not achieved, and with continued EQS exceedance a management response is triggered.

EQG and EQS use indicators closer to the pressure and response ends of the pressure-response relation, respectively. The conceptual framework for applying EQC is illustrated in Figure A.2.

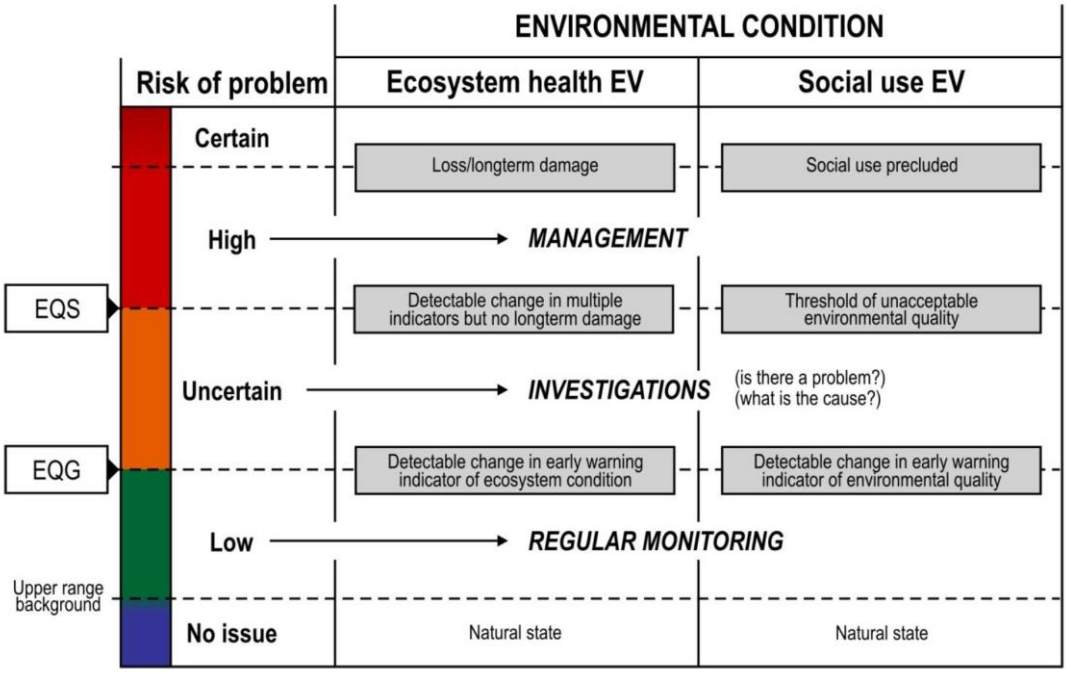

Figure A.2 ***Conceptual diagram of relation between the two types of EQC (EQG and EQS shown on left) and associated environmental condition (shown on the right) (EPA 2016)***

Four levels of ecological protection (LEPs) can be spatially applied to represent the minimum acceptable level of MEQ to be achieved through management:

– **Maximum LEP Area (Maximum Ecological Protection Area)**: Allowance for no changes in the quality of water, sediment or biota (e.g. no changes in contaminant concentrations with no resultant detectable changes beyond natural variation in the diversity of species and biological communities, ecosystem processes and abundance/biomass of marine life).
– **High LEP Area (High Ecological Protection Area or HEPA)**: Allowance for small changes in the quality of water, sediment or biota (e.g. small changes in contaminant concentrations with no resultant detectable changes beyond natural variation in the diversity of species and biological communities, ecosystem processes and abundance/biomass of marine life).
– **Moderate LEP Area (Moderate Ecological Protection Area or MEPA)**: Allowance for moderate changes in the quality of water, sediment and biota (e.g. moderate changes in contaminant concentrations that cause small changes beyond natural variation in ecosystem processes and abundance/biomass of marine life, but no detectable changes from the natural diversity of species and biological communities).

– **Low LEP Area (Low Ecological Protection Area or LEPA)**: Allowance for large changes in the quality of water, sediment and biota (e.g. large changes in contaminant concentrations causing large changes beyond natural variation in the natural diversity of species and biological communities, rates of ecosystem processes and abundance/biomass of marine life, but which do not result in bioaccumulation/ biomagnification in near-by high ecological protection areas). [1]

As described in EPA (2016), ANZECC (2000) (now ANZG (2018)) recognises and provides guidelines for three (3) of the four (4) LEP types (noting no change allowed in the Maximum LEP area) that are the basis for the EGQs, namely:

– Relatively undisturbed (i.e. HEPA) where:
  - Recommended 99% species protection guideline trigger levels for toxicant in waters (except 95% species protection level for cobalt (Co)).
  - Interim Sediment Quality Guideline (ISQG) -low guideline trigger levels for toxicants in sediments, which is superseded here by the ANZG (2018) default guideline values for toxicants in sediments.
  - The 80th percentile and/or 20th percentile of the data distribution for a suitable relatively unmodified reference site for the physical and chemical stressors or the default guideline trigger value provided.
– Slightly to moderately disturbed (i.e. MEPA) where
  - Recommended 90% species protection guideline trigger levels for toxicant in waters.
  - ISQG-low guideline trigger levels for toxicants in sediments, which is superseded here by the ANZG (2018) default guideline values for toxicants in sediments.
  - The 95th percentile and/or 5th percentile of the data distribution for a suitable relatively unmodified reference site for the physical and chemical stressors.
– Highly disturbed (i.e. LEPA).
  - For toxicants with potential to adversely bioaccumulate or biomagnify, the recommended 80% species protection guideline trigger levels for toxicant in waters.

A-2 EQMF Implementation

The proposal may potentially lead to decreased MEQ and risks on marine organisms from toxicity associated with wharf facility operations from for examples stormwater inputs and accidental vessel/facility spills. (Pressure: increased toxicants → Effect: toxicity → Response: decreased marine organism health).

Due to the potential for metal/metalloid (e.g. Cd, Cr, Cu, Pb, Hg, Ni, As, Zn) and organic (e.g. benzene, naphthalene) contaminant loads from the facility (e.g. stormwater, chemical/hydrocarbon spills from vessel/facility) during operational activities, a range of metal/metalloid and organic analytes will be monitored in the waters as EQG indicators for the EQO of maintenance of ecosystem integrity. In the sediments, the same metals/metalloid analytes will be monitored, and total PAH will be monitored as the indicator of hydrocarbon spills.

Table A.3 provides a high level summary of the basis for the design of the routine monitoring program of this MEQMP to maintain EQOs.

Table A.3 Summary of EQC indicator types, assessment locations, monitoring period and frequency, and monitoring justification to maintain EQOs

EQO	EQC Indicator Type	EQC Assessment Location(s)	Routine Monitoring Frequency	Monitoring Justification
Maintenance of Environmental Quality	Toxicants in water	MEPA, HEPA and reference sites	Semi-annual	Surveillance to track contaminants from operations due to proposal marine infrastructure
	Toxicants in sediment		Every 2 years	Low risk on basis of proposed operational activities of the marine infrastructure

[1] The fourth category of LEP, namely 'Low', generally only occurs in the immediate region of outfalls (e.g. wastewater or desalination) and is not applicable to the proposal.

The EQO for maintenance of ecosystem integrity requires the spatial classification of two LEPs in the vicinity of the proposed marine infrastructure and proximal waters, namely:

– Moderate LEP or MEPA in the immediate vicinity of the proposed marine infrastructure. A MEPA classification recognises that the operational activities may reduce MEQ on a local scale. In the MEPA operational pressures are allowed to cause moderate changes in the quality of water, sediment and biota beyond natural variation in ecosystem processes and abundance/biomass of marine life, but no detectable changes from the natural diversity of species and biological communities.
– High LEP or HEPA delineation will cover the marine environment excluding the area with a MEPA delineation.

Eight (8) monitoring sites are proposed as indicatively illustrated in Figure A.3 where:

– Two (2) sites in the western (M-W) and eastern (M-E) MEPA.
– Two (2) HEPA sites on the western (H-W) and eastern (H-E) MEPA-HEPA boundaries.
– Two (2) HEPA sites, one (1) each in the middle of Bays 2 (site H-B2) and 3 (site H-B3).
– Two (2) reference sites ~4 km (site R-W) and ~3 km (site R-E) to the west-northwest and east-southeast of the proposed wharf, respectively.

The laboratory(s) used for analysis of water and sediment samples to be NATA accredited with limits of reporting below the relevant EQG values.

Figure A.3 *MEPA and indictive MEQMP monitoring sites in region of reclamation area (top) and over the entire monitoring region (bottom)*

A-3 Routine monitoring of EQG compliance

This section describes the routine monitoring to verify whether the EQGs for the EQOs are met. EQG numeric values are based upon EPA (2016) and EPA (2017).

A sampling and analysis plan (SAP) to carry out the routine monitoring in terms of pre-survey preparation, field methodology (including field procedures for sample collection, storage and transport), laboratory analysis (including QA/QC), data analysis (including QA/QC) and reporting will be prepared by the MEQMP monitoring service provider(s) prior to operations.

Some EQGs are based on the median value at a monitoring site. Three (3) samples (or measurements) will be collected at each monitoring site so that the median value can be determined.

Some EQGs are based on the maximum value of samples from a monitoring site. Three (3) samples (or measurements) will be collected at each monitoring site so that the maximum value can be determined.

The objective of the routine monitoring program for the EQO maintenance of ecosystem integrity is to verify that the EQGs have been met within the MEPA, and for the HEPA at the MEPA-HEPA boundary and within Bays 2 and 3 as specified in Table A.4. If an EQG is exceeded for two (2) consecutive surveys then reactive monitoring and management for the EQO maintenance of ecosystem integrity as per Section A-4 will be implemented.

Table A.4 Routine monitoring program for the EQO maintenance of ecosystem integrity

LEP Type	EGQ	Pressure or Effect: Parameter(s)	Routine Monitoring Specifications	Frequency
HEPA	**EQG HEPA 1**: Maximum[2] water concentrations of each of the HEPA monitoring sites should not exceed the following ANZG (2018) default guideline values for toxicants (99% species protection levels except for Co at 95% species protection level): *Dissolved Metals and Metalloids* Cd: 0.7 µg/L; Hg: 0.1 µg/L Cr III: 7.7 µg/L; Ni: 7 µg/L Cr IV: 0.14 µg/L; Ag: 0.8 µg/L Co: 1 µg/L; V: 50 µg/L Cu: 0.3 µg/L; Zn: 3.3 µg/L Pb: 2.2 µg/L *Organics* Benzene: 500 µg/L Naphthalene: 50 µg/L	Increased toxicants in water: *Metals and Metalloids* **Cd, Cr III, Cr IV, Co, Cu, Pb, Hg, Ni, Ag, V, Zn** *Organics* **Benzene, Naphthalene**	Three (3) mid-depth samples at each of the six (6) MEQMP HEPA sites (Figure A-1)	Routine monitoring: Semi-annual (Jan., Jul.)
	EQG HEPA 2: Median value of a contaminants in the sediments of each of the HEPA monitoring sites should not exceed the following ANZG (2018) default guideline values: *Metals* Sb: 2 mg/kg dry wt; Pb: 50 mg/kg dry wt As: 20 mg/kg dry wt; Hg: 0.15 mg/kg dry wt Cd: 1.5 mg/kg dry wt; Ni: 21 mg/kg dry wt Cr: 80 mg/kg dry wt; Ag: 1 mg/kg dry wt Cu: 65 mg/kg dry wt; Zn: 200 mg/kg dry wt *Organotins*; *Organics*[3] TBT: 9 µg Sn/kg dry wt; Total PAHs: 10,000 mg/kg dry wt	Increased toxicants in sediments: *Metals and Metalloids* **Sb, As, Cd, Cr Cu, Pb, Hg, Ni, Ag, Zn** *Organotins* **TBT** *Organics* **Total PAH** Supporting data: TOC[4]	Three (3) composite samples at each of the six (6) MEQMP HEPA sites (Figure A-1):	Pre-construction (baseline) monitoring: One survey prior to construction Post-construction monitoring: One survey after construction Routine monitoring: Every 2 years (Jul.)
MEPA	**EQG MEPA 1**: Maximum[2] water concentrations of each of the MEPA monitoring sites should not exceed following ANZG (2018) default guideline values for toxicants (90% species protection levels): *Dissolved Metals and Metalloids* Cd: 14 µg/L; Cu: 3 µg/L; Ag: 1.8 µg/L Cr III: 49 µg/L; Pb: 6.6 µg/L; V: 160 µg/L Cr IV: 20 µg/L; Hg: 0.7 µg/L; Zn: 12 µg/L Co: 14 µg/L; Ni: 200 µg/L *Organics* Benzene 900 µg/L Naphthalene: 90 µg/L	Increased toxicants in water: *Metals and Metalloids* **Cd, Cr III, Cr IV, Co, Cu, Pb, Hg, Ni, Ag, V, Zn** *Organics* **Benzene, Naphthalene**	Three (3) mid-depth samples at each of the two (2) MEQMP MEPA sites (Figure A-1)	Routine monitoring: Semi-annual (Jan., Jul.)

[2] EPA (2017) stipulates 95th percentile. Insufficient measurements to calculate for a defined area during a single survey, hence maximum adopted.
[3] PAHs indicator of potential minor hydrocarbon spills.
[4] To correct organic contaminant analytes to 1% total organic carbon (TOC).

LEP Type	EGQ	Pressure or Effect: Parameter(s)	Routine Monitoring Specifications	Frequency
	EQG MEPA 2: Ambient value of a contaminant in sediments from each of the MEPA monitoring sites should not exceed following ANZG (2018) default guideline values (GV-High): *Metals* Sb: 2 mg/kg dry wt As: 20 mg/kg dry wt Cd: 1.5 mg/kg dry wt Cr: 80 mg/kg dry wt Cu: 65 mg/kg dry wt Pb: 50 mg/kg dry wt Hg: 0.15 mg/kg dry wt Ni: 21 mg/kg dry wt Ag: 1mg/kg dry wt Zn: 200 mg/kg dry wt *Organotins* TBT: 70 µg Sn/kg dry wt *Organics* Total PAHs: 10,000 µg/kg	Increased toxicants in sediments: *Metals and Metalloids* **Sb, As, Cd, Cr Cu, Pb, Hg, Ni, Ag, Zn** *Organotins* **TBT** *Organics* **Total PAH** Supporting data: TOC[4]	Three (3) composite samples at each of the two (2) MEPA HEPA sites (Figure A-1):	Pre-construction (baseline) monitoring: One survey prior to construction Post-construction monitoring: One survey after construction Routine monitoring: Every 2 years (Jul.)

A-4 Reactive monitoring for EQG non-compliance

This section describes the reactive monitoring and management actions in the event of an EQG(s) exceedance(s) (Section A-3). Generally, the procedure in the event of non-compliance of an EQG(s) is to carry out a reactive survey(s) to evaluate compliance of the EQS. If non-compliance of the EQS occurs then carry out management actions until EQG are met. Table A-5 describes the reactive monitoring and management actions (also see Section 2.1.5 for management provisions) in the event that an EQG(s) for the EQO maintenance of ecosystem integrity is not met in the MEPA and/or HEPA.

Table A.5 Reactive monitoring program and management actions for non-compliance for the EQO maintenance of ecosystem integrity

EQP Type	EQG Trigger	EQS	EQC Compliance Evaluation	Management Actions	Reactive Monitoring Specifications
HEPA	EGQ HEPA 1 not met (toxicants in water)	**EQS HEPA 1**: Maximum bioavailable contaminant concentration(s) at the HEPA monitoring site(s) should not exceed EQG HEPA. 1	Determine bioavailable contaminant concentrations as per techniques summarised in Table 8.3.3 of ANZECC (2000)	If EQS HEPA 1 met then no further reactive monitoring and management. If EQS HEPA 1 not met then: – Carry out reactive monitoring – Investigate if exceedance is likely project-related (e.g. vessel/facility spill, stormwater) or other (e.g. naturally elevated levels from reference site[s]) cause, and risk to MEQ – If needed determine further monitoring and management responses	– Carry out monthly monitoring of the non-compliant HEPA site(s) as per routine monitoring specifications until EQG HEPA 1 is met for two (2) consecutive surveys then revert to routine monitoring schedule. – If EQG HEPA 1 not met for reactive monitoring survey then determine bioavailable concentrations of samples and evaluate as per EQSs.
	EGQ HEPA 2 not met (toxicants in sediments)	**EQS HEPA 2**: Maximum and median bioavailable contaminant concentrations of for the HEPA monitoring site (s), should not exceed EQG HEPA 2	Determine bioavailable contaminant concentrations from stored sediment samples as follows: – Metals/metalloids concentrations via dilute acid extraction. – Organic concentrations via organic content normalisation or equilibrium partitioning.	If EQS HEPA 2 met then no further reactive monitoring and management. If EQS HEPA 2 not met then: – Notify DWER of EQS exceedance – Carry out reactive monitoring to confirm EQS non-compliance – Investigate if exceedance is project-related (e.g. vessel/facility spill, stormwater) or natural cause (e.g. naturally elevated levels at reference site[s]), and risk to MEQ – Evaluate applicable management measures (e.g mapping of unacceptable sediment contamination region(s) and sediment removal) – If needed, determine further monitoring and/or management responses	– Carry out repeat sediment survey of the non-compliant HEPA site as per routine monitoring specifications for EQG HEPA 2 to confirm (or otherwise) EQG HEPA 2 non-compliance. – If EQG HEPA 2 not met for reactive monitoring survey then analyse bioavailable concentrations of samples and evaluate as per EQS.
MEPA	EGQ MEPA 1 not met (toxicants in water)	**EQS MEPA 1:** Maximum bioavailable contaminant concentration(s) in at the MEPA monitoring site(s) should not exceed EQG MEPA 1.	Determine bioavailable contaminant concentrations as per techniques summarised in Table 8.3.3 of ANZECC (2000)	If EQS MEPA 1 met then no further reactive monitoring and management. If EQS MEPA 1 not met then: – Notify DWER of EQS exceedance – Carry out reactive monitoring – Investigate if exceedance is project-related (e.g. vessel/facility spill, stormwater) or other (e.g. elevated levels at reference site[s]) cause, and risk to MEQ – If needed, determine further monitoring and/or management responses	– Carry out monthly monitoring of the non-compliant MEPA sites(s) as per routine monitoring specifications until EQG MEPA 1 two (2) consecutive surveys then revert to routine monitoring schedule. – If EQG MEPA 1 not met for reactive monitoring survey then determine bioavailable concentrations of samples and evaluate as per EQS.

EQP Type	EQG Trigger	EQS	EQC Compliance Evaluation	Management Actions	Reactive Monitoring Specifications
	EGQ MEPA 2 not met (toxicants in sediments)	**EQS MEPA 2:** Maximum and median bioavailable contaminant concentrations, respectively, at the MEPA monitoring site(s) does should not exceed EQG MEPA 2	Determine bioavailable concentrations from stored sediment samples as follows: – Metals/metalloids concentrations via dilute acid extraction. Organometallic /organic concentrations via organic content normalisation or equilibrium partitioning.	If EQS MEPA 2 met then no further reactive monitoring and management. If EQS MEPA 2 non-compliance then: – Notify DWER of EQS exceedance – Carry out reactive monitoring to confirm EQS non-compliance – Investigate if exceedance is project-related (e.g. vessel/facility spill, stormwater) or natural cause (e.g. elevated levels at reference site[s]), and risk to MEQ – Evaluate applicable management measures (e.g mapping of unacceptable sediment contamination region(s) and sediment removal – If needed, determine further management responses	– Carry out repeat sediment survey of the non-compliant MEPA site as per routine monitoring specifications for EQG MEPA 2 to confirm (or otherwise) EQ MEPA 2 not met. – If EQG MEPA 2 not met for reactive monitoring survey then analyse bioavailable concentrations from reactive monitoring survey and evaluate as per EQS

Appendix B

Wharf Lighting Plan

Kimberly Technology Solutions

Cockatoo Island Marine Supply Base Lighting

BASIS OF DESIGN

WGA22078

WGA22078-RP-EE-0001_0

CIL-2000-PRJ-REP-001

19 July 2024

Revision History

REV	DATE	ISSUE	ORIGINATOR	CHECKER	APPROVER
0	19/07/2024	Issued for Use	AT	KL	KL

Contents

Figures

Tables

1 INTRODUCTION

1.1 Background

Kimberley Technology Services (Company) is developing a multi-user marine supply and support base on Cockatoo Island, located off the north-west coastline.

1.2 Project Overview

The Project will develop a marine facility to achieve the following:

- Supporting Browse Basin operations in the Kimberley.
- Creating an independent multi-user platform that benefits diverse industries from Oil and Gas to Aquaculture.
- Integrating with the location to attract new business opportunities.
- Focusing on industries which cannot be carried out due to distance or topography constraints to reduce mainland impact.

The primary components to be developed in execution of the Project are shown in Figure 2 and include:

- Floating wharfs (each 90m x 25m)
- Barge ramps
- Revetment wraps around the facility to provide protection against waves

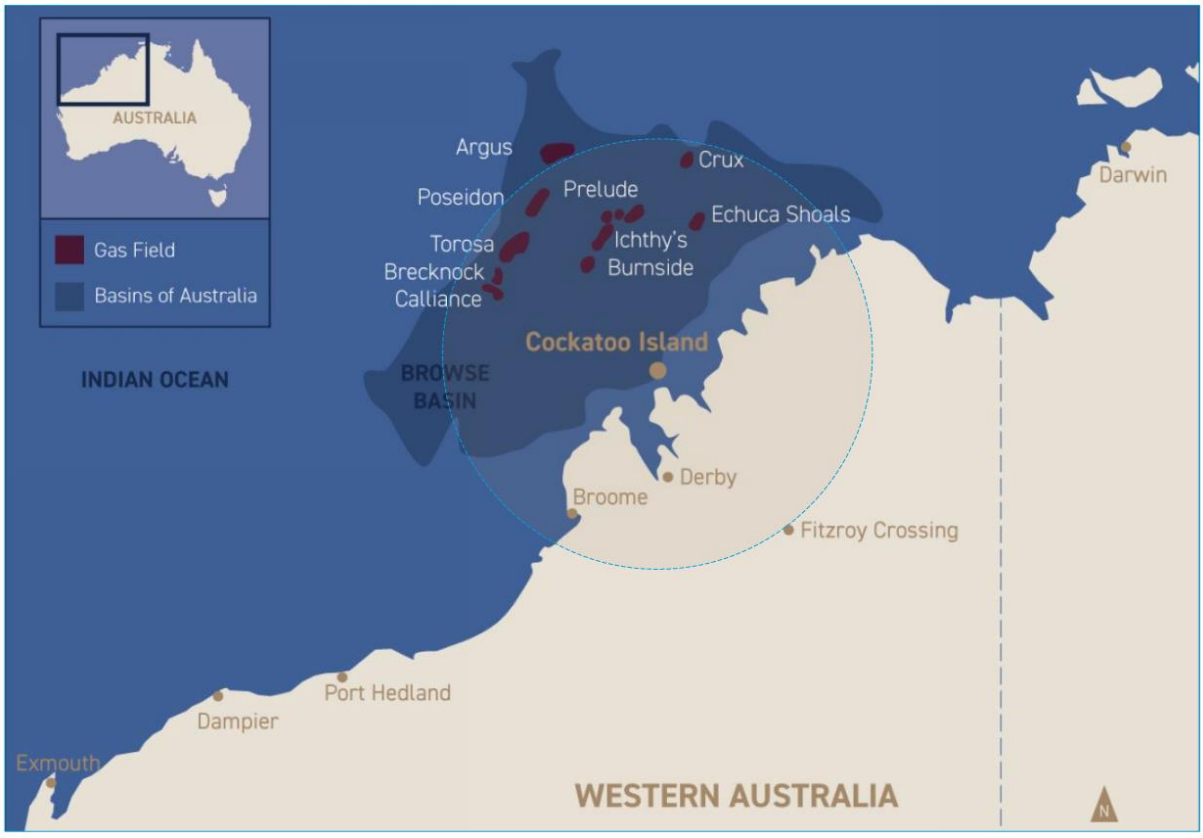

Figure 1: Cockatoo Island Marine Base Location Plan

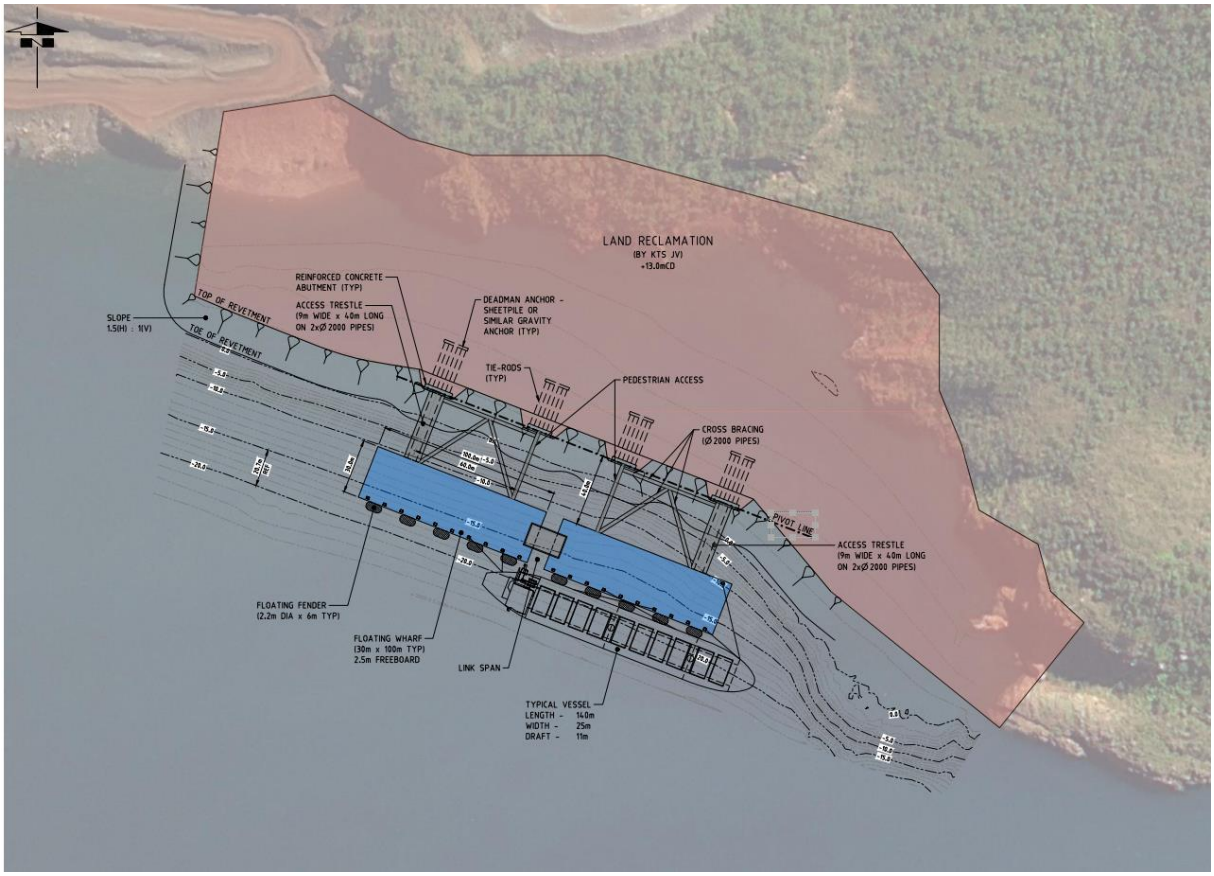

Figure 2: Cockatoo Island Marine Infrastructure Plan

1.3 Document Overview

The purpose of this Basis of Design is to describe the requirements of the Lighting for the Cockatoo Island Marine supply and support base facility. The Basis of design aims to describe inputs to the design process including company project requirements, design standards and guidelines.

1.4 Definitions

For the purpose of this document the following interpretation of terms and abbreviations shall apply:

Table 1: Definitions

TERM/ABBREVIATION	MEANING
AHD	Australian Height Datum
AS	Australian Standard
AS/NZS	Australian Standard/New Zealand Standard
BoD	Basis of Design
DotEE	Department of the Environment and Energy
EPA	Environmental Protection Agency
Lumens	Lumens Measure of Light from a Source
LUX	Unit of Illuminance - Luminous Flux Per Unit Area
m	Metre

2 REFERENCE DOCUMENTS

2.1 Reference Drawings

The following reference drawings are included

Table 2: CPR Reference Drawings

DOCUMENT NUMBER	DRAWING TITLE	REVISION
WGA220078-SK-CV-0001	Cockatoo Island Concept General Arrangement	B
WGA220078-SK-EE-0001	Cockatoo Island Lighting Level Layout Drawing	A

2.2 Light Impacts Guidelines

Floating Wharf, access ways and adjacent land storage areas lighting shall be designed in accordance with the following Light impact guidelines.

- Environmental Protection Agency No.5 Environmental Assessment Guideline for Protecting Marine Turtles from Light Impacts November 2010 and has considered the following.
- DotEE 2020 National Light Pollution Guidelines for Wildlife Including marine turtles, seabirds and migratory shorebirds – January 2020 Version 1.0.

2.3 Australian Codes and International Standards

Lighting target levels have been determined in accordance with the latest version of relevant Australian Standards including but is not limited to those listed in the BoD. The following Australian standards are noted as being particularly relevant to the lighting design.

Table 3: Australian and International Standards

DOCUMENT NUMBER	DOCUMENT TITLE
AS/NZS 1158	Lighting For Roads and Public Spaces (Series)
AS/NZS 1680	Interior and Workplace Lighting

2.4 Statutory Authorities and Requirements

Relevant Authorities for the Work include:

- Department of Mines, Industry Regulation, and Safety (Mines Safety Inspection Amendment Act and Mines Safety and Inspection Regulations).
- Department of Environment and Conservation - Government of Western Australia.
- Work Safe Western Australia (Occupational Health Safety and Welfare Act and Regulations).
- Department of Transport.

All elements of the Work must be designed and constructed in accordance with all Legislative Requirements:

- Aboriginal Heritage Act (1972)
- Dangerous Goods Safety Act (2004)
- Environmental Protection Act (1986)
- Environmental Protection Regulations (1987)
- Maritime Transport and Offshore Facilities Security Act (2003)
- Mining Act (1978)
- Mines Safety and Inspection Act (1994) & Mines Safety and Inspection Amendment Act (2004)

- Mines Safety and Inspection Regulations (1995)
- Occupational Safety and Health Act (1984)
- Occupational Safety and Health Regulations (1996)
- Port Authorities Act (1999)

3 BASIS OF DESIGN

Outdoor lighting in the floating wharf and storage area will provide the quality of lighting required to undertake the tasks required for operation of the facility.

LED lighting shall be used unless otherwise approved by the Company.

External lighting shall use sources that minimise or eliminate short-wavelength light in the blue, violet and ultraviolet spectrums to minimise impact on marine fauna.

Where installed along walkways, lighting shall be installed 2400mm above walkway level and mounted on a “swivel pole” or similar approved pole that eliminates working at heights.

Where installed over the Floating Wharf’s access ways, lighting shall be installed at a nominal 8000mm above the deck on a hinged pole or fixed to the permanent structure where available.

Lighting on floating wharf, access ways and adjacent land storage areas are powered by 240V AC.

Lighting levels in all areas shall be sufficient for safe access.

This BoD does not consider lighting installed in internal spaces.

3.1 Lighting Lumens Levels and Design Factors

General

A light loss factor (maintenance factor) of 0.8 shall be used in the lighting design calculations.

The Lighting Uniformity of illuminance is based on AS/NZS 1680.5:2012, Outdoor workplace lighting Table 3.1 Loading and unloading – Manual. A uniformity of 5 to 1 and General storage – pedestrian access uniformity of 7 to 1.

Uniformity for general lighting of 0.2 shall be used in the Lighting calculations.

The recommended average-maintained lux levels required in the lighting design are listed in the table below and are based on the following.

The lighting levels have been selected from AS/NZS 1680.5, Interior and workplace lighting Part 5: Outdoor workplace lighting Table 3.1.

Walkways General

- AS 1680 Interior and workplace lighting Part 5: Outdoor workplace lighting Table 3.1 Recommended Light Technical Parameters for General Outdoor Areas.

Wharf Platform

- Loading and unloading Manual - Loading and unloading of trucks by manual labour including manually moving objects between the truck and another form of transport.

Storage Area

- Loading and unloading - Loading and unloading of trucks by forklift, the area surrounding the truck and route of the forklift.

LOCATION	ACTIVITY	AVERAGE MAINTAINED LUX	STANDARD
Walkways	General storage – pedestrian access, through traffic and controlled pedestrian access	20	AS1680.5 Table 3.1
Wharf platform	Loading and unloading	40	AS1680.5 Table 3.1
Adjacent Land	Storage & Handling - loading unloading with Forklift	40	AS1680.5 Table 3.1

3.2 Lighting Controls

External lighting control will use combination of photo Electric (PE) sensors, timer control and manual controls for energy efficiency and to limit light pollution. The area lighting is split into a number of zones with ability to turn sections of light on and off depending on the area of the facility that is in use.

The ability to switch off lighting when not required is utilised to minimise impact on the marine life.

3.2.1 Lighting Zones

The lighting zones shown in drawings WGA220078-SK-EE-0001 will have the following controls available:

1. Minimal for Access/Security, Lumitrol Control Only
2. Normal for General Access/Misc. Tasks
3. Floating Wharf Area
4. Storage Area

3.3 Emergency Lighting

Emergency lighting is provided by battery backed lights for emergency egress from the wharf area, lighting shall be installed at change of direction and along the walkways where artificial lighting is installed.

The emergency evacuation and exit lights will be based on self-contained fittings to AS 2293. Emergency evacuation and exit lights will remain lit for a minimum of two hours on loss of supply.

Illuminance levels will be calculated to provide minimum horizontal illuminance at floor level of 0.2 lux.

4 LIGHTING DESIGN AND ENVIRONMENTAL IMPACT

The Cockatoo Island multi-user marine supply and support base infrastructure Environmental impact minimisation measures are summarised below.

The lighting of the outdoor areas of the Cockatoo Island Floating wharf and storage area is to be provided by Amber colour 1970k LED lighting bulkheads on the walkways and LED floodlights on the floating wharf and storage area. The advantages of the amber LED lighting include the high energy efficiency and a light spectrum that has a lesser visual impact than white light sources on the surrounding marine life.

4.1 Methodology

The methodology for the light spill assessment shall consider the work processes and site usage to identify the lighting requirements. The pole positions, luminaire mounting heights, luminaire selection and luminaire aiming angles shall be designed to provide an optimum lighting and minimise light spill.

Light shields shall be installed where required to minimise light spill on adjacent land or water outside of the functional working area.

Lighting shall be split into a number of zones to allow for the lighting to be switched off areas when not required.

4.2 Lighting Standards

The lighting design is in accordance AS/NZS 1680.5 Australian and New Zealand Interior and workplace lighting, Part5: outdoor workplace lighting.

The following shall also be considered as part of the lighting design.

Environmental Protection Agency No.5 Environmental Assessment Guideline for Protecting Marine Turtles from Light Impacts November 2010 and has considered the following:

- Keeping light off the beach and turning lights off when not needed
- Minimising lighting mount height low with lowest intensity lighting for the task
- Minimise light escaping upwards and outwards
- Use of long wavelength lighting

DotEE 2020 National Light Pollution Guidelines for Wildlife Including marine turtles, seabirds and migratory shorebirds – January 2020 Version 1.0:

- Only add light for specific purposes
- Use adaptive light controls to manage light timing, intensity and colour
- Light only the object or area intended – keep lights close to the ground
- Directed and shielded to avoid light spill
- Use the lowest intensity lighting appropriate for the task
- Use lights with reduced or filtered blue, violet and ultra-violet wavelengths

4.3 Luminaire Colour Temperature Selection

The lighting of the outdoor areas shall be provided by Amber colour 1970k LED lighting bulkheads on the walkways and LED floodlights on the Floating wharf and storage area that have low level filtered blue, violet and ultra-violet wavelengths. The amber LED light spectrum has a lesser visual impact than white light sources on the surrounding marine life.

4.4 Luminaire Selection

Minimisation of any direct light spill requires selection of a luminaires that direct light to the area required and minimise stray light.

The walkways and boundary of the working area shall use of LED lightings that are fitted with optics that direct the light in a narrow beam to the areas requiring light and minimise stray light and reduce the light spill. Area lighting shall include the use of amber coloured Floodlights with a forward throw distribution to ensure maximum light distribution across the intended area and minimum backwards and forwards light spill outside of the work area to minimise impact on the marine life

4.5 Luminaire Position and Mounting Height

The position, orientation and mounting height of the luminaire are equally important to luminaire selection to ensure the minimum environmental light spill and to provide the required outdoor lighting.

The walkways shall use Bulkhead fittings on 2.4m Swivel pole to minimise light spill outside of the walkway.

Minimising the height in conjunction with the asymmetric floodlight Lens optics and optimising the orientation shall be used to reduce the extent of light spill.

WGA

FOR FURTHER INFORMATION CONTACT:

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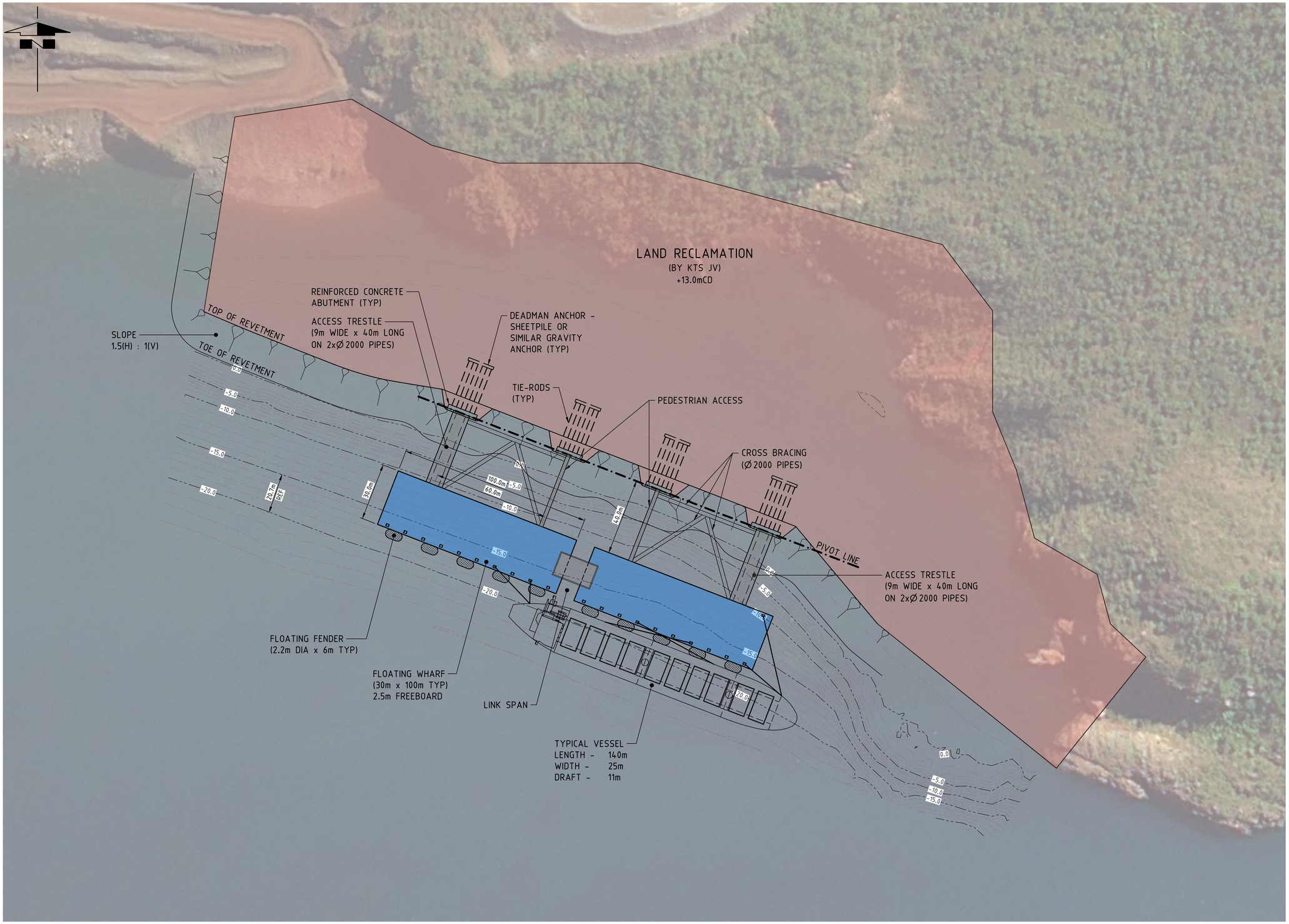
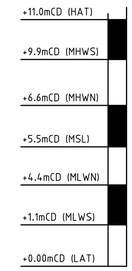


TIDAL RANGE (YAMPI SOUND)

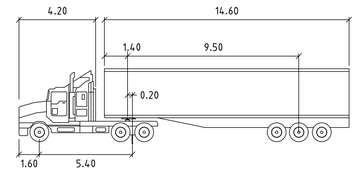
(REF. ANTT 2022)



ACCESS RAMP SLOPES	
RAMP SLOPE	MINIMUM TIDAL LEVEL (mCD)
1:8	+5.5
1:10	+6.5
1:12	+7.2

NOTES:
1. VALUES PROVIDED FOR 40m ACCESS RAMP.
2. ALL SLOPES MEET AUSTROAD (PART 3, COMMENTARY C21) REQUIREMENTS FOR ACCESS RAMP SLOPE ASSESSMENT

DESIGN VEHICLE



AV (AUSTRALIAN STANDARDS)

meters

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 28.3
Tractor Track	: 2.50	Articulating Angle	: 72.0
Trailer Track	: 2.50		

COCKATOO ISLAND MARINE SUPPLY BASE
CONCEPT GENERAL ARRANGEMENT

SCALE 1:1000

When sheet printed full size, the scale bar is 100mm.

0 50 100mm

20 10 0 20 40
SCALE BAR (m)
1:1000

INFORMATION ISSUE
NOT FOR CONSTRUCTION

KTS Doc Ref: **CIL-2000-PRJ-DRG-009_A - Concept General Arrangement**

REV.	DATE	DESCRIPTION	DRAFT	ENG.	CHKD
A	31.03.2022	ISSUED FOR INFORMATION	EN	MF	LC
B	04.11.2022	RE-ISSUED FOR INFORMATION	RP	MF	LC

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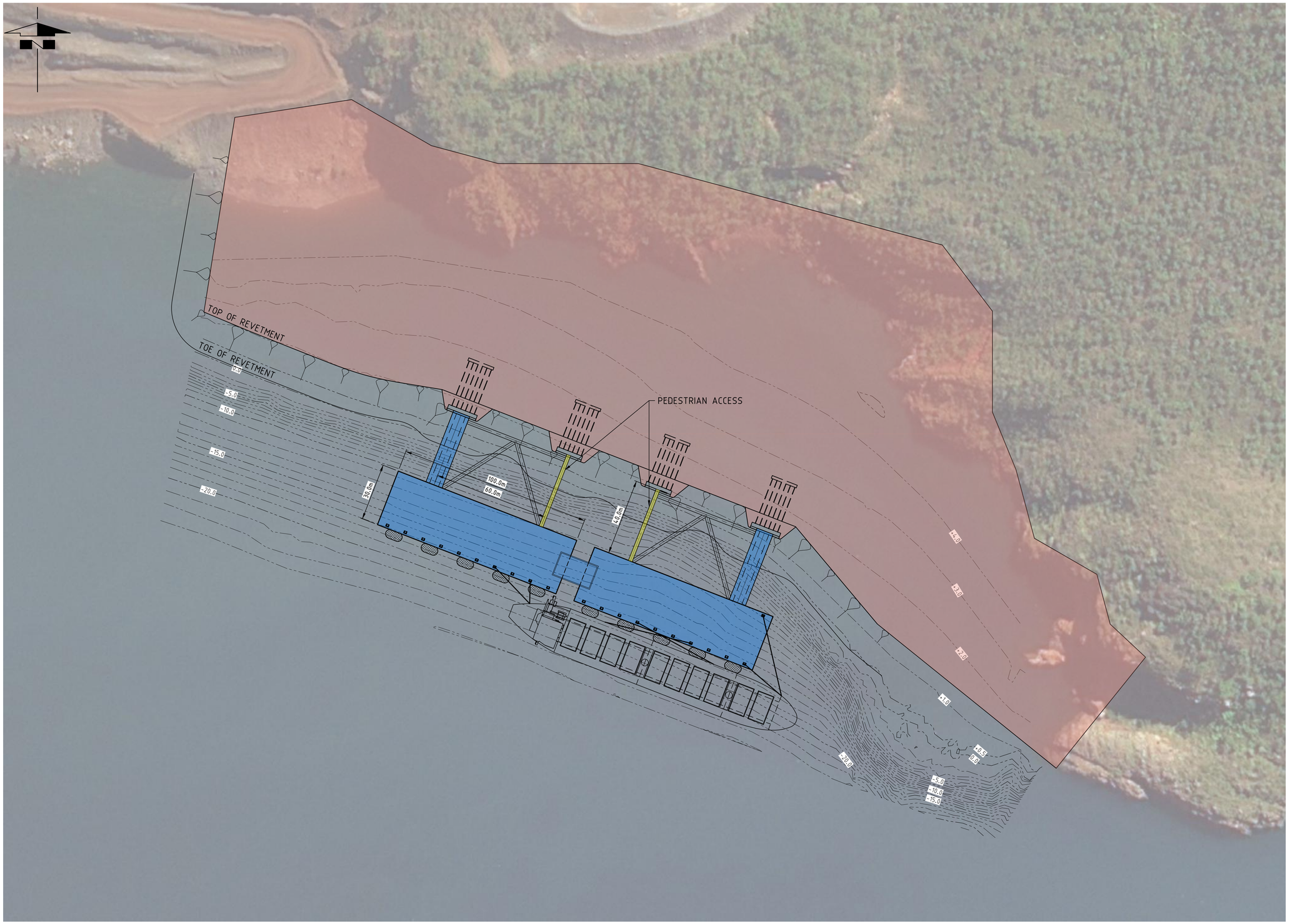
CONCEPT GENERAL ARRANGEMENT ©

A1 | DOCUMENT NUMBER | Project Number | Sheet No. | Rev.

Design MF | Drawn EN | WGA220078-SK-CV-0001 B



COCKATOO ISLAND MARINE SUPPLY BASE
LIGHTING LUX LEVELS ARRANGEMENT

SCALE 1:1000

SCALE BAR (m)
1:1000
20 10 0 20 40

When sheet printed full size, the scale bar is 100mm.
0 50 100mm

INFORMATION ISSUE
NOT FOR CONSTRUCTION

KTS Doc Ref: **CIL-2000-PRJ-DRG-017_A - Marine Lighting Arrangement**

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0	16.07.2024	ISSUED FOR USE	CWH	AT	KL

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COCKATOO ISLAND

LIGHTING ARRANGEMENT

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