RioTinto

Environmental Management Plan

Cape Lambert Port A Marine Structures Refurbishment Project

December 2018

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1. Background

1.1 Project description

The Project is situated within the existing Cape Lambert Port, located on Pilbara coast of Western Australia approximately 5 km from Point Samson, 12 km from Wickham and 60 km from Karratha (**Figure 1-1**). The Cape Lambert Port consists of two operational areas, Cape Lambert Port A (CLA) and Cape Lambert Port B (CLB).

1.1.1 Project area

The Project area (**Figure 1-2**), comprising the works area (CLA jetty/wharf, service wharf and two laydown areas) plus a 2 km radius, encompasses the extent of potential direct and indirect impacts of the Project.

1.2 Proposed activities

The proposed activities associated with the Project are predominantly nearshore works, located within the existing port facility and include:

- Offsite fabrication and delivery of piles, caps, fenders and mooring equipment required for 18 berthing dolphins and two mooring dolphins at the CLA wharf. Piles will be 1.2 m in diameter. The onshore component of the Project will involve the use of two existing laydown areas within the Lease Area for storage of piles and associated equipment. The piles will be loaded aboard barges at the existing CLA Service Wharf for haulage to the nearshore worksites at the CLA wharf and jetty.
- Replacement of dolphins via the installation of new dolphins alongside the existing structures; these will be connected by a steel jetty walkway between the new dolphins to enhance safe access around the wharf. A total of 108 new piles will be driven into the seabed using a hydraulic pile hammer supported by a crane and jack-up barges. Following the completion of installation of the new replacement dolphins, the redundant dolphins will be mechanically cut above seabed level and transported to shore with the intention to be recycled as scrap metal.
- Strengthening the CLA jetty by the installation of an additional 36 piles with tie-ins back into the jetty. The piles will be installed in groups of four (two either side of the jetty) at nine locations along the jetty. These piles will also be installed using a hydraulic pile hammer supported by a crane and jack-up barges.

1.3 Purpose and scope

This Environmental Management Plan (EMP) informs how the Project will manage impacts to sensitive environmental values as required under the Western Australian *Environmental Protection Act 1996 (EP Act)*, and the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*. The EMP will be implemented for the duration of the Project and:

- Describes the environmental values of the Project area
- Identifies potential impacts on species and other sensitive environmental values that may occur as a result of the Project
- Undertakes a risk assessment to evaluate the potential impacts that pose the most risk to environmental values and those that require detail management measures to reduce the risk
- Identifies the measures to be applied to avoid and minimise environmental impacts from the Project
- Details the objectives, triggers and performance targets to be achieved by the implementation of this management plan.

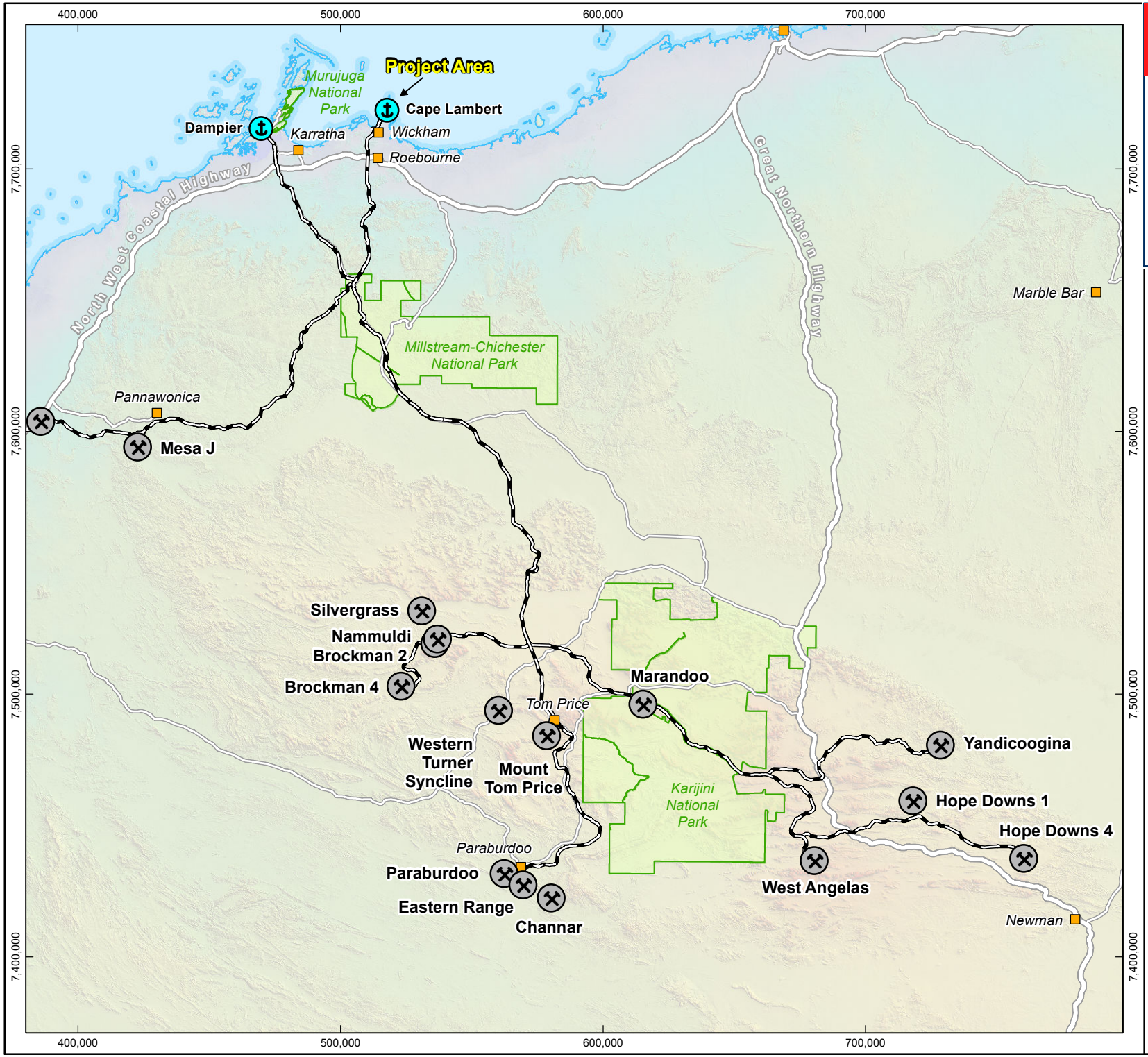

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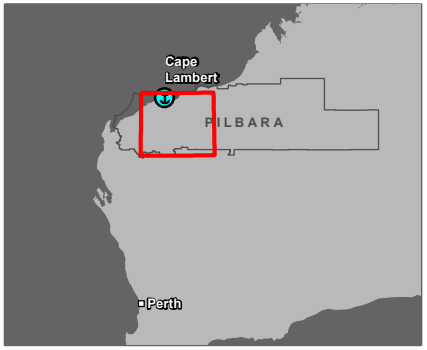
Figure 1-1: Locality

T. Murphy
December, 2018

Plan No: PDE0164793v1
Proj: MGA94 Zone 50

Legend

- Rio Tinto Mine
- Port
- Town
- National Park
- Rio Tinto Railway
- Highway
- Major Road



N

0 20 40 60 80 100
Kilometres

Map units in metres

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eco logical AUSTRALIA
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Figure 1-2: Project Area

Drawn: NR
Date: 18-Dec-18

Proj: GDA 1994 MGA Zone 50
Scale: 1:20,000 @ A4 page size

LEGEND

- Project Area
- Works Footprint
- Jetty Piles

N

0 0.5 1
Kilometres

Map units in metres

1.4 Timeframes

1.4.1 Project timeframes

The Project will be implemented once all external and internal approvals have been obtained and the tendering/contract process has been finalised.

It is anticipated that the Project will commence in Q3 2019 and extend for approximately 12-18 months. This will be dependent on the scheduling of periods when access to CLA berths is granted to undertake the works so as not to disrupt ongoing port operations. Given good working conditions, completion of a dolphin could take around 4-5 days, while installation of pile arrangements for the jetty strengthening works could take around 1-2 days per pile location.

1.4.2 Work timeframes

Piling will be undertaken during day-time (7 am to 7 pm, Monday to Saturday). Piling will only be undertaken in the evening (7 pm to 10 pm, Monday to Saturday) in the unlikely event that a pile that has been positioned during the day-time is not secure or stable and is at risk of toppling. In such a scenario, sufficient piling will be undertaken to make the pile safe and stable before completion the next available piling day. No piling will be undertaken during night-time (10 pm to 7 am).

Piling will not be required over this whole period. Outside the period of piling, the implementation phase will involve delivery of piles, stockpiling of piles, loading barges with piles, delivery to the work area, positioning piles, installation of above water infrastructure (e.g. walkways between dolphins, caps, jetty tie-ins) and removal of redundant infrastructure.

Depending on progress, the CLA jetty strengthening works will be undertaken at the same time as the CLA dolphin replacement works. This may result in up to two pile driving barges operating concurrently for short periods.

1.5 Stakeholders

Key stakeholders were identified based on Rio Tinto's experience in project developments in the Pilbara region, especially recent port expansions and upgrades at Dampier and Cape Lambert. The following key stakeholders were identified:

State and Local Government agencies

- City of Karratha
- Department of Jobs Tourism, Science and Innovation
- Department of Transport
- Environmental Protection Authority Services of the Department of Water and Environmental Regulation (EPA)
- Pilbara Ports Authority

Commonwealth Government agencies

- Department of the Environment and Energy (DoEE)

Non-government organisations

- Point Samson Community Association
- Coastal Community Environmental Forum
- Dampier Technical Advisory and Consultative Committee

1.6 Structure of the EMP

The objective of this EMP is to create a risk-based usable document that is clear and structured to assist the regulator during the assessment process, and a document that can be readily implemented by a Contractor. The EMP structure is summarised below:

- Project description
- An overview of the existing environment
- Identification of activities and potential impacts to populate the risk assessment
- Risk assessment to identify activities that are the highest risk and need active management
- Specific management measures
- Reporting and review.

This EMP has been prepared to identify and assess project activities and risks while tailoring management actions. The EMP attempts to meet the objectives of the Commonwealth DoEE's Environmental Management Plan Guidelines and the Western Australia EPA's Instruction on how to prepare *Environmental Protection Act 1986* Part IV Environmental Management Plans.

1.6.1 Relationship to other plans

To ensure the EMP is easily implemented by a Contractor, the document has focussed on project activities that may impact on sensitive receptors, and associated management actions to be implemented. Information such as the existing environment (terrestrial and marine) can be found in the Cape Lambert Port A EPBC Act referral (2018) with its associated technical reports, the Cape Lambert Port A EP Act referral (2018) with its associated technical reports, and the Cape Lambert Port B (CLB) Development Public Environment Review and Draft Public Environmental Report and its associated technical reports (SKM 2009).

Table 1-1 outlines the existing approvals and management plans that apply to the Cape Lambert lease area.

Table 1-1: Existing approvals and management plan related to the Cape Lambert lease area

Existing approvals / management plan	Description
Ministerial Statement 514 (28 June 1999)	Upgrade of CLA to accommodate ore from the West Angelas mine site and increase throughput to 55 Mtpa. Included marine and terrestrial works
Ministerial Statement 741 (18 May 2007) Ministerial Statement 1050 (30 December 2016) – s46 change of conditions (dust and noise)	Upgrade of CLA to increase throughput to 85 Mtpa. Included terrestrial works only. Subsequent change to proposal amendment under MS 741 for 105 Mtpa throughput
Ministerial Statement 743 (12 July 2007)	Dredging for upgrade of CLA to 85 Mtpa. Included marine works only
Ministerial Statement 840 (30 September 2010) and Ministerial Statement 876 (31 October 2010) Ministerial Statement 1049 (30 December 2016) – s46 change of conditions (dust) EPBC 2008/4032 (26 October 2010)	Construction of the CLB project with 130 Mtpa capacity. Both terrestrial and marine works
Sea Dumping Permit No. SD2016/3242 (16 June 2016)	Dumping up to 400,000 m^3 (in-situ) of dredged material derived from maintenance dredging of Cape Lambert from 16 June 2016 to 31 May 2019

Existing approvals / management plan	Description
Prescribed Premises Licence (L5278/1973/13)	Category 5 – Processing or beneficiation of metallic or non-metallic ore Category 12 – Screening etc of material Category 52 – Electrical Power Generation Category 58 – Bulk material loading or unloading Category 73 – Bulk storage of chemicals, etc
Cape Lambert Operations Marine Environmental Quality Management Plan (MEQMP)	Developed as part of management goals for the area and in fulfilment of condition 13 of Ministerial Statement No. 743. The MEQMP seeks to reconcile the need for protection of the marine environment with the operations of the area as a designated operations facility adjacent to a centre of population
Marine Turtle Management Plan	Developed as a requirement of Ministerial Statement No. 840 and EPBC 2008/4032. Plan was also aligned the requirements of Ministerial Statement No. 743. Covers both operational and construction (CLB) related issues
Ecosystem Research and Monitoring Program (ERMP)	Condition 10 of EPBC 2008/4032 required development of an ERMP to acquire a detailed ecological understanding of the marine environment of the Cape Lambert region The ERMP works have been completed and is relevant only in that the information gathered has been used to develop this EMP

2. Existing environment

Extensive environmental studies were conducted in the Cape Lambert area as part of the CLB project (EPBC 2008/4032 and Ministerial Statement 840). A significant amount of environmental information has also been gathered during the implementation of Condition 10 (ERMP) of EPBC 2008/4032. Some additional studies have been specifically undertaken to inform the assessment of the CLA Marine Structures Refurbishment Project. The key studies and reports include:

- Public Environmental Review and Draft Public Environment Report (SKM 2009)
- Assessment of lighting effects on turtles (Bassett 2009)
- Species specific surveys for *Lerista nevinae* (Biota 2008a)
- Flora and vegetation survey (Biota 2008b)
- Marine turtle assessment (Biota 2008c)
- Seasonal fauna survey (Biota 2008d)
- Sediment sampling and analysis report (MScience 2015)
- Humpback whale aerial surveys 2012-2016 review (BMT Oceanica 2017)
- Underwater noise literature review addendum (ERM and JASCO 2018)
- Underwater noise modelling report (Li and McPherson 2018)
- Underwater noise report (ERM 2018a)
- Ambient noise impact assessment (ERM 2018b)
- CLA jetty habitat assessment (Hydrobiology 2018).

The following sections present a summary of the existing environment of the Project area, with further information available in those documents cited above. Table 2-1 summarises the environmental values for the region. The summary is focused on the key environmental factors that may be impacted and will be managed through the implementation of the EMP.

The focus of the sensitive receptors relevant to the project activities are the subject of a risk assessment. The risk ratings are assessed in Section 5 for each environmentally sensitive receptor and project activity using the risk matrix as per ISO 31000:2009.

Table 2-1: Summary of environmental values at Cape Lambert

Environmental factor of value	Description within Project area
Terrestrial	
Terrestrial flora and fauna	• The Project area consists of large portions of previously disturbed areas, where terrestrial vegetation has been cleared to allow for the infrastructure associated with Cape Lambert operations. • A search of the EPBC Protected Matters Search Tool (PMST) indicated that no threatened ecological communities or threatened flora species' habitat was known to occur or had the potential to occur within a 10 km radius of the Project area. • The terrestrial habitat of highest value is located at Bells Beach and Cooling Water Beach and is mostly comprised of primary dunes.
Terrestrial environment	• Local light environment at Cape Lambert is well lit due to the requirements of the operational port facility. • Eight receptor locations have the potential to be impacted by noise generated from the Project. The receptors are a mix of industrial, commercial and residential premises and range from between 4.5 km to 11.5 km away from the CLA wharf (ERM 2008b).

Environmental factor of value	Description within Project area
Marine	
Protected areas	• Marine protected areas of relevance to the Project is the Commonwealth Dampier Marine Park, which is located within 10 km of the Project area. • The State proposed Dampier Archipelago Marine Park is also located within 20 km of Cape Lambert.
Oceanography and bathymetry	• Cape Lambert is located on the North West Shelf, which comprises 95,000 km^2 of continental shelf extending from the North West Cape of Western Australia to the Arafura Sea. • The regional bathymetry is complex with depths generally less than 20 m. There is a broad, shallow (<10 m) near shore region with several exposed reefs and islands. • The area immediately north of Cape Lambert is defined by a broad, shallow intertidal flat that gently slopes to a shallow bank stretching for a few hundred metres before quickly sloping down to a uniform depth of approximately -7 to -9 m below Chart Datum (m CD). A further 1.5 to 2 km beyond this area, the seabed steeply slopes to -12 to -14 m CD.
Sediment characteristics[1]	• Sediment material within the Cape Lambert area has been previously assessed and considered suitable for ocean disposal when compared to the National Assessment Guidelines for Dredging (NAGD; DEWHA 2009) • Tributyltin levels, polycyclic aromatic hydrocarbons and total recoverable hydrocarbons have been all below NAGD screening guidelines. • Elevated nickel and chromium concentrations have been located throughout proposed dredging areas, which is consistent with marine sediments within the Pilbara region. Further eco-toxicity testing has not found evidence of acute of chronic toxicity. • The risk of actual and potential acid sulphate soils has been low, with the buffer capacity of the material found to be sufficiently high to neutralise any potential acidity. • Physical sediment characteristics has varied in composition. Material targeted for maintenance dredging, which comprises predominantly unconsolidated sediments, have been typical of surrounding sediments. Particle size distributions showed a predominance of fines and fine sand in sediments of the nearshore berths and swing basins, while sediments from the reference sites further offshore contained less fines and more sand.
Water quality	• Water quality of the shallow nearshore waters of the Project area are influenced by the tidal and regional wind conditions of the wider Cape Lambert area. • Turbidity and total suspended solids with the Project area have been highly variable and can be attributed to a variety of factors including storms events and tides, as well as vessel movements.

Marine habitats	• The marine habitats in the Cape Lambert area can be sub-divided into four broad types:
	  ○ intertidal hard substratum (rocky shores)
	  ○ subtidal hard substratum (reefs, shoals and pavement)
	  ○ intertidal soft substratum (beaches, tidal flats)

[1] As per Cape Lambert Maintenance Dredging Program Sampling and Analysis Plan Implementation Report: December 2015 (MScience Marine Research 2015)

Environmental factor of value	Description within Project area
	○ subtidal soft substratum (seafloor sediments). • The benthic habitat within the Project footprint is typical of the Pilbara region, represented by sub-tropical/semi-arid, nearshore tidally driven waters. • The most widespread marine habitat in the Project area (including within the majority of the Project footprint) is subtidal soft substratum, comprising smooth sediments of sand and silt (SKM 2008e; Hydrobiology 2018). A small portion of patchy hard coral, soft coral, macroalgae and smooth sediment/pavement is present at the southern end of the existing wharf (Hydrobiology 2018). Additional patches of soft coral and macroalgae over pavement are patchily distributed along the remainder of the wharf footprint (Hydrobiology 2018).
Marine fauna	• The wider Cape Lambert area is utilised by a range of marine fauna including turtles, whales and dolphins. Whales and dolphins are well documented in the proposed Dampier Archipelago Marine Park, < 20 km from the Project area. • Four species of marine turtles are known to nest in the Cape Lambert region; flatback, green, hawksbill and loggerhead (but nests very rarely). Of the four species known to nest in the region, three species (flatback, green and hawksbills, the latter nesting rarely with <1% of all nests annually being hawksbills) nest on Bell's Beach and Cooling Water Beach in the Project area. • Humpback whales are known to occur in the Project area during their migration along the Pilbara coastline.
MNES	• Threatened species that are known or have the potential to occur in the Project area include: ○ Humpback whale (*Megaptera novaeangli*) ○ Whale shark (*Rhincodon typus*) ○ Loggerhead turtle (*Caretta caretta* ○ Green turtle (*Chelonia mydas*) ○ Leatherback turtle (*Dermochelys coriacea*) ○ Hawksbill turtle (*Eretmochelys imbricata*). • Migratory marine species that are known or have the potential to occur in the Project area include: ○ Bryde's whale (*Balaenoptera edeni*) ○ Dugong (*Dugong dugong*) ○ Reef manta ray (*Manta alfredi*) ○ Giant manta ray (*Manta birostris*) ○ Indo-Pacific humpback dolphin (*Sousa chinensis*) ○ Spotted bottlenose dolphin (*Tursiops aduncus).*

3. Work activities and potential impacts

If left unmanaged, the Project has the potential to result in impacts to environmental values during implementation. As the port facility is already operating and the Project essentially consists of maintenance/refurbishment works (with no ongoing changes to current operation once commissioned), there are no potential impacts from the operation phase of the Project.

The potential impacts associated with the Project are summarised below and discussed in more detail in the EPBC Referral Supporting Document to the Commonwealth (DoEE) and the Environmental Review Document supporting the referral to the State (EPA).

The potential impacts presented below (Table 3-1) are further considered via a formal risk assessment process in **Section 5**. The risk assessment has been used to inform the potential impacts that require tailored management and mitigation measures.

Table 3-1: Potential impacts associated with the Project

Potential impact	Description within the Project area	Species or sensitive receptor
Underwater noise	Increased underwater noise resulting from pile driving activities Potential for noise above injury/behavioural change thresholds within and adjacent to Project area	Marine fauna, especially humpback whales and turtles
Ambient noise and vibration	Potential for slight increases in background noise levels associated with general work activities Considered negligible in context of operating port	Neighbouring residential areas Terrestrial environment
Light spill	Localised and temporary lighting associated with work activities during restricted work hours	Marine turtles
Vessel strike	Very low risk of vessels strike from small number of vessel movements including crane barge, piling barge, support vessels moving at restricted speeds (4 – 12 knots)	Marine megafauna
Impacts to water quality and benthic communities	Localised reduction in water quality during pile driving as sediments are disturbed Potential for turbidity increases, but within ambient conditions of operational port Potential for release of contaminants bound in sediment, although sediments considered suitable for ocean disposal and wharf environment continually resuspended via ship movements Highly localised removal of benthic habitat (within footprint of new piles and jack-up barge supports) Very low risk for potential for localised smothering of a portion of benthic habitat. Species present are likely to be resilient to periodic sedimentation	Marine environment
Introduced marine pests (IMP)	IMPs may be introduced via vessels that are not resident at the Port	Marine environment
Waste and spills (terrestrial and/or marine)	Waste may be released into the terrestrial or marine environment via spills or inappropriate disposal of waste materials	Marine and terrestrial environment

4. Risk assessment

4.1 Method and scope

A risk assessment for the Project was undertaken to identify the potential impacts with a greater environmental risk and where assessment and management controls should be focussed.

This assessment was an iterative process where potential impacts were considered from both a likelihood and consequence perspective to understand the risk in the absence of management controls. Any risks with a rating of intermediate or above were determined to require controls to prevent adverse effects on environmental values. Risk levels were then re-evaluated to consider whether controls adequately reduced the risk of activity and/or if there are issues which remain a high risk item despite the introduction of controls.

The risk assessment was undertaken using a systematic approach based on international best practice standards, including:

- AS/NZS ISO 31000:2009: Risk management – Principles and Guidelines (Standard).
- HB 158:2010: Delivering assurance based on ISO 31000:2009 Risk management – Principles and Guidelines (Handbook).
- HB 203:2012: Managing environment-related risk (Handbook).
- HB 436:2004: Risk Management Guidelines Companion to AS/NZS 4360:2004 (Handbook).

The scope of this risk assessment includes activities associated with the implementation phase of the Project. Activities subject to this risk assessment include:

- Underwater noise
- Ambient noise and vibration
- Vessel strike
- Impacts to water quality & benthic communities
- Introduced marine species
- Light spill
- Waste

The risk ratings were assessed for each environmentally sensitive receptor and project activity using the risk matrix in **Table 4-1** below. Inherent risk ratings were assessed assuming minimum industry standard would be achieved without the implementation of additional management controls or risk assessment.

Management controls relevant to each inherent risk were identified, applying the management response criteria (**Table 4-2**) and particularly focussing on those inherent risks rated as 'intermediate' and above. Controls employed as industry standard practise and/or those currently operating at CLA/CLB were applied initially to determine initial residual risk ratings. These ratings were further informed by impact analysis and specific project controls developed within this EMP. The ratings were revised iteratively to reduce the residual risks to as low as reasonably possible.

Table 4-3 and **Table 4-4** defines the likelihood and consequence relating to the activity.

Table 4-1: Risk matrix

		Consequence	1	2	3	4	5
			Trivial	Minor	Severe	Major	Catastrophic
Likelihood	A	Almost certain	Low	Intermediate	High	Extreme	Extreme
	B	Likely	Low	Low	Intermediate	High	Extreme
	C	Possible	Negligible	Low	Intermediate	High	High
	D	Unlikely	Negligible	Negligible	Low	Intermediate	High
	E	Rare	Negligible	Negligible	Negligible	Low	Intermediate

Table 4-2: Risk rating, risk class and associated risk management response

Rating	Risk management response
Extreme	Risks that significantly exceed the risk acceptance threshold and need urgent and immediate attention. Modify the threat, likelihood or consequence so that the risk is reduced to 'Intermediate' or lower.
High	Risks that exceed the risk acceptance threshold and require proactive management. Modify the threat, likelihood or consequence so that the risk is reduced to 'Intermediate' or lower.
Intermediate	Risks that lie on the risk acceptance threshold and require active monitoring. The implementation of additional measures could be used to reduce the risk further. Modify the threat, the likelihood or consequence to reduce the risk to 'Low' or 'Negligible' if practicable
Low	Determine the management plan for the threat to prevent occurrence and monitor changes that could affect the classification.
Negligible	Review at the next review interval Manage by routine procedures – reassess at the next review

Table 4-3: Definition of likelihood

Likelihood/probability		
A	Almost certain	Common repeating occurrence that is ongoing. Is expected to occur with port maintenance/upgrade projects of this scale
B	Likely	Will probably occur at some time and in most circumstances. Known to occur with port maintenance/upgrade developments.
C	Possible	Could occur at some time but not often. Sometimes occurs with port maintenance/upgrade developments.
D	Unlikely	Could potentially occur at some time. Uncommonly occurs in port maintenance/upgrade developments.
E	Rare	Practically impossible. Will only occur in very rare circumstances. Not known to occur in port maintenance/upgrade developments.

Table 4-4: Consequence definitions for fauna, marine/terrestrial environment and sensitive human receptors

1	2	3	4	5
TRIVIAL	**MINOR**	**SEVERE**	**MAJOR**	**CATASTROPHIC**
Fauna				
No impact to fauna species habitat Minor (local) temporary habitat modification[1] and/or lifecycle disruption[2] for a fauna species	Minor local impact of fauna species habitat Moderate local habitat modification[1] and/or lifecycle disruption[2] for a fauna species	Moderate local impact of fauna species habitat Substantial local habitat modification[1] and/or lifecycle disruption[2] for a fauna species	Substantial local impact of fauna species habitat Moderate regional habitat modification[1] and/or lifecycle disruption[2] for a fauna species	Moderate or substantial regional impact of fauna species habitat Substantial regional habitat modification[1] and/or lifecycle disruption[2] for a fauna species
No temporary impact to individuals of threatened fauna species	Minor (local) temporary decrease in size of population(s) of threatened fauna species	Moderate local impact to population(s) behaviour of threatened fauna species	Substantial local impact to population(s) behaviour of threatened fauna species	Moderate or substantial regional impact to population(s) behaviour of threatened fauna species
Marine and terrestrial environments				
No detectable (visual) change to background water quality; no exceedance of background	Local, short-term, minor exceedance of background water quality (e.g. turbidity).	Local, long-term OR widespread, short-term, exceedance of background water quality (e.g. turbidity).	Local, permanent OR widespread, long-term exceedance of background water quality (e.g. turbidity).	Major exceedance of background water quality that is widespread and permanent Widespread, permanent exceedance of background water quality (e.g. turbidity).
Minor leak or spill contained within vessel or bunded area	Minor leak or spill affecting soil around vessels or bunded area; minimal response and clean-up required	Leak or spill affecting surrounding waters or terrestrial areas; Clean-up procedures required	Major leak or spill affecting surrounding waters or terrestrial areas, some minor permanent impacts	Leak or spill causing widespread environmental impact to surrounding waters or terrestrial areas in the region, some permanent impacts
Noise (underwater and ambient)				
Noise emissions do not impact to marine megafauna behaviour.	Minor (local) impact to marine megafauna behaviour.	Short-term, local impact to marine megafauna behaviour.	Long-term, local impact to marine megafauna behaviour.	Long-term, regional impacts to marine megafauna behaviour.
Noise emissions do not impact sensitive human receptors	Minor (local) impact to sensitive human receptors	Short-term, local impact and disruption to sensitive human receptors.	Long-term, local impact and disruption to sensitive human receptors.	Long-term, major exceedance of ambient noise conditions causing widespread disruption to sensitive human receptors.

[1] Habitat modification can include fragmentation, and alteration of feeding or habitat resources including water quality; [2] Lifecycle disruptions can include disruption of breeding, feeding, migration, resting behaviour, etc

4.2 Results

Inherent risks of the Project were intermediate to high for all Project activities, barring vessel strike, for which the inherent risk was low. If left unmanaged, underwater noise, changes in water quality and introduced marine species have the potential to result in impacts on sensitive marine environs and fauna. Increases in ambient noise can also cause substantial disruption to local communities if left unmanaged.

With the application of the proposed management controls the residual risk of all potential impacts was reduced to low or negligible.

The full risk assessment is presented in **Table 4-5** below.

Table 4-5: Risk assessment of project activities and management controls

POTENTIAL IMPACT (CHANGE/EFFECT)	GENERATING ACTIVITY	ENVIRONMENTAL RECEPTOR	CONSEQUENCE	LIKELIHOOD	INHERENT RISK	ASSUMPTIONS/COMMENTS	MANAGEMENT CONTROLS	CONSEQUENCE	LIKELIHOOD	RESIDUAL RISK
Increase in underwater noise levels beyond injury or behavioural thresholds	Pile driving	Marine turtles and mammals	3	B	I	Noise behaviour in line with modelling (ERM 2018a) Maximum two pile driving operations operating concurrently	Tailored management controls required, including soft starts and marine fauna observation & exclusion zones (see this EMP Section 6)	2	B	L
Ambient noise and vibration	Loading, stock-piling, offload of materials Pile driving	Nearby residential communities	3	B	I	Increased noise levels may disturb local residential communities	Tailored management controls required, including confirmation of modelling, restricted works hours and community engagement (see this EMP Section 6)	2	B	L
Collisions between vessels and marine fauna	Increased vessel movements	Large marine fauna including whales, turtles, dugong, dolphins	2	C	L	Required vessels limited in number and include only crane barge, piling barge(s) and support vessels All vessels will travel at restricted speeds (4-12 knots) as required within the Port limits Crane and piling barges will be stationary for the majority of works	Adherence to Port operating rules regarding vessel speeds	2	E	N
Impacts to water quality & benthic communities	Pile driving	Marine environment	2	A	I	Minimum number of piles are used to adequately strengthen jetty and replace dolphins Disturbance is localised within immediate vicinity of pile driving At most two pile driving operations undertaken concurrently (worst case)	No additional management controls required	1	A	L

POTENTIAL IMPACT (CHANGE/EFFECT)	GENERATING ACTIVITY	ENVIRONMENTAL RECEPTOR	CONSEQUENCE	LIKELIHOOD	INHERENT RISK	ASSUMPTIONS/COMMENTS	MANAGEMENT CONTROLS	CONSEQUENCE	LIKELIHOOD	RESIDUAL RISK
						Redundant piles will be cut off at natural substrate level and sub-surface structures remain in place Increases in turbidity are within ambient levels of operating port Sediments are not contaminated and regularly resuspended around operational areas (i.e. berths) from ship/tug vessel movements				
Introduction of introduced marine species	Arrival of vessels with IMPs	Marine environment	4	C	H	All vessels for the Project will either be locally sourced or assessed for the risk of introduced marine pests Escalation to vessel inspection/cleaning if a high risk of introducing IMP determined	Assessment of the risk of IMPs for all non-local vessels On-going implementation of existing Port-wide IMP monitoring and response protocols	4	E	L
Light spill	Lighting during night works	Marine turtles	3	C	I	Majority of works will be undertaken between 7 am and 7 pm Evening works until 10 pm permitted only where required to safely secure piles/equipment Lighting will be localised on jetty/wharf/barge vessels Works are contained within the existing CLA setting, which already has an environment of light spill and the Project will not result in the increase of this existing light spill	No additional management controls required	1	D	N

POTENTIAL IMPACT (CHANGE/EFFECT)	GENERATING ACTIVITY	ENVIRONMENTAL RECEPTOR	CONSEQUENCE	LIKELIHOOD	INHERENT RISK	ASSUMPTIONS/COMMENTS	MANAGEMENT CONTROLS	CONSEQUENCE	LIKELIHOOD	RESIDUAL RISK
Release of waste into marine or terrestrial environments	Spills Inappropriate disposal of waste	Marine and/or terrestrial environment	3	C	I	Management, disposal and storage of hazardous materials to Australian Standards and consistent with MSDS All redundant piles will be transported to shore with the intention to be recycled as scrap metal Appropriate containment and disposal of ancillary waste materials (e.g. asbestos from pile caps and gilsomastic paints) Port Walcott Cape Lambert Oil Spill Contingency Plan (OSCP) will be implemented as required	Solid waste will be placed in suitable containers and recycled or disposed of via a licensed contractor Any hazardous waste will be stored in an appropriate manner prior to disposal Spill kits will be available on all piling vessels and staff trained in their use	2	D	N

5. Environmental management and mitigation procedures

The risk assessment in Section 4 identified that the majority of potential impacts from the project will result in negligible risk to environmental values, if undertaken in line with the planned project framework and industry standard controls. However, both underwater and ambient (terrestrial) noise were identified as potential impacts that requires specific management controls to be implemented in order to reduce risks to an acceptable level.

A summary of the general project activities and industry standard controls that will be implemented to avoid and reduce impacts is provided in **Table 5-1**. Tailored frameworks for addressing underwater noise and ambient noise are provided in **Table 5-2** and **Table 5-3** respectively.

Table 5-1: General project activities and industry standard controls that will be implemented to avoid and reduce impacts

Measures to avoid and reduce impacts	Potential impacts addressed
All vessels undertaking works associated with the Project will travel at 4 - 12 knots	Vessel strike
No more than two pile driving operations will occur concurrently (worst case)	Impacts to water quality, underwater noise and ambient noise
Minimum number of piles will be used to undertake jetty strengthening and dolphin replacement activities	Impacts to water quality and benthic communities, underwater noise, ambient noise
Works will be undertaken as close to existing infrastructure as possible while ensuring maximum effectiveness	Impacts to water quality and benthic communities
Redundant piles will be cut at the natural substrate level and removed. Sub-surface infrastructure will be capped and remain in-situ	Impacts to water quality and benthic communities
All non-local vessels will be assessed for the risk of IMPs	IMPs
On-going implementation of existing Port-wide IMP monitoring and response protocols	IMPs
Works hours will be between 7 am and 7 pm. Night works will extend no later than 10 pm and will only be undertaken if required to safely secure piles/equipment	Light spill, underwater noise and ambient noise
All lighting will be localised on jetty/wharf/barge vessels	Light spill
The existing Rio Tinto complaints hotline will be available for community to register concerns	Ambient noise
All redundant piles will be transported to shore with the intention to be recycled as scrap metal	Waste
Management, disposal and storage of hazardous materials will be to Australian Standards and will be consistent with Material Safety Data Sheets	Waste
Port Walcott Cape Lambert Oil Spill Contingency Plan will be implemented as required	Waste
Spill kits will be available on all piling vessels and staff trained in their use	Waste
Solid waste will be placed in suitable containers and recycled or disposed of via a licensed contractor	Waste

Table 5-2: Underwater noise management framework

Performance Objective	Management strategy/target	Key Performance Indicators
To ensure marine fauna, particularly humpback whales and turtles are not injured or significantly disturbed due to underwater noise	Underwater noise to be managed primarily through procedural controls during pile driving, with no impacts to marine animals as a result of piling activity	No works to commence if whales/turtles present in observation zone Cessation of piling if whales/turtles observed in exclusion zone No reported strandings of sick, injured or decreased marine turtles or whales within the Project area for the life of the Project Daily records of marine fauna observations kept when piling undertaken

Management component	Responsibility	Timing
Specific management controls • The underwater noise management procedure presented in • **Figure 5-1** and described below will be implemented. • A suitably trained marine fauna observer will be located at an elevated location on the wharf/jetty immediately prior to and during all piling works. • An observation zone will be established 2 km from the piling activity. • An exclusion zone of 500 m for whales and 300 m for marine turtles will be established from the piling activity. • The observation zone will be checked for 30 minutes prior to the commencement of piling activities each day. If no whales/turtle are present, works can commence (soft start – see below). If whales/turtles are present in the observation zone, commencement will be delayed until all animals have exited the observation zone or have not been seen for 20 minutes. • The suitably trained marine fauna observer will monitor the exclusion zone continuously during piling activities. If whales/turtles are sighted in the exclusion zone, works will cease (i.e. as soon as safely possible). Works will not commence until the animal(s) exit the exclusion zone or have not been seen for 20 minutes (soft start required). • Soft start up procedures will be implemented for all piling activities, for a period of no less than 30 minutes.	Contractor/ Proponent's delegate	On-going

Management component	Responsibility	Timing

• During periods of low visibility (where a distance of 500 m cannot be clearly viewed), pile driving activities may be undertaken provided that during the preceding 24 hour period:
  ○ there have not been 3 or more shut down situations due to marine turtles or whale sightings
  ○ a 2 hour period of continual observations during pile driving works was undertaken in good visibility immediately prior to low visibility (to a distance of 500 m) and no marine turtles or whales sighted.
• Piling to occur during daylight hours unless in the case of a safety/emergency; at such times it will not extend beyond 10 pm.
• Daily records of all marine fauna sighting and associated shut downs to be kept including:
  ○ record observed cetaceans in a format consistent with the National Cetacean Sighting and Strandings Database
  ○ other marine fauna observations, including fish kills and wildlife injuries within 500 m of piling operations
  ○ fauna behaviours, in particular any behaviours that could be attributed to piling activities
  ○ management responses in relation to dead and injured wildlife, including suspension of piling activities
  ○ observation effort in relation to piling activities.
• Herding of cetaceans from the area will not be undertaken using vessels.
• Warning strikes will not be used to deter cetaceans from the area.		

Monitoring • Daily review of records and compliance to marine fauna procedure (i.e. marine fauna observations undertaken, piling logs demonstrating soft start-up being undertaken). • Marine fauna observations ongoing for duration of works.	Trained marine fauna observer	Duration of piling
Reporting • A log of all visual observations of whales, marine turtles, and other marine fauna maintained daily. • All operational shut down events to be logged and maintained. • Report any stranding of sick, injured or deceased marine turtles or whales recorded in 2 km radius (i.e. in the Project area).	Contractor/ Proponent's delegate	Duration of piling
Adaptive implementation (corrective actions) • Cease piling works as indicated by controls. • Any reports of strandings of sick, injured or deceased marine turtles or whales investigated immediately.	Contractor/ Proponent's delegate	Duration of piling

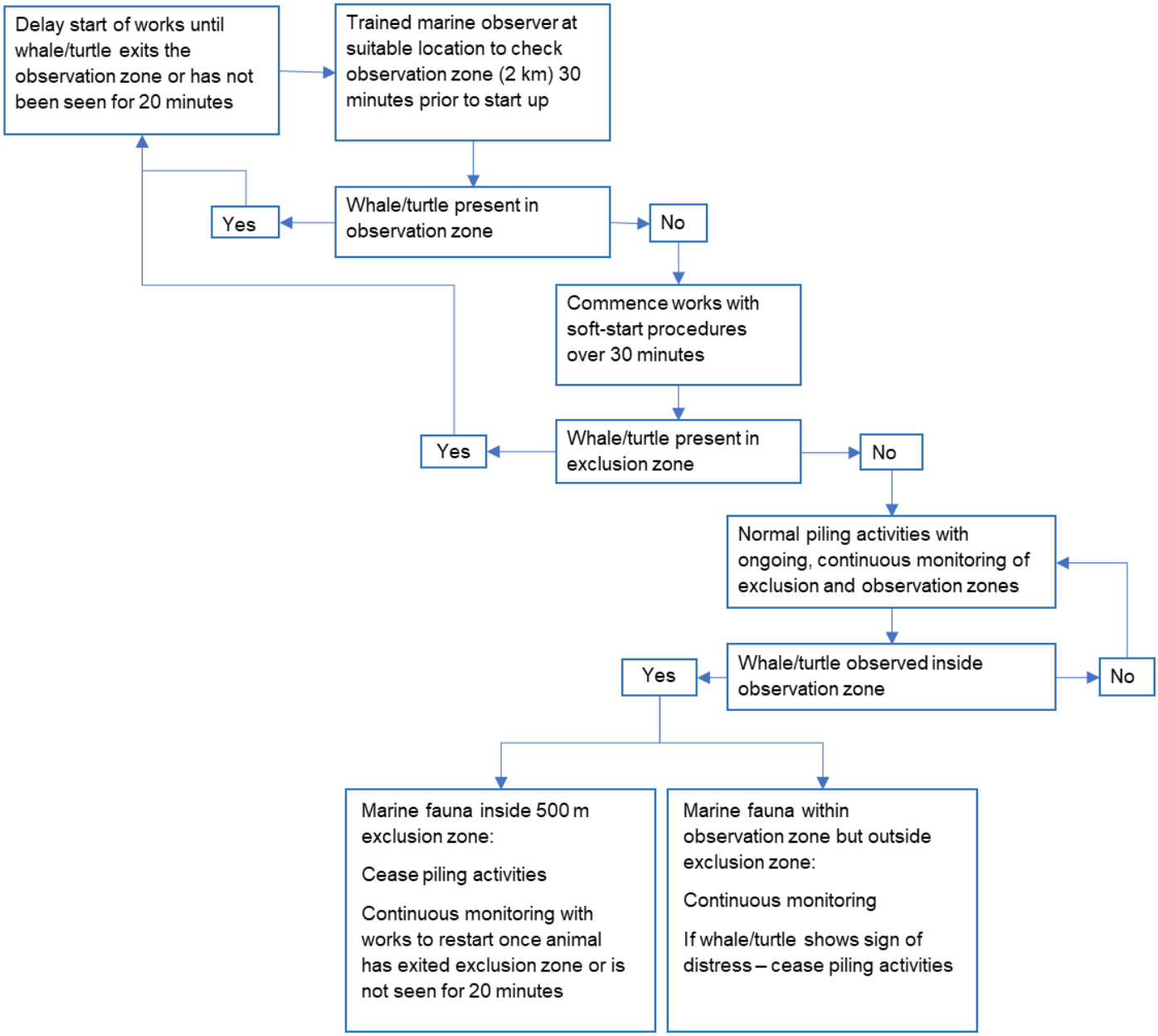

Figure 5-1: Flow diagram for underwater noise management

Table 5-3: Ambient noise management framework

Performance Objective	Management strategy/target	Key Performance Indicators
To minimise the impact of Project generated noise emissions on nearby sensitive receptors and the environment	Ambient noise to be managed through procedural controls during noise generating activities, with no complaints lodged and compliance maintained with relevant noise regulations	Number of complaints No exceedance of modelled average noise levels for all receivers

Management component	Responsibility	Timing
Specific management controls • Piling activities will only be undertaken during daytime hours (7 am to 7 pm). Piling will only occur in evening hours in the case of an emergency or safety concern (7 pm to 10 pm). • Noise generating activities not associated with pile driving itself (e.g. unloading of piles from ship to shore) will only be undertaken during daytime hours. • Induction package will include noise management procedures, piling hours, complaints handling procedures and the location of noise sensitive receptors. • Formal notification to Point Samson Community Association and the City of Karratha prior to the commencement of piling works. • Rio Tinto's community hotline/email will be made available to Point Samson Community Association	Contractor/ Proponent's delegate	On-going

Monitoring
• Noise validation monitoring will be undertaken at Point Samson to confirm noise modelling results. Monitoring will be managed by suitably qualified technicians and may include:
  ○ attended noise measurements conducted using a hand held Type 1 or Type 2 'integrating-averaging' sound level meter
  ○ unattended noise measurements using a Type 1 or Type 2 environmental noise logger.
	Contractor/ Proponent's delegate	Periods over duration of piling

Reporting • Updates to Point Samson Community Association on the results of noise model confirmation monitoring • Complaints will be recorded and reported as per Rio Tinto incident reporting procedure	Contractor/ Proponent's delegate	Duration of piling

Management component	Responsibility	Timing
Adaptive implementation (corrective actions)		
• If noise modelling confirmation monitoring shows exceedances, the monitoring and action protocol in **Figure 5-2** will be followed	Contractor/ Proponent's delegate	Duration of piling

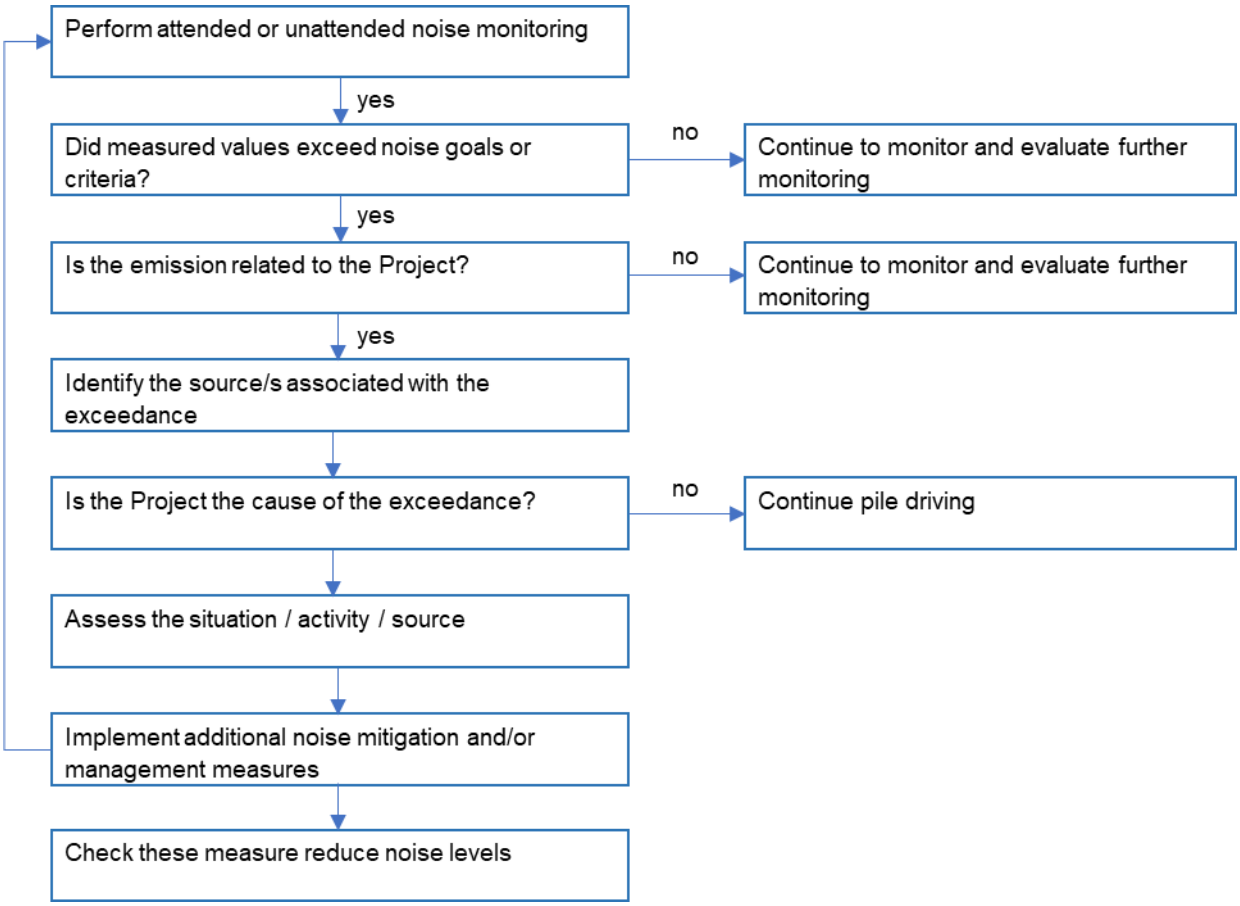

Figure 5-2: Noise monitoring and action protocol

6. Reporting and review process

Reporting will be undertaken as per the reporting requirements outlined in **Table 5-2** and **Table 5-3** in **Section 5** above.

The EMP will be reviewed in response to any significant changes in Project scope, legislative requirements, risk profile or occurrence of major environmental incidents.

If considered necessary, Rio Tinto will update the EMP and submit an amendment for approval to the DoEE and the Department of Water and Environmental Regulation.

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