



Department of
Transport

Port Hedland Spoilbank Marina Proposal

Construction Environmental Management Plan



Table

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SUMMARY

Title: Spoilbank Marina Proposal Construction Environmental Management Plan (CEMP)

Proponent: Department of Transport

Key Environmental Factors

The following EPA Environmental Objectives guide and inform the CEMP and the attached management plans, which have been developed in accordance with the EPA's Instructions on how to prepare *Environmental Protection Act 1986 Part IV Environmental Management Plans*:

- **Marine Fauna** – The EPA's Environmental Objective for this Factor is *'to protect marine fauna so that biological diversity and ecological integrity are maintained'*.
- **Air Quality** – The EPA's Environmental Objective for this Factor is *'to maintain air quality and minimise emissions so that environmental values are protected'*.
- **Benthic Communities and Habitats** – The EPA's Environmental Objective for this Factor is *'to protect benthic communities and habitats so that biological diversity and ecological integrity are maintained'*.
- **Marine Environmental Quality** – The EPA's Environmental Objective for this Factor is *'to maintain the quality of water, sediment and biota so that environmental values are protected'*.

1. Context, Scope and Rationale

1.1 Proposal

The Western Australian (WA) Department of Transport (DoT) propose to construct the Port Hedland Spoilbank Marina (the Proposal) located on the western side of the spoilbank sand formation in the town of Port Hedland, Pilbara region of WA. The spoilbank is a man-made coastal landform created in the late-1960s and early-1970s as a result of disposing dredge material associated with Port Hedland's inner harbour development.

The Proposal includes a marina basin, rock armoured breakwaters, dredged approach channel, boat pens, a boat ramp and landside infrastructure such as carparks, amenities, public open space, lighting, paths and gardens. The Proposal involves ground disturbance of up to 40 hectares (ha) within a development envelope of approximately 77 ha. Clearing of up to 14 ha of Acacia Shrubland is proposed, which has been classed as being in degraded condition (Strategen, 2020b).

The physical and operational elements are detailed are summarised below:

- Marina basin, berth facilities (up to 80 pens), boat launching area and entrance channel.
- Capital dredging works resulting in up to 900,000 cubic metres (m³) of dredge spoil and dredged to a maximum depth of -2m chart datum (-5.9m AHD). Dredge spoil will be used onsite as fill material to raise the finished ground level prior to landscaping - no ocean disposal of dredge material will occur as part of this Proposal.
- Construction of the marina's breakwaters, revetments and sand trap. Materials for the construction of these structures will be sourced from local and regional quarry operations.
- Parking facility, amenities (public and pen holders), public open space and upgrading of road infrastructure.

Table 1: Summary of the Proposed Action

Title	Port Hedland Spoilbank Marina Proposal
Proponent name	Department of Transport
Short description	<p>The Proposal is for constructing and operating the Port Hedland Spoilbank Marina, located within the Town of Port Hedland, Pilbara. The Proposal includes:</p> <ul style="list-style-type: none">• dry-land excavation of the marina basin (maximum depth to -2m chart datum (-5.9m AHD))• capital dredging works resulting in up to 900,000 cubic metres (m³) of dredge spoil and dredged to a maximum depth of -2m chart datum (-5.9m AHD)• sand trap• construction of breakwaters and revetment walls

	<ul style="list-style-type: none"> disposal of capital dredge spoil on land as fill material to raise the finished ground level prior to landscaping, with excess material disposed offsite. <p>The Proposal also includes the ongoing management and maintenance of the marina water body and infrastructure.</p>
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Element	Location	Proposed Extent
<i>Physical Marine Element</i>		
Marina basin and entrance channel	Figure 1	Ground disturbance and clearing of up to 12 ha
Breakwater and revetment wall	Figure 1	Ground disturbance and clearing of up to 6 ha
Sand trap	Figure 1	Ground disturbance and clearing of up to 8.5 ha
<i>Physical Terrestrial Element</i>		
Parking and trailer bays	Figure 1	Ground disturbance and clearing of up to 5 ha
Public open space	Figure 1	Ground disturbance and clearing of up to 5 ha
Road infrastructure	Figure 1	Ground disturbance and clearing of up to 3 ha

1.2 Scope

This CEMP has been prepared to outline how environmental impacts will be managed during construction of the marine and land-based components of the Proposal.

The CEMP is comprised of an overall environmental management framework and specific management sections to address relevant environmental factors and mitigate potential impacts of construction activities. The Contractor appointed to undertake the works will incorporate the management framework into the Contractor's CEMP for the Proposal.

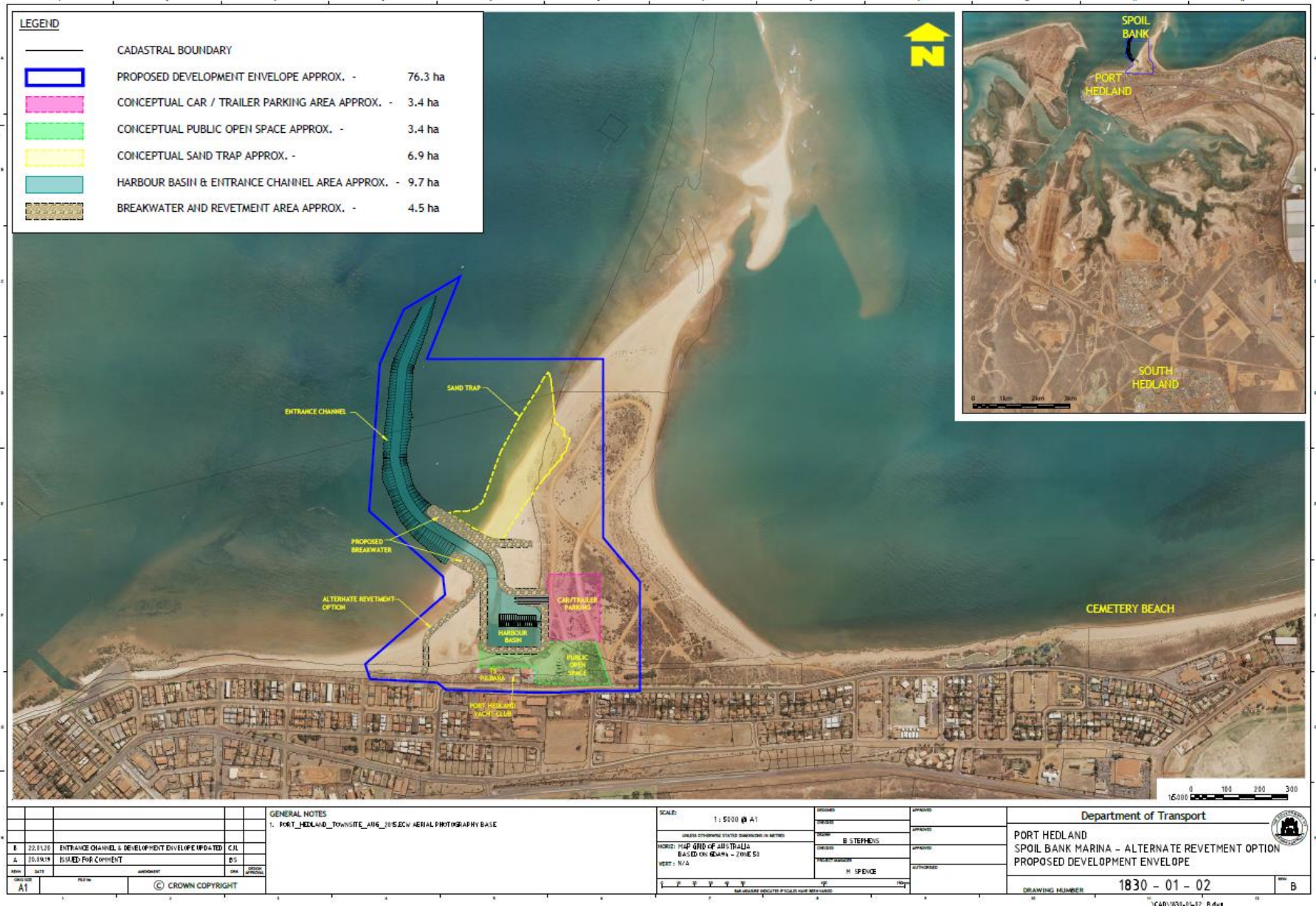


Figure 1: Port Hedland Spoilbank Marina Proposal and Development Envelope

1.3 Key environmental factors

This CEMP has been prepared to address the EPA's Environmental Factors for:

- Marine Fauna;
- Air Quality;
- Marine Environmental Quality;
- Benthic Habitat and Communities.

1.4 Commonwealth Determination

DoT referred the Proposal to the Commonwealth's Department of Environment and Energy (DoEE) under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 22 August 2019. The Proposal was determined to be a 'Controlled Action' by a Delegate of the Commonwealth Minister for the EPBC Act on 21 January 2020 as it will, or is likely to have, a significant impact on the following Matters of National Environmental Significance (MNES):

- Listed threatened species and communities (section 18 and 18A); and
- Listed migratory species (sections 20 & 20A).

1.5 Rational and approach

Survey and study findings

The Port Hedland region has historically been the subject of numerous large-scale infrastructure developments, including extensive and periodic capital and maintenance dredging campaigns. The environment has been extensively surveyed and is well-understood.

Terrestrial flora and vegetation

DoT environmental consultants undertook a flora and vegetation desktop assessment and reconnaissance site survey work in February 2019 (Appendix G), in accordance with EPA's guidelines. It was noted that the site is characterised by predominantly bare sediment with areas of sparsely covered patches of colonising coastal shrubs and grasses (dominant species Buffel grass). No Threatened or Priority Ecological Communities were recorded, and no species of conservation significance were found. The vegetation was generally in degraded condition, being dominated by Buffel grass, and was fragmented by many four-wheel-drive tracks (Strategen, 2020b).

DoT's consultants concluded that the Spoilbank Reserve is characterised by a low diversity of vascular flora species and high densities of aggressive weeds. The vegetation does not meet criteria for conservation significance, and no Priority Flora species were identified at the site (Strategen, 2020b).

Groundwater

Groundwater survey work included a 12-month groundwater monitoring program of the study area in 2015 (RPS, 2015). The program consisted of salinity profiling to determine the presence and location of the saline interface, groundwater quality monitoring and an assessment of groundwater-tidal interactions. The study identified groundwater flow in a northerly direction and discharge into the ocean at the coast. However, due to the presence of the spoilbank, a minor north to south aligned groundwater mound developed, acting as a groundwater divide between the east and west boundaries of the site, directing flows towards both sides of the spoilbank.

The Project area experiences a very high tidal range, which at times exceeds six metres (RPS, 2014). Tidal impact on groundwater elevations occur in two main cycles – semi-diurnal cycles between high and low, and neap and spring tides occurring twice every lunar month. Salinity fluctuated during the 12-month period, most likely correlating to the temporal variations of rainfall recharge to the aquifer. Salinity ranged between saline and hypersaline (5000 mg/L and 40,000 mg/L TDS).

Groundwater quality investigations recorded exceedances in total iron and dissolved cadmium, copper, nickel and zinc (RPS, 2014). These recordings were similar throughout the entire monitoring period with no spatial or temporal trend. The Detailed Site Investigation undertaken by RPS in 2014 concluded that metal concentrations in groundwater are considered reflective of natural conditions in the aquifer given the consistent concentrations across and up-hydraulic gradient of the site, and the fact that no contamination sources were identified.

Surface Water

The Proposed Action is located on a man-made feature with no discernible surface water flows. No surface water or surface expressions of groundwater are present at the site (RPS, 2011).

Sediment Quality

Environmental investigations and survey work was undertaken across the Proposal's development envelope to characterise the physio-chemical composition of the marine sediment (subtidal and intertidal) (Teal *et al*, 2019). Sampling was undertaken in accordance with the National Assessment Guidelines for Dredging (NAGD, 2009) and the samples were analysed for particle size distribution, total organic carbon, pesticides, metals, organotins, acid sulfate soils, asbestos containing materials and hydrocarbons.

All analytes were below the available ANZG (2018) guideline values, NEPM (2013) Health Investigation Levels (HILS) and NAGD (2009) Screening Levels. At six locations, Aluminium and Iron exceeded locally derived background levels, however these exceedances were considered to be consistent with ambient concentrations in the area.

All samples were screened for acid sulfate soils and selected samples were subject to chromium suite acid sulfate analysis. The chromium reducible sulfur concentration of three samples were above the action criteria of 0.03% sulfur. The locations of two samples (B12 and S29-B) were in the nearshore environment and one (C02) at the start of the navigation channel (Figure 2). However, consideration of the acid

neutralising capacity presented a positive Net Acidity, which indicated sufficient in-situ buffering capacity for any acid generated during handling. The analysis concluded that sediments were considered suitable for onshore disposal.



Figure 2 – Location of sampling sites that recorded sulphur concentration of 0.03% (Teal *et al*, 2019)

Marine Fauna

The Port Hedland area is known to support a number of conservation significant marine fauna species, including marine reptiles, cetaceans, fish species and migratory shorebirds. Cemetery Beach, located approximately 2 km east of the development envelope, has been identified as a biologically important area for inter-nesting flatback turtles (*Natator depressus*). It is understood that Cemetery Beach supports a mid-sized community (approx. 200 – 500 individuals) that nest on the beach between late November and March, with key hatchling periods between January to March (RPS *et al*, 2020).

The EPBC Act Protected Matters Search Tool (PMST) report (5 km buffer radius) identified a number of threatened and migratory marine fauna species that may frequent the area, including the blue whale, southern right whale, humpback whale, great white shark, whale shark, as well as dwarf, narrow and green sawfish.

Green turtles have also been observed within the Port Hedland Harbour and surrounding mangrove creeks (PENV, 2019). Although juvenile and adult turtles utilise habitat within the Port Hedland area for foraging and breeding, regionally significant foraging sites are known to occur beyond the Port Hedland Inner Harbour (RPS *et al*, 2020).

The green sawfish has been historically recorded in inshore marine waters and inhabits muddy bottom habitats and estuaries (Thorburn *et al*, 2007). The green sawfish is the most commonly distributed species of sawfish in Western Australian waters, occurring in areas with a muddy substrate and frequently found in shallow water. It commonly inhabits marine inshore waters, estuaries and lagoons. Most sawfish move into marine waters during or after the wet season and re-enter estuarine or fresher waters to breed (Morgan *et al*, 2011).

A large number of seabird and shorebird species (or species habitat) may occur within the vicinity of the proposed action; this includes species classified as threatened and migratory under the EPBC Act or specially protected under the WA *Biodiversity Conservation Act 2016*.

Benthic Communities and Habitat

DoT's environmental consultants undertook ground truthing surveys and targeted survey work in 2019 (Appendix P), in accordance with *Technical Guidance, Protection of Benthic Communities and Habitats* (EPA, 2016c).

The Proposal's subtidal BCH assessment mapped three broad BCH classes within the Detailed Mapping Zone and LAU, including:

- Bare Sand
- Mixed assemblage (Corals, Sponges, Macroalgae, and Hydrozoan)
- Mixed assemblage with seagrass (sparse Seagrass, Sponges, Macroalgae, and Hydrozoan)

The benthic cover was found to be generally sparse to low across more than 95 per cent of the study area. Small areas of low to medium-density mixed assemblage habitat were typically found on consolidated or semi-consolidated substrate generally

in shallow water and/or in the intertidal zone and mostly along the shoreline. Areas of mixed assemblage with seagrass were found in slightly deeper water (>3 m) generally in areas with coarse sediment substrate. All habitats identified within LAUs are considered to be widespread across the turbid nearshore environments of the Pilbara region and did not represent conservation significant habitat (Teal *et al*, 2019b).

In the vicinity of the development envelope mixed assemblage habitat were present on low profile reefs and patches of very sparse ephemeral seagrass on sand were also observed. Sparse seagrass communities were observed in the vicinity of the Project area, and in the coastal LAU to the west. Survey work also observed corals occurring in proximity of the Proposal's development envelope.

1.6 Key assumptions and uncertainties

DoT has identified the key sensitive receptor requiring specific management to be the biologically important population of flatback turtles (*N. depressus*) located at Cemetery Beach, approximately 2 km east of the development envelope. The flatback turtle is considered a Matter of National Environmental Significance and is protected under the Commonwealth's Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) and the State's Biodiversity Conservation Act 2016.

DoT has identified the key impact pathways for the species to be from construction and operational light spill / pollution, vessel strikes and dredging equipment entrainment, water quality changes and underwater noise. DoT has outlined a robust management approach as part of this RSI and is of the view that the impacts associated with the Proposal could be avoided entirely or minimised to an acceptable level. DoT's impact predictions are supported by technical experts, including Pendoley Environmental (PENV, 2019).

In addition to marine fauna, DoT has identified fugitive dust emissions generated during construction activities to be a key environmental issue for the Proposal. To manage fugitive dust emissions, a Dust Management Plan (DMP) has been developed to inform the proposal's management measures, monitoring requirements and reporting protocols.

1.7 Management approach

DoT has undertaken site specific environmental studies and investigations that have informed project specific management plans, including:

Dredge Environmental Management Plan (DEMP) (Teal *et al*, 2020) (Appendix A), which includes dredge plume modelling (including spatially delineated Zones of Impact), ecological impact assessment (including benthic cumulative loss predictions). The DEMP is informed by management-based provisions that clearly define management objectives, supported by appropriate monitoring programs that include management targets, management actions, adaptive management and reporting protocols.

The Dust Management Plan (DMP) (Strategen, 2020a) (Appendix B), commits the Contractor to ensure a number of environmental objective detailed within the DMP are met. The DMP provides for a site risk assessment that directs the required

management measures and monitoring required to ensure fugitive dust emissions generated during construction can be minimised to as low as practicable.

Marine Fauna Monitoring Program (Section 2.4), detailing the management measures that direct the engagement of a suitability qualified marine fauna observers and provides for marine fauna exclusion zones delineated based on underwater noise modelling, and providing for appropriate monitoring and reporting procedures and protocols.

To supplement the management framework identified in this CEMP, a Contractor's CEMP will be developed and implemented, and will include more detailed instruction on day to day management.

1.8 Stakeholder consultation

The Pilbara Ports Authority, on advice of the Port Hedland Industry Council was consulted in the development of this CEMP, as well as the Proposal's Dust Management Plan.

2. EMP Provisions

2.1 Environmental Objectives

The following EPA environmental factors and objectives guide and inform the CEMP and the attached management plans, which have been developed in accordance with the EPA's Instructions on how to prepare *Environmental Protection Act 1986* Part IV Environmental Management Plans:

- **Marine Fauna** – The EPA's Environmental Objective for this Factor is *'to protect marine fauna so that biological diversity and ecological integrity are maintained'*.
- **Air Quality** – The EPA's Environmental Objective for this Factor is *'to maintain air quality and minimise emissions so that environmental values are protected'*.
- **Benthic Communities and Habitats** – The EPA's Environmental Objective for this Factor is *'to protect benthic communities and habitats so that biological diversity and ecological integrity are maintained'*.
- **Marine Environmental Quality** – The EPA's Environmental Objective for this Factor is *'to maintain the quality of water, sediment and biota so that environmental values are protected'*.

As this Proposal is a Controlled Action under the EPBC Act, DoT is committed to ensuring management for Matter of National Environmental Significance (MNES) are guided by clear environment objectives defined to achieve the following outcomes, including:

- **Listed Threatened Species and Communities:**

Environmental Outcome: Significant residual impacts do not occur from the proposed action and therefore the biological diversity and ecological integrity of Listed Threatened Species and Communities will be maintained.

- **Listed Migratory Species:**

Environmental Outcome: Significant residual impacts will not occur from the proposed action and therefore the biological diversity and ecological integrity of Listed Migratory Species will be maintained.

The key environmental factors and objectives to be managed under this CEMP have been derived from the Statement of Environmental Principles, Factors and Objectives (EPA, 2016), which outlines objectives aimed at protecting all environments (Themes) including: Sea, Land, Water, Air and People. In consideration of potential environmental impact pathways associated with the proposed construction activities, subsequent project specific Environmental Protection Outcomes (EPOs) and Management Targets (MTs) were derived for each of these factors and are outlined in Table 1.

Table 1 – Management-based Provisions Table

Environmental Factor	EPA Objective	Potential Environmental Impacts	Environmental Outcomes	Management Targets	Management Measures
Marine Fauna	<i>To protect marine fauna so that biological diversity and ecological integrity are maintained.</i>	Injury or death of marine fauna as a result of dredge operations.	No reported negative impacts on marine fauna attributable to marine or terrestrial construction works	No incidences of marine fauna injury or death as a result of turbidity impacts	Outlined in DEMP (Appendix A) and Marine Fauna Monitoring Program (Section 2.4).
				No incidences of marine fauna injury or death as a result of dredge operations	
		Injury or death of marine fauna due to vessel movement (strike).		No incidences of marine fauna injury or death as a result of vessel strike	
		Disturbance to turtle nesting due to marine or terrestrial construction works (noise and light).		No disturbance to turtle nesting as a result of marine or terrestrial construction works	
		Turbidity impacts on marine fauna.		No incidences of marine fauna injury or death as a result of turbidity impacts	
		Introduction of marine pests as a result of construction vessel movements.		No introduction and/or spread of invasive marine species	
		Transfer and spread of potential contaminated sediment/soil	No adverse impacts on land or soil quality resulting from sediment/soil contaminants	Reduce impacts from known contaminated sediment/soil in line with NAGD (2009).	

Air Quality	<i>To maintain air quality and minimise emissions so that environmental values are protected.</i>	Dust generated by activities associated with the construction phases of the Project has the potential to impact on the amenity of residents.	Minimise the generation of fugitive dust emissions during construction to as low as practicable.	Minimise visible dust plumes generated during construction activities.	Outlined in the Dust Management Plan (Appendix B).
Benthic Communities and Habitats (BCH)	<i>To protect BCH so that biological diversity and ecological integrity are maintained.</i>	Direct impacts on BCH due to removal of substrate within the dredge and breakwater footprint.	No irreversible loss, or serious damage to BCH outside of the Zone of High Impact (ZoHI).	Dredging operations do not occur outside the defined dredge footprint	Outlined in DEMP (Appendix A)
		Indirect impacts of benthic communities and habitats due to reduction in available light caused by increase in suspended sediments released into the water column during dredging and discharge of dredge return water	No irreversible loss of BCH outside of the Worst Case ZoHI	No irreversible loss of BCH outside of the Best Case ZoHI	
		Turbidity impacts on BCH arising from return water discharge	Maintain a 'Moderate Level of Ecological Protection' at point of dredge return water discharge	High Level of Ecological Protection for water quality at the discharge point	
Marine Environmental Quality	<i>To maintain the quality of water, sediment and biota so that environmental values are protected.</i>	Disturbance of contaminants in sediments during dredging and return water discharger has the potential to deteriorate water quality and contaminate marine organisms	Sediment quality during dredging and disposal shall be maintained to a 'High Level of Ecological Protection'	Undertake a pre disturbance sediment investigation to determine level of contaminants within project footprint. (complete)	Outlined in DEMP (Appendix A) and detailed in Section 2.5 (Surface and Ground Water Quality).
		Changes to the physico-chemical properties of the water column as a result of	Water quality during dredging and discharging of return water shall be	Manage potential sediment contamination pathways and water quality to maintain a	

	dredging and return water discharge	maintained to a 'High Level of Ecological Protection'.	'High Level of Ecological Protection'.
	Hydrocarbon release into the marine environment from a vessel spill and or bunkering operations	Water quality during dredging and discharging of return water shall be maintained to a 'High Level of Ecological Protection'.	Vessel bunkering, chemical storage and spill response will have no adverse impacts to the marine environment.

2.2 Impact Pathways and Management

Further to the site-specific management plans, this CEMP further outlines several construction related impact mechanisms that have the potential to impact the EPA's Environmental Factors listed above, including:

- Construction Light Spill/Pollution
- Marine Fauna Underwater Noise / Vessel Strikes
- Surface and Ground Water (Including Acid Sulphate Soils)
- Noise and Vibrations
- Traffic Management
- Invasive Marine Species

Each of the above impact mechanisms are discussed in the sections below. Each section is structured to briefly describe the environmental objectives, relevant legislation and guidelines, management measures and monitoring requirements.

2.3 Construction Light Spill/Pollution

Construction light spill has the potential to create a new point source of light in the horizon and requires consideration and management.

2.3.1 Environmental Objectives

- To protect marine fauna so that biological diversity and ecological integrity are maintained
- Significant residual impacts do not occur from the proposed action and therefore the biological diversity and ecological integrity of EPBC Act 'Listed Threatened Species and Ecological Communities' and 'Listed Migratory Species' will be maintained.

2.3.2 Legislation / Guidelines

- EPBC Act (Commonwealth)
- BC Act (WA)
- Environmental Factor Guideline – Marine Fauna (EPA, 2016)
- Spoilbank Light Impact Assessment Report (RPS et al, 2020)
- Environmental Assessment Guideline for Protecting Marine Turtles from Light Impacts (EPA, 2010)
- Commonwealth's *National Light Pollution Guidelines for Wildlife - including Marine Turtles, Seabirds and Migratory Shorebirds (Draft)* (DoEE, 2019)

2.3.3 Management Measures

- The direction and intensity of artificial light point sources should be managed to avoid and reduce light emissions occurring in a westerly direction towards Cemetery Beach.
- All non-essential construction lighting should be turned off at night-time.
- Inspection of the construction area at the end of each construction day to identify potential sources of problematic point source (e.g. task lighting, arena lighting and vehicles).
- Lighting should be selected and managed in accordance with relevant State and Commonwealth guidelines, with a specific focus on the following core principles:
 - Keep it OFF (keep light off the beach and lights off when not needed)
 - Keep it LOW (mount lights low down with lowest intensity for the job)
 - Keep it SHIELDED (stop all light escaping upwards and outwards), and
 - Keep it LONG (use long wavelength lights).
- Further management measures include:
 - Shielding the east facing side (i.e. side facing towards the Cemetery Beach nesting area) of the pole mounted lights to further reduce line of sight visibility to hatchlings within the Cemetery Beach nesting area.
 - Minimise pole mounted lights required to safely light the main access road and parking and when unavoidable, use low intensity amber LED lights.
 - Using lighting controls and / or motion sensors during turtle hatching (early December to mid-February) to keep areas dark when not in use and only providing light when active use of an area is required.

2.3.4 Monitoring

Protocols and Procedures

- Daily site checklist.

Frequency

- Daily, at dusk prior to the lock-up of the site.

Location

- Monitoring and inspections should occur along the eastern boundary of the site.

Responsibility

- Contractor.

Response

- Turn off all non-essential construction light sources.
- Report environmental incidents in accordance with Section 4 of the CEMP.

2.4 Marine Fauna Underwater Noise / Vessel Strikes

Underwater noise due to dredging and piling has the potential to disrupt and disorientate marine fauna and therefore requires consideration and management, including noise management protocols to avoid permanent threshold shift (PTS) (permanent impacts to hearing) and temporary threshold shift (TTS) (temporary impacts to hearing) in marine fauna and minimise adverse behavioural responses. The protocols have been based on underwater acoustic modelling of noise generating activities that will inform an area around these activities to prevent PTS/TTS (Appendix C).

As well as the monitoring and reporting protocols presented in Section 2.4.4, the following management measure should be considered during piling and dredging activities:

- **Marina piles:** As far as practical, piling should be scheduled for low tide. For Marina Piling, observations should be made before piling commences to make sure that the Marina area is clear of megafauna. If the area is clear, then piling can commence.
- **Channel Marker Piles Water depth < 3 m:** Where water depths at the pile are < 3m and only as a precautionary measure, an observation should be made before piling commences to make sure that there are no megafauna are in close proximity of piling operations (i.e. within 50 m) before piling commences. If megafauna are in close proximity, piling should only commence when they have moved outside the area.
- **Channel Marker Piles Water depth > 3 m:** For water depths > 3 m it is proposed that a noise management zone be used to manage noise impacts in the following way:
 - **Before Piling Commences:** Marine Observers should confirm that a noise management zone out to 300 m is clear of Humpback Whales and clear of dolphins and Turtles out to 100 m. Once the management zone is clear, piling can commence.
 - **During Piling:** If Humpback Whales or Turtles move within 500 m and dolphins within 100 m of the piling moving towards the piling activity, then piling should stop within 5 minutes of the observation being made. Once the animals have moved out of their respective management zones piling can recommence.

2.4.1 Management Objectives

- To protect marine fauna so that biological diversity and ecological integrity are maintained.
- Significant residual impacts do not occur from the proposed action and therefore the biological diversity and ecological integrity of EPBC Act 'Listed Threatened Species and Ecological Communities' and 'List Migratory Species' will be maintained.

2.4.2 Legislation / Guidelines

- EPBC Act (Commonwealth)
- BC Act (WA)
- EPA Environmental Factor Guideline – Marine Fauna (EPA, 2016)

2.4.3 Management Measures

Pre-construction Phase

- Site contractor(s) to undertake environmental induction for all site staff, providing information on marine reptiles (including the Flatback and Green Turtles), cetaceans and fish species (including the Green, Dwarf and Narrow sawfish) awareness and associated management and monitoring protocols.
- Appoint a suitably trained marine fauna observer (MFO) tasked with monitoring for marine fauna to avoid and minimise impacts relating to piling (underwater noise impacts) and dredging (marine fauna entrainment) activities.
- Educate construction site contractor(s) that the MFO has the responsibility and powers of suspending dredging and piling activities based on the below monitoring protocols and procedures.

Construction Phase

- Suitably trained marine fauna observer (MFO) on duty during all targeted noise generating activities.
- Site contractor(s) to undertake all specified monitoring protocols and procedures.
- No start-up of marine noise generating piling activities if marine fauna are observed inside the exclusion zones as per defined protocols.

2.4.4 Monitoring

The monitoring protocols and procedures have been based on underwater acoustic modelling of noise generating activities that will inform an area around these activities to prevent PTS/TTS (Appendix C).

Protocols and Procedures

To mitigate potential impacts of the Proposal on significant marine fauna the Contractor must implement the following management and monitoring protocols during marine piling and dredging works:

1. Undertake pre-start shoreline checks for turtle activity and ensure accurate recording and log sheets are kept, as well as turtle activities are reported to DBCA within 48 hours.
2. No marine piling or dredging activities are permitted between 1 December and 31 March.
3. A suitably trained Marine Fauna Observer must maintain a watch for marine turtles, sawfish and whales during piling and dredge vessel transit. If marine turtles, sawfish or whales are sighted within 300 metres of the piling and dredging vessels, a maximum vessel speed of 6 knots must be applied.
4. Piling and dredging activities must not commence until a suitably trained Marine Fauna Observer has verified that no marine turtles and sawfish have been observed within 300 metres of piling and dredging activities and no whales have been observed within 1500 metres during the 30 minute period immediately prior to the commencement of piling and dredging activities.
5. Soft start-up procedures must be implemented for all piling and dredging activities, for a period of no less than 15 minutes.
6. A suitably trained Marine Fauna Observer must monitor a 1500 metre radius around the piling and dredging activities continuously during piling and dredging activities to identify if there are any marine turtles, sawfish or whales present.
7. If a suitably trained Marine Fauna Observer observes a marine turtle or sawfish within 300 metres or a whale within 500 metres of piling and dredging activities, piling and dredging activities must be suspended within 2 minutes of the sighting or as soon as safely possible.
8. Piling and dredging activities that have been suspended must not recommence until the sighted marine turtle or sawfish have moved beyond 300 metres, or the sighted whale has moved beyond 1500 metres of piling and dredging activities of their own accord, or the marine turtle or sawfish has not been seen within 300 metres, or the whale within 500 metres of piling and dredging activities for a period of at least 30 minutes.
9. Piling and dredging activities that have been suspended for more than 15 minutes must recommence with soft start-up procedures.
10. During periods of low visibility (where a distance out to 1500 metres cannot be clearly viewed), pile driving and dredging activities may be undertaken, provided that during the preceding 24 hour period:

- a. there have not been 3 or more shut down situations due to marine turtle, sawfish or whale sightings; and
- b. a 2 hour period of continuous observation was undertaken in good visibility (to a distance of 1500 metres) and no marine turtles, sawfish or whales were sighted.

11. Monitor and log the occurrence of sick, injured and dead turtles within the development envelope.

Frequency

- On-going during piling and dredging activities.

Location

- Appropriate monitoring locations shall be selected by the Marine Fauna Observer prior to the commencement of any marine piling or dredging activities, to ensure the entire extent of the exclusion zones identified in section 2.4.4 is visible.

Responsibility

- Contractor and Marine Fauna Observer.

Response

- A log detailing marine turtle and marine mammal sightings and activities will be maintained on all vessels.
- Any incidents that relate to mammal injury/mortality will be documented and reported to DoT. DoT will report all incidents of injury or mortality to the DBCA and DoEE within 48 hours.
- Report environmental incidents in accordance with Section 4 of the CEMP.

2.5 Surface and Ground Water

Fine sediments are expected to be released from Dredge Material Management Areas (DMMA) during on-site dewatering of dredge material. Bunding has been detailed in the DEMP (Appendix A).

Hazardous materials and fuels (i.e. hydrocarbons) have the potential to leak or spill on-site and enter surface and ground water, and ultimately enter the marine environments. Management for these impact pathways will be a focus of this section.

2.5.1 Environmental Objectives

- To maintain the quality of surface and ground water, sediment and biota so that the environmental values are protected.
- To maintain the quality of land and soils so that environmental values are protected.
- No adverse impacts surface or groundwater quality resulting from handling Potential Acid Sulphate Soils (PASS).

- No adverse impacts on land or soils quality resulting from sediment/soil contamination, including PASS.

2.5.2 Legislation / Guidelines

- National Water Management Australian and New Zealand Environment Conservation Council Strategy Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ 2000).
- Water Quality Protection Note: Contaminant Spills – Emergency Response (DoW 2006).

2.5.3 Management Measures

Pre-construction Phase

- Site contractor(s) to undertake environmental induction, including information on required surface water management actions.

Construction Phase

- Implement actions to avoid spills of liquids/chemicals into surface and groundwater, and if a spill occurs within the project area, emergency spill procedures will be implemented in accordance with relevant Australian Standards.
- Spill kits (marine and terrestrial) are to be located on site, maintained by the Contractor and personnel trained in their use. The required resources of spill kits will be informed by a construction environmental risk assessment led by the Contractor, which will consider the range of probable hydrocarbon spill risks for marine and terrestrial works, and the response capability required for these scenarios
- At the commencement of the settlement period, the reclamation area will be stabilised, for instance with hydro-mulch, jute matting or geotextile, to minimise mobilisation of the material in the reclamation area through overland flows.

2.5.4 Monitoring

Protocols and Procedures

- Pre-start daily inspections to be undertaken of all site vehicles to check for fluid leaks.
- Monitoring for increases in turbidity (with response actions) should be carried out in accordance with the DEMP.
- Monitoring for hydrocarbon spills (with response actions) should be carried out in accordance with the DEMP.
- Monitoring for PASS in accordance with DEMP.

Frequency

- On-going during construction.

Location

- On-site and within the marine environment of the development envelope.

Responsibility

- Contractor.

Response

- Hydrocarbon spills into the marine environment (in State waters) be immediately reported to Department of Transport's Maritime Environmental Emergency Response (MEER) unit (ph. 9480 9924).
- Uncontained spills to be reported to the DWER via the Pollution Watch Hotline on 1300 784 782.
- Implement MEER's oil spill response protocols.
- Report environmental incidents in accordance with Section 4 of the CEMP.

2.6 Noise and Vibrations

Noise from the construction works could impact to sensitive receptors within the Town of Port Hedland (construction, public, commercial, and residential areas).

2.6.1 Environmental Objectives

- Manage emissions (including air and noise) so they do not adversely affect environmental values or the health, welfare and amenity of people and land uses.

2.6.2 Legislation / Guidelines

- Environmental Protection (Noise) Regulations 1997.
- EAG No. 13: Consideration of Environmental Impacts from Noise (EPA 2014).
- Australian Standard AS 2436:1981, Guide to Noise Control on Construction, Maintenance and Demolition Sites.

2.6.3 Management Measures

Pre-construction Phase:

- Site contractor(s) to undertake environmental induction for all staff, providing information on required noise management actions.
- The site contractor(s) is required to develop a Noise Management Plan to manage potential noise impacts. The Noise Management Plan should be submitted to the Town of Port Hedland at least seven days before the work starts with the plan being approved by the Town prior to the commencement of construction activities.

Construction Phase:

- All equipment, machines and vehicles on site during construction to be the quietest reasonably available consistent with operational requirements, and to be routinely maintained to ensure effectiveness of noise suppression systems and equipment.
- All “warm-up” of equipment by employees and site contractor(s) arriving early to the construction site not to be carried out outside of approved construction hours.
- Site contractor(s) to ensure works are only carried out between 6.00 am and 7.00 pm on any day that is not a Sunday or a public holiday.

2.6.4 Monitoring

Protocols and Procedures

- Undertaken in accordance with the approved Noise Management Plan.

Frequency

- Undertaken in accordance with the approved Noise Management Plan.

Location

- Undertaken in accordance with the approved Noise Management Plan.

Responsibility

- Contractor.

Response

- Undertaken in accordance with the approved Noise Management Plan.
- Any noise-related complaints to be registered as an environmental incident, triggering review of work processes and a corrective action managed by the site contractor(s) if the complaint is supported and can be resolved.
- Report environmental incidents in accordance with Section 4 of the CEMP.

2.7 Traffic Management

Traffic associated with the construction works, in particular truck movements, could cause impacts to sensitive receptors (construction, public, commercial, and residential areas).

2.7.1 Environmental Objectives

- Manage traffic impacts (including dust and noise) so they do not adversely affect environmental values or the health, welfare and amenity of people and land uses.

2.7.2. Legislation / Guidelines

All traffic management works and control devices shall be in accordance with:

- AS 1742 – Manual of uniform traffic control devices
 - Part 1 – General introduction and index of signs
 - Part 2 – Traffic control for general use
 - Part 3 – Traffic control for works on roads
 - Part 4 – Speed controls
- Guide to Preparation of Traffic Management Plans
- Local Government Act 1995
- Main Roads Act 1930
- Occupational Safety & Health Act 1984
- Occupational Safety & Health Regulations 1996
- Road Traffic Act 1974

2.7.3 Management Measures

Pre-construction Phase:

- Site contractor(s) to undertake site induction, including information on required traffic management controls and actions.
- The site contractor(s) is required to develop a Traffic Management Plan (TMP) to manage potential impacts. The Traffic Management Plan should be submitted to the Town of Port Hedland at least seven days before the work starts with the plan being approved by the Town prior to the commencement of construction activities.
- The site contractor(s) is required to develop a DMP as noted above.

Construction Phase:

- All equipment, machines, deliveries and vehicles associated with the construction to adhere to the approved TMP and DMP.

2.7.4 Monitoring

Protocols and Procedures

Frequency

- Daily, or in accordance with approved TMP and DMP.

Location

- Site and approach roads.

Responsibility

- Contractor

Response

- Undertaken in accordance with the approved TMP and DMP.
- Any traffic-related complaints to be registered as an environmental incident, triggering review of work processes and a corrective action managed by the site contractor(s) if the complaint is supported and can be resolved.
- Report environmental incidents in accordance with Section 4 of the CEMP.

2.8 Invasive Marine Species

Introduction of invasive marine species into the surrounding environment during construction vessel movements.

2.8.1 Environmental Objectives

- To protect marine fauna so that biological diversity and ecological integrity are maintained
- Significant residual impacts do not occur from the proposed action and therefore the biological diversity and ecological integrity of EPBC Act 'Listed Threatened Species and Ecological Communities' and 'List Migratory Species' will be maintained.

2.8.2 Legislation / Guidelines

- EPBC Act (Commonwealth)
- BC Act (WA)
- WA Department of Primary Industries and Regional Development (DPIRD) Biosecurity Procedures

2.8.3 Management Measures

- The Contractor will be required to ensure that before mobilising any vessels related to dredge and construction activities, it will be verified that best-practice cleaning and inspections have taken place prior to leaving the vessels last port of origin
- All vessels are in compliance with the PPA Introduced Marine Pest Risk Assessment and DPIRD's biosecurity procedures and protocols, including Vessel Check 2.0.

2.8.4 Monitoring

Protocols and Procedures

- On-going visual monitoring for invasive species presence is required.

Frequency

- On-going.

Location

- Dredge and supply vessels.

Responsibility

- Contractor.

Response

- Contact DPIRD within 24 hours of finding invasive marine species with the construction site.
- Report environmental incidents in accordance with Section 4 of the CEMP.

2.9 Environmental Inspections

All environmental Inspections shall be performed and documented by the Contractor or a designated staff, as noted in Section 3.

The person undertaking the daily inspections shall initial the inspection sheet after checking off each environmental aspect. In the event that any non-conforming environmental issues are observed they should be noted on the inspection sheet, and brought to the attention of the Principal. Cross reference can be made to attached sheets or documents for major incidents.

Additional Environmental Inspections shall be conducted when:

- High risk jobs are proposed
- High volume fuel transfer
- Dewatering of sediments
- When the job requirements change.
- When new plant or equipment arrive on site.

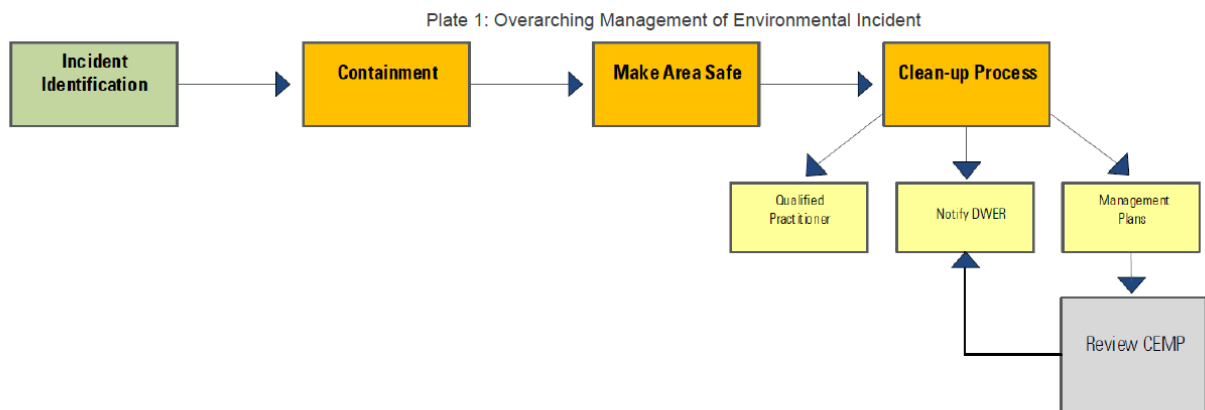
The Environmental Inspections may be used to assess the need for additional on-site management of process, change of equipment and/or procedure changes for work instructions requirements.

2.10 Unexpected Findings Protocol

In the event that any spill, chemical exposure, breach of bund, excess dust, or new material suspected of containing potentially hazardous substances is found (e.g. asbestos containing material), the following procedures should be implemented:

1. Stop/prevent any activity in the area.
2. Place signage and barricade area – make area safe. Do not touch or disturb the item/material.
3. Report the Unexpected Occurrence/Finding to the Superintendent.
4. Record the location, visual appearance, odour, and extent, type of accident or material and mode of discovering the material to the Superintendent.

5. Obtain assistance from a suitably qualified practitioner in identifying the potential hazard to human health or the environment in accordance with regulatory requirements.
6. Establish management actions in compliance with regulatory requirements.
7. Obtain the Superintendent and the approval of the relevant regulator for the proposed management actions.
8. Implement the approval management action plan and seek on-going advice as necessary.
9. Document the findings and compliance with the approved action plan and provide documentation to the Superintendent.
10. Update the CEMP procedures and controls as required.



Management framework for environmental incidents

3. ROLES AND RESPONSIBILITIES

3.1 Roles and Responsibilities

The overarching responsibility for the implementation of this CEMP lies with the Principal. This CEMP has been prepared for all Site users including those involved in construction prior to occupation on the Site. This includes:

- Principal
- Superintendent
- Facility Manager
- Contractors
- Subcontractors
- Occupants/Users.

The roles and responsibilities of organisations or individuals in relation to the environmental protection measures during construction are described in Table 2. These responsibilities do not replace any other regulatory responsibilities of parties in relation to a change in land use or development work at the Site.

Table 2: Environmental protection roles and responsibilities

Stakeholder	Roles and Responsibilities
<p>The Principle and the Superintendent as it's agent</p>	<p>The Principal is the party with ultimate responsibility of the Site, under the circumstance applying at the time. This may include but not be limited to the following:</p> <ul style="list-style-type: none"> • Promoting and maintaining environmental management by aiming to prevent environmental impacts caused by working practices • Monitoring compliance with environmental legislation, regulation, standards and codes • Allocation of financial resources to adequately meet environmental management needs • Provision of competent person(s) to investigate environmental incidents and accidents and initiate corrective (preventative) actions • Provision of adequate resources for effective environmental management • Notification to the Contractor of potential environmental issues • Assessing and reviewing Contractors' abilities to comply with environmental management requirements • Confirmation of Contractor adherence to the CEMP requirements • Ensuring adequate instruction and training is provided for all employees. • Confirmation that the Site condition complies with this CEMP after Site works by the Principal or any contractor • Inform the occupants of the Heritage values identified for the Site • Ensure adequate monitoring of the Contractor with regard to implementation of this plan during construction.
<p>Contractor</p>	<p>The Contractor is responsible for the day to day activities during normal Site operations (i.e. during construction). The Contractor, as far as it is reasonably practical, is responsible for:</p> <ul style="list-style-type: none"> • Undergoing training and induction to effectively fulfil its environmental management role and responsibilities • Ensuring employees are inducted in CEMP and follow environmental management procedures • Promoting environmental management and encouraging the involvement of all personnel in cooperating and being involved with toolbox meetings • Ensuring that all management actions outlined in the CEMP are carried out • Undertaking inspections and completing relevant checklists

	<ul style="list-style-type: none"> • Reporting of all environmental hazards and incidents and ensuring appropriate records are created and investigations undertaken • Notification of the Superintendent in the event of non-compliance or failure to meet environmental targets and all environmental incidents outlined in this CEMP • Ensuring environmental management issues are resolved as soon as is practicable • Ensuring that all employees receive relevant training • Recording of all activities relating to soil excavation including the location and nature of the excavation • Ensuring that plant and equipment complies with Regulations, Codes of Practice or Standards and that documentation is available on request. • Ensure that all inductees to the Site (i.e. employees / subcontractors) have read the CEMP and sign the CEMP Induction Log, Appendix D • It is the role of the Contractor to contact the appropriate authority in the event of an Environmental Incident or adverse environmental impact taken place during the development of the project.
<p>Employees and subcontractors</p>	<p>Employees and sub-contractors on-site shall:</p> <ul style="list-style-type: none"> • Comply with and adhere to the CEMP and relevant procedures • Perform their work in accordance with training and instructions provided • Report all environmental hazards, incidents and “near misses” that occur at the Site to the Contractor 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 CEMP Induction Log Appendix D.
<p>Contractors and their employees engaged in excavation works</p>	<p>All Personnel have a responsibility to make decisions with respect to environmental protection and pollution prevention. All Personnel shall:</p> <ul style="list-style-type: none"> • Comply with the requirements of statutory safety and environmental legislation • Comply with, and adhere to, the CEMP and relevant procedures • Be responsible for environmental compliance, in so far as they have some control, either direct or indirectly • Immediately report all environmental incidents/accidents, or other environmental concerns in the workplace • Advise supervision immediately of unsafe conditions or activities in the work area • Be responsible for keeping the workplace in a clean and tidy condition.

Companies undertaking underground services at the Site	<p>Have responsibility for:</p> <ul style="list-style-type: none"> • Obtaining a copy of the CEMP prior to carrying out any excavation work at the Site • Complying with the requirements and intent of the CEMP during excavation works on-site.
Department of Water and Environmental Regulation (DWER)	In the event of a failure to comply with the CEMP, the DWER has powers to require further management of any environmental issues and / or additional assessments if deemed necessary.

4. ENVIRONMENTAL INCIDENTS AND RESPONSE FRAMEWORK

4.1 Environmental Inspections

The person undertaking monitoring shall document and sign-off after checking off each monitoring aspect (where applicable). Further Environmental Inspections shall be conducted when the job requirements change.

4.2 General Incident Response

In the event that any unplanned or non-conforming environmental issues (i.e. targets are not met or management actions are not followed) are observed, they should be noted on an inspection sheet and an environmental incident form completed. The following points will be recorded in an environmental incident form:

1. Time and date of incident
2. Location and description of event
3. Incident category, as described in Table 3
4. Weather conditions
5. Involved parties
6. Person recording complaint and witness (if applicable)
7. Steps to make area safe
8. Steps to rectify problem
9. Steps to ensure incident will not occur again (e.g. process review of management plans)
10. Notification to relevant authority
11. Deadline to rectify incident
12. Sign off once clean-up is completed.

Any significant incident that occurs on or arises from this Site shall be reported with urgency commensurate with the incident. Table 3 provides guidance on the hierarchy of incidents and their reporting.

Table 3: Hierarchy of incidents and their reporting

Incident Category	Rank	Description	Reporting Level	Reporting Time
1	High	Incident with a significant risk of environmental impact, potential impact off-site (e.g. neighbouring occupants) and/or cause alarm to the community	Contractor, Superintendent, Responsible authorities (i.e. DWER, EPA)	All environmental incidents shall be reported to the Superintendent as soon as the immediate response to the incident is complete. It is also a requirement that all hydrocarbon spills into the marine environment (in State waters) be immediately reported to Department of Transport's Maritime Environmental Emergency Response (MEER) unit (ph. 9480 9924) and PPA's VTS in accordance with the Port Handbook. MEER's protocols must then be followed. Refer also DoT website.
2	Intermediate	Incident with potential to cause minor environmental impact or cause concern to neighbouring occupants and/or the community.	Contractor, Superintendent & responsible authorities (i.e. DWER, Council, EPA)	All environmental incidents be reported to the Superintendent as soon as the immediate response to the incident is complete. 24 Hours
3	Low	Incident unlikely to cause immediate environmental impact but requires rectification	Contractor, Superintendent & responsible authorities (i.e. DWER)	All environmental incidents be reported to the Superintendent as soon as the immediate response to the incident is complete. 7 days

In addition, emergency response to protect public health and safety, and the environment requires the following actions:

- Assess the nature and scale of the problem
- Take appropriate actions to immediately contain/mitigate problem - if safe to do so
- Make the area safe
- Communicate with relevant personnel on/off-site to advise them of the situation
- Verbally report to Superintendent and relevant regulatory authorities based on the magnitude and seriousness of the event
- Deploy appropriate internal and/or external resources to rectify the situation, if necessary
- Record and report the incident and outcome in Site's CEMP Environmental Incident Forms (prepared by the Contractor)
- Implement remedial/corrective action on facilities, procedures and/or practices

- Superintendent signs out the final check in CEMP Environmental Incident Forms (prepared by the Contractor)
- Review and update of the CEMP.

4.3 Emergencies

An “emergency” is any situation arising in which an unplanned occurrence potentially results in an immediate or imminent hazard to public health and safety or to the environment. Certain “near miss” situations should also be treated as reportable emergency incidents.

Table 4 summarises some of the potential environmental emergency situations possible at this Site for which contingency plans are to be prepared by the Contractor.

Table 4: Potential environmental emergency situations

Issue	Emergency Condition	Contact In Event of Emergency
Contamination of the ocean	<ul style="list-style-type: none"> • Spill of contaminant into the ocean (e.g. fuel). • Sediment runoff into ocean 	<ul style="list-style-type: none"> • Contractor • Superintendent • DWER
Off-site dust, litter or waste	<ul style="list-style-type: none"> • Visible particles, litter or waste resulting in aesthetic impact on neighbouring properties or environment. 	<ul style="list-style-type: none"> • Contractor
Fire	<ul style="list-style-type: none"> • Fire in equipment, facilities or fuel/chemical storage. 	<ul style="list-style-type: none"> • Contractor • Superintendent • Fire Brigade • DWER

4.4 Public Compliant Resolution

In the event a complaint is received it shall be recorded appropriately. It is the responsibility of the Contractor to assess the collected complaint to allow formal judgement of the nature and severity of the complaint and to ensure that the person voicing the complaint can receive feedback if the person had requested it.

All information will be recorded, either from a phone call, written or verbal complaint be made to a member onsite. The following information should be collected:

1. Time and date of complaint
2. Nature of complaint (e.g. location, description of events that led to complaint, etc.)
3. Weather conditions (e.g. windy period and potential for increased dust)
4. Involved parties
5. Name and contact details of person making complaint, if provided
6. Is a response required?
7. Person recording complaint

8. Project manager of appointed personnel following it up.

Every complaint relating to the environment shall be treated as an environmental incident and therefore recorded as an environmental incident.

5. REFERENCES

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Strategen (2020b) *Flora and Vegetation Botanical Survey Report*, report prepared for Department of Transport

Talis (2020) *Underwater Noise Modelling Report*, report prepared for Department of Transport

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Teal Solutions and O2 Marine (2020c) *Dredge Environmental Management Plan*, prepared for the Department of Transport

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6. APPENDICES

Appendix A – Dredge Environmental Management Plan (Teal *et al*, 2020)

Appendix B – Dust Management Plan (Strategen, 2020)

Appendix C – Underwater Noise Modelling Report (Talis, 2020)