Operational Environmental Management Plan

Dampier Seawater Desalination Plant

RTIO-0213702

Hamersley Iron Pty Limited

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Disclaimer and Limitation

This Environmental Management Plan has been prepared by Rio Tinto's Iron Ore group (Rio Tinto), on behalf of Hamersley Iron Pty Limited (the Proponent), specifically for the Dampier Seawater Desalination Plant Proposal.

Neither the report nor its contents may be referred to without the express approval of Rio Tinto, unless the document has been submitted by Rio Tinto to the relevant government regulator for assessment in connection with the Dampier Seawater Desalination Plant Proposal.

Document Status					
Rev	Author	Reviewer/s	Date	Approved for Issue	
				To Whom	Date
1	Advisian	Approvals, HSES, Ops Environment	8/9/2022	Approvals, Ops Environment	5/10/2022

SUMMARY

This Operational Environmental Management Plan (OEMP) has been prepared by Rio Tinto on behalf of Hamersley Iron Pty Limited (the Proponent) for the Dampier Seawater Desalination Plant (DSDP) Proposal (the Proposal). This OEMP specifically addresses the management of the following key EPA Environmental Factors associated with the Proposal:

Marine Environmental Quality (MEQ):

- Monitoring and management associated with the proposed Environmental Quality Plan (EQP).

Marine Fauna:

- Operational lighting impacts are minimised as low as practicable; and
- Setting appropriate limits on the intake pond's suction velocity to prevent marine fauna impingement.

Marine Environmental Quality

The Proponent's consultants undertook dispersion plume of the hypersaline brine from the proposed outfall location (Advisian 2022). The purpose the plume dilution modelling was to determine the boundaries for the Levels of Ecological Protection (LEP) for the project. The LEPs are defined as the four levels of ecological protection (Maximum, High, Moderate and Low) as per the EPA's *Technical Guidance – Protecting the Quality of Western Australia's Marine Environment* (EPA, 2016). Baseline water quality data collected by the Proponent's consultants were used to determine the baseline water quality values and the environmental quality criteria (EQC) for the LEP, for winter and summer seasons.

Marine Fauna

Biologically important areas (BIAs) for marine turtles have been identified for EPBC Act and BC Act listed species with a potential to occur within 20 km of the development envelope. Protected fish species (Sawfish) are also known to occur in the Burrup Peninsula. Foraging turtles and sawfish species may occur in the waters within and adjacent to the development envelope; however, large numbers are not expected, given the lack of significant foraging habitat and water depths (<10 m) being shallower than the apparent optimal depth of 50 m (Whittock et al., 2016). If present, the species are likely to transiting through the area in their migratory routes up the coast.

Light emissions associated with operations include facility lighting within the development envelope. Impacts on marine fauna from artificial light may include changes in physiology, altering behaviours, change in the availability of habitat or food resources, and/or increase in predation rates. When considering the current extent of light spill and skyglow along the industrialised Burrup Peninsula, as well as the line of sight analysis undertaken by the Proponent, and the distance to significant marine fauna habitat (nesting beaches), it is considered that the Proposal is unlikely to significantly impact marine fauna foraging or transiting within the area.

There is potential for impingement (marine fauna trapped against intake screens by force of the flowing water) of marine fauna associated with seawater that is drawn to the intake. Seawater will be drawn from the artificial seawater intake pond which connects to the open ocean through an existing culvert.

It is possible juvenile species may fit between the screen aperture and enter the seawater intake pond. However, the seawater intake pond itself is designed to be wider and deeper than the culverts to facilitate a passive mechanism to reduce water velocity and allow Total Suspended Solids (TSS) to settle before reaching the intake pumps. This will have the same effect on marine fauna species as it does TSS, preventing them from being drawn into the pumps. Due to the predicted intake velocity, fish may be able to swim back out of the culverts, particularly during the receding tide, preventing significant impacts at the individual or population level from occurring.

Summary Table 11 below presents the environmental commitments for the MEQ and Marine Fauna environmental factor to be met through implementation of this OEMP, as well as the environmental criteria and management targets to measure achievement of the associated environmental outcomes and objectives.

Summary Table 1: Environmental criteria and targets to measure achievement of environmental outcomes and objectives

<table>
<tr><td colspan="2">Proposal title</td><td>Dampier Seawater Desalination Plant</td></tr>
<tr><td colspan="2">Proponent</td><td>Hamersley Iron Pty Ltd</td></tr>
<tr><td colspan="2">Ministerial Statement number</td><td>TBC</td></tr>
<tr><td colspan="2">Purpose of this OEMP</td><td>This OEMP provides management for environmental values with the potential to be impacted by the Dampier Seawater Desalination Plant Proposal.</td></tr>
<tr><td colspan="3">Marine Environmental Quality
Environmental Protection Authority (EPA) Objective: To maintain the quality of water, sediment and biota so environmental values are protected.</td></tr>
<tr><td rowspan="2">Outcome-based provisions</td><td>Predicted Impacts</td><td>Some changes to water quality are expected within the areas defined as low and moderate levels of ecological protection (LEP) (Figure A2.4).
The Proposal will result in the following residual impacts to water quality:
There will be a small increase in salinity within the proposed boundaries of Low and Moderate LEP. However, due to the rapid dilution of the plume within close proximity of the outfall location, this is not expected to exceed the relevant EQC.
There will be a small increase in the toxicity associated with the discharge. The highest levels of toxicity from Australian desalination plants has been assumed in the impact assessment, however significant work has been completed during the design process to reduce impacts associated with the toxicity of the discharge. Therefore, the actual toxicity is expected to be much lower and the EQC are expected to be met within the Low and Moderate LEP.</td></tr>
<tr><td>Environmental outcome</td><td>“to meet the Environmental Quality Criteria defined in this plan for a Moderate Level of Ecological Protection inside of the boundary of the Low Level of Ecological Protection area as defined in Figure A2.4.”

And

“to meet the Environmental Quality Criteria defined in this plan for a High Level of Ecological Protection inside of the boundary of the revised Moderate Level of Ecological Protection area as defined in Figure A2.4.”</td></tr>
</table>

	Trigger criteria / Environmental Quality Criteria (EQC)	• Dilutions required for a 99% species protection level exceed 1:222 • Dilutions required for a 90% species protection level exceed 1:59 • Median depth averaged values of salinity during flood tide conditions are less than 29.083 ppt below the salinity of the discharge within 300m of the discharge during summer. • Median depth averaged values of salinity during slack tide conditions are less than 29.083 ppt below the salinity of the discharge within 300m of the discharge during summer. • Median depth averaged values of salinity during flood tide conditions are less than 28.334 ppt below the salinity of the discharge within 210m of the discharge during winter • Median depth averaged values of salinity during slack tide conditions are less than 28.334 ppt below the salinity of the discharge within 210m of the discharge during winter • The salinity of the wastewater stream before discharge exceeds 69 ppt
	Threshold criteria / Environmental Quality Standards (EQS)	• Median depth averaged salinity levels at the low/moderate LEP boundary are more than 0.47ppt above the reference site salinity in Summer or more than 0.42ppt above the reference site data in winter. • Median depth averaged salinity levels at the moderate/high LEP boundary are more than 0.25ppt above reference site data in the summer or more than 0.29ppt above the reference site data in the winter.
Marine Fauna **Environmental Protection Authority (EPA) Objective**: *To ensure the biological diversity and ecological integrity are maintained.*		
Objective-based provisions	**Predicted Impacts**	• Operational Light Spill • Marine Fauna Impingements
	Environmental Objective	*'No reported negative impacts on marine fauna attributable to the operational lighting requirements of the Proposal'* *And* *"Marine fauna impingement is avoided and reduced to as low as practicable."*

	Management Actions	**<u>Operational Light Spill</u>** 1. Operational lighting that do not require to be continually lit will be switched off and/or activated by motion sensors. 2. Operational lighting design will follow the core principles of the State's Guidelines *EAG 5 for Protecting Marine Turtles from Light Impacts* (EPA 2010) guidelines including: o Keep it OFF (keep light off the beach and lights off when not needed) o Keep it LOW (mount lights low down with lowest intensity for the job) o Keep it SHIELDED (stop all light escaping upwards and outwards), and o Keep it LONG (use long wavelength lights). 3. To compliment the State's guidelines, the operational lighting design will follow the principles of Commonwealth's *Best Practice Lighting Design outlined in the National Light Pollution Guidelines for Wildlife* (Commonwealth of Australia, 2020), including: o Use lighting only where/when needed o Direct lighting downwards and away from sensitive habitats (ocean) o Shield lamps to prevent light spill (vertical and horizontal) o All permanent desalination plant outdoor lighting will consist of either low-pressure sodium-vapour and/or amber LED (595 nm) luminaries. 4. Darksky certified and certified lighting products will be used to minimize the amount of blue light in the night-time environment **<u>Marine Fauna Impingement</u>** 1. The culverts at the entrance of the intake pond are covered by screens with a minimum aperture of 150 mm. 2. Intake pipe screen mesh size will be of an adequate size that prevents juvenile marine species from entering. 3. Intake velocity at culverts, located 100 m from intake pipes, will be managed to maintain 0.1 – 0.15 m/s.
Proposed Operation Start Date		Q1 2025
OEMP required pre-construction?		☒ Yes ☐ No

Corporate endorsement

I hereby certify that to the best of my knowledge, the provisions within this Dampier Seawater Desalination Plant Proposal Operational Environmental Management Plan are true and correct.

Name: DECLAN DOHERTY **Signed:** 

Designation: General Manager, Dampier Port **Date:** 6.10.2022

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Abbreviations

ACAR	Annual Compliance Assessment Report
BWT	below water table
Baseline phase	data collected before commencement of proposed operations
CHMP	Cultural Heritage Management Plan
CTD	current, temperature and depth
DAWE	Department of Agriculture, Water and the Environment (Cwth)
DWER	Department of Water and Environmental Regulation
DSDP	Dampier Seawater Desalination Plant
OEMP	Environment Management Plan
EP Act	*Environmental Protection Act 1986*
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EQC	environmental quality criteria
EQO	environmental quality objectives
EQP	Environmental Quality Plan
EQS	environmental quality standards
ERD	Environmental Review Document
Framework for OEMPs	Rio Tinto Framework for development of OEMPs as described in Appendix 1
GIS	geographic information system
GPS	global positioning system
Impact phase	implementation of OEMP, including reporting, during construction and operation
LEP	level of ecological protection
Management zone	level of management appropriate for an environmental value, as determined by risk assessment described in the Rio Tinto Framework for OEMPs
MEQMMP	Marine Environmental Quality Monitoring and Management Plan
Proponent	Hamersley Iron Pty Ltd
Proposal	Dampier Seawater Desalination Plant Proposal
SPR	a '*causal pathway conceptual model*' (Stressor, Pressure, Receptor) approach for potential impacts due to project (refer to Appendix 1)
TSS	total suspended solids
WET	whole effluent toxicity

1. CONTEXT, SCOPE AND RATIONALE

This Operational Environmental Management Plan (OEMP) has been prepared by Rio Tinto on behalf of Hamersley Iron Pty Limited (the Proponent) for the Dampier Seawater Desalination Plant Proposal (the Proposal). This OEMP was produced to support assessment of the Proposal under the Western Australia (WA) *Environmental Protection Act 1986* (EP Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This OEMP was developed according to the Conceptual Framework for the Development of Rio Tinto Environmental Management Plans (internal guidance described in Appendix 1). This framework provides a standardised approach to environmental management at Rio Tinto's Pilbara Iron Ore Operations, in accordance with WA and Commonwealth Policy and Guidance, including:

- Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2021 (EPA 2021a)
- Environment Protection Authority's (EPA) Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans (EPA 2021b)
- Environment Protection Authority's (EPA) Interim Guidance for Environmental outcomes and outcomes-based conditions (EPA, 2021c)
- Environmental Impact Assessment (Divisions 1 and 2) Procedures Manual (EPA 2021d)
- Environmental Management Plan Guidelines (Commonwealth of Australia 2014).

This OEMP is subject to approval by the Environmental Protection Authority (EPA) and will subsequently be implemented.

Implementation of this OEMP, including phases for monitoring and reporting, will be staged to align with operational activities within the development envelope (see Section 2).

Additional management plans subject to approval by the Environmental Protection Authority (EPA) include the following:

- Dampier Seawater Desalination Plant Cultural Heritage Management Plan (CHMP) (Rio Tinto, 2022a)
- Dampier Seawater Desalination Plant Construction Environmental Management Plan (CEMP) (Rio Tinto, 2022b).

1.1 Proposal description

This Proposal is for the construction and operation of the desalination plant at Parker Point, located approximately 1 km north-east of Dampier township within the Proponent's existing Dampier port industrial area (Figure 1-1 - 1-4). The scope of this environmental management plan focuses on managing the potential impacts associated with the operational phase of the Proposal.

The Proposal will establish a potable water supply for the Proponent's Dampier operations (including Parker Point and East Intercourse Island Ports), the town of Dampier and proposed connection into the West Pilbara Water Supply Scheme, which services the towns and ports of the West Pilbara region. The desalination plant may be delivered in stages up to a maximum production capacity of 8 GL/a to meet future water demands.

The Proposal includes the construction and operation of a seawater desalination plant and water transfer pipelines connecting the plant to potable water tanks and the existing West Pilbara Water Supply Scheme (Figure 1-2). The Proposal includes:

- Seawater desalination plant
- Seawater intake
- Outfall to ocean
- Water transfer pipelines connecting the plant to potable water tanks and the existing West Pilbara Water Supply Scheme
- Other associated supporting infrastructure and services.

The seawater intake will be located within the existing intake pond to the south-west of the desalination plant (previously used as a cooling-water pond for the decommissioned power station), specifically to minimise the Proposal's impact to the marine environment. The desalination plant brine stream will be discharged to the ocean via an outfall constructed along the existing Parker Point wharf.

The Proposal is being developed separately, but partially within the footprint of existing Port of Dampier operations at Parker Point. Hence, activities that are part of, or required for continuation of, the existing Parker Point wharf operations do not form part of this assessment or management plan.

The scope of the Proposal subject to this assessment and management plan also excludes:

- Low impact activities, required during the Part IV assessment, including geotechnical assessments and investigations, environmental and heritage investigations. These activities will be subject to provisions under relevant legislation, such as the Rights in Water and Irrigation Act 1914 (WA) and Part V of the EP Act (WA).
- Accommodation camps, or upgrades to accommodation camps, and associated facilities (constructed during the Part IV assessment in accordance with separate authorisations).

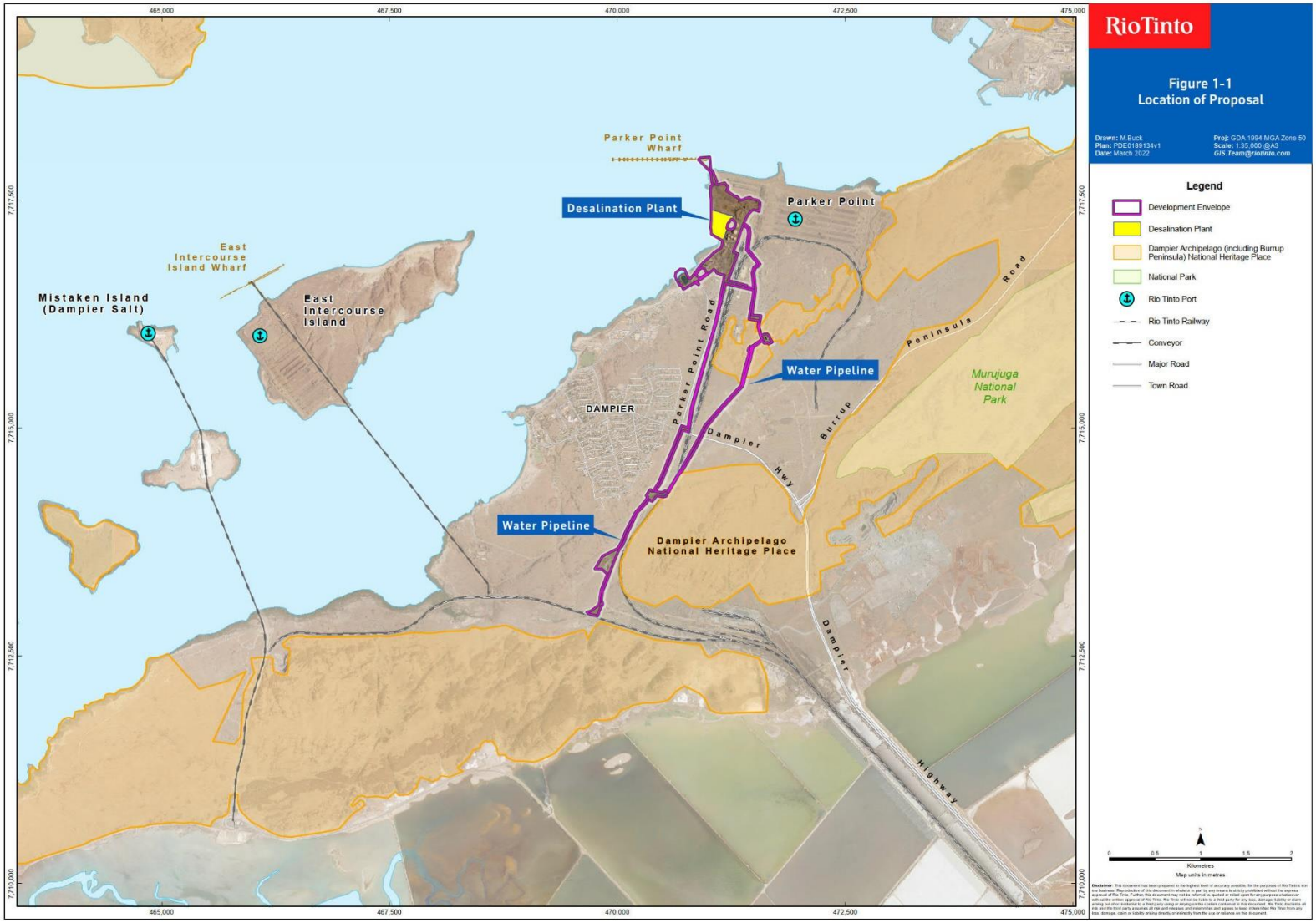


Figure 1-1 Location of the proposed desalination plant

Figure 1-2: Development envelope and indicative footprint (Map 1)

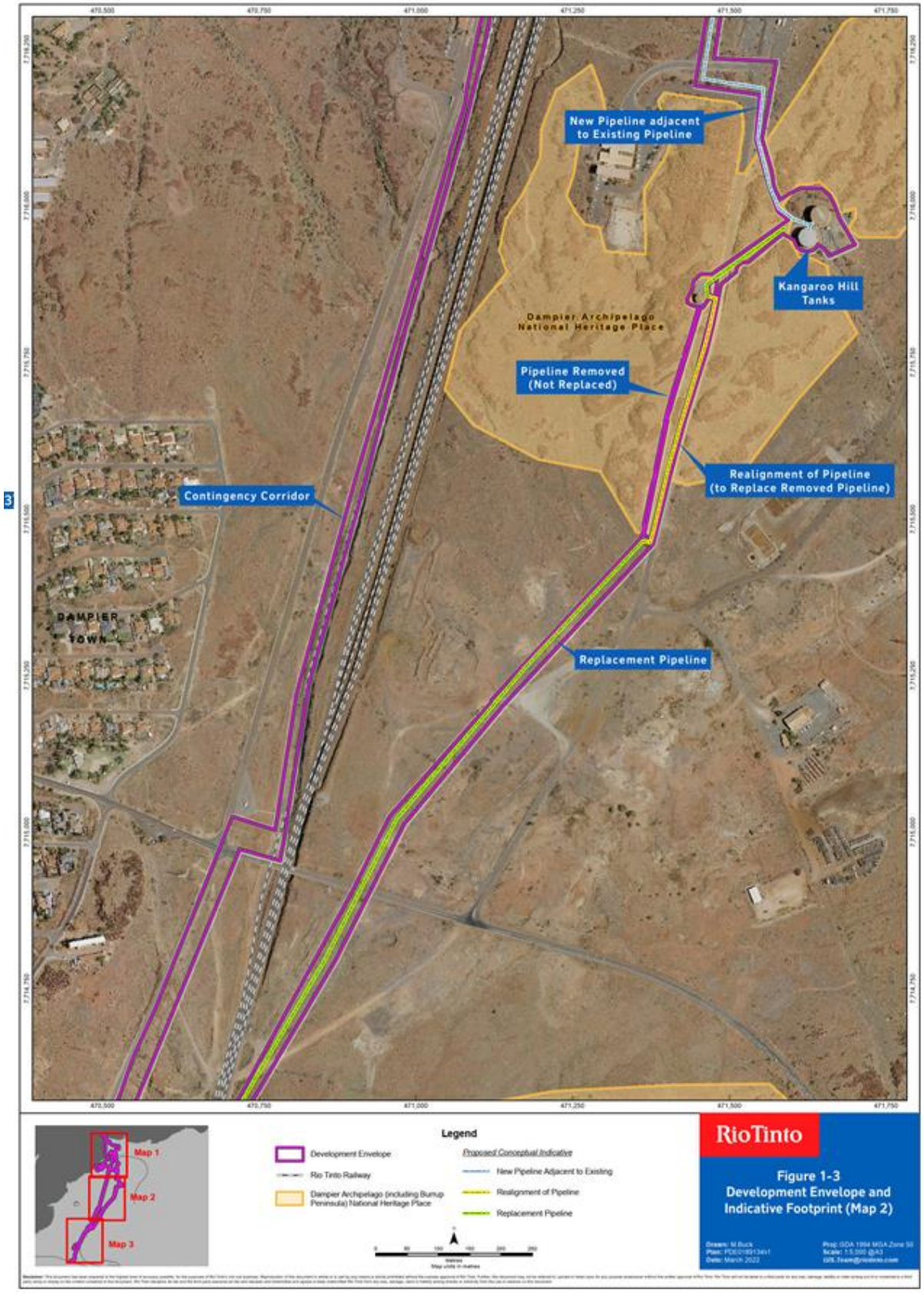


Figure 1-3: Development envelope and indicative footprint (Map 2)

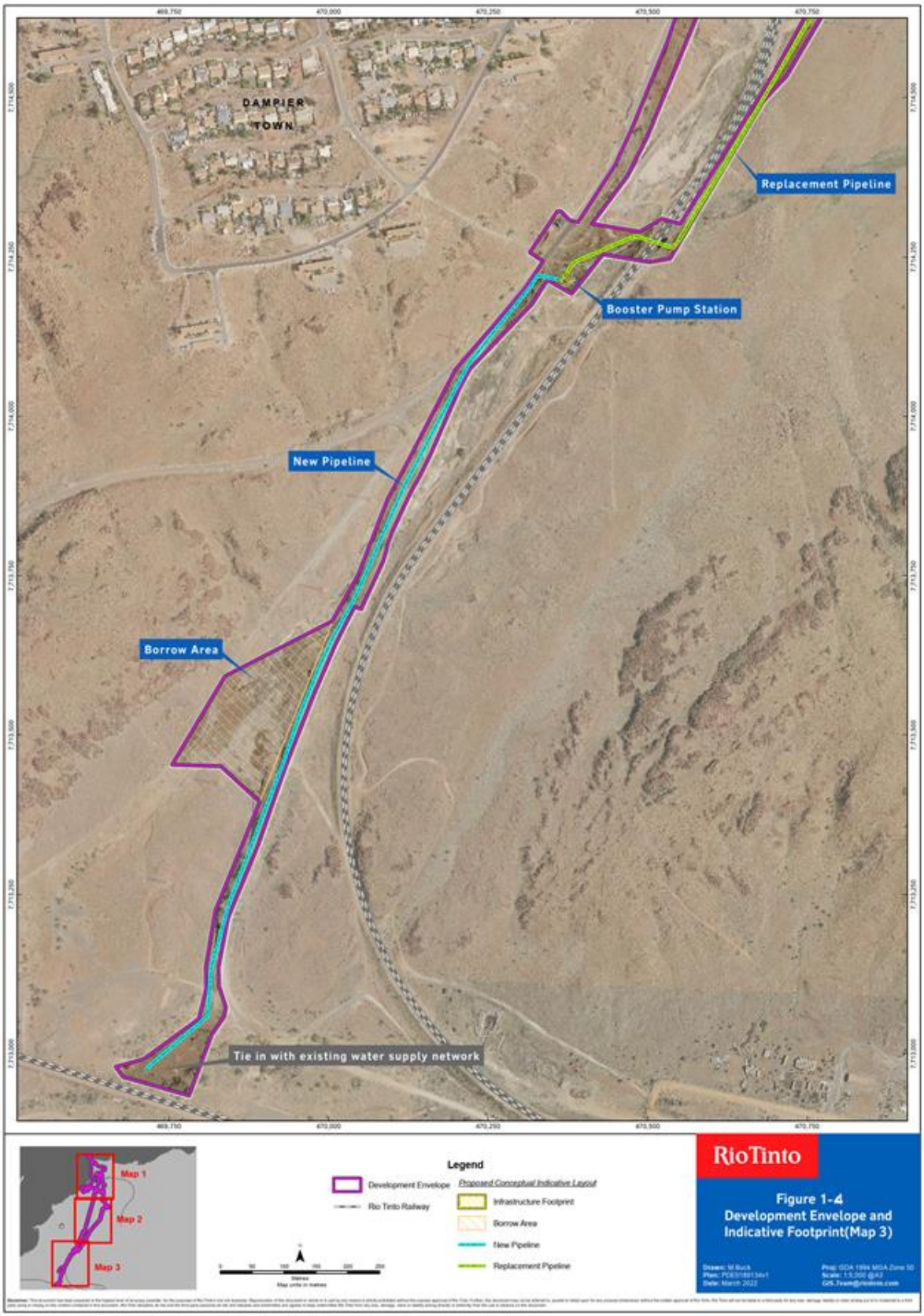


Figure 1-4: Development envelope and indicative footprint (Map 3)

1.2 Key environmental factors

The two key environmental factors requiring specific management actions during the operational stage of the Proposal, as identified in the EPA Referral Supporting Document (Rio Tinto, 2022c), include:

- Marine Environmental Quality (MEQ)
- Marine Fauna (including listed marine fauna species protected under the EPBC Act).

The associated environmental values and potential impacts to the MEQ and Marine Fauna environmental factors are described in Table 1-1.

Table 1-1: Environmental values, and potential impacts from the Proposal as addressed in this Environmental Management Plan (as per the stressor, pressure, receptor model[1])

Environmental value (receptor)	Potential impacts	
	Direct	Indirect
Marine Environmental Quality (Ecosystem health, cultural and spiritual values)	**Brine Discharge** Changes to marine water quality associated with standard brine eco-toxicity (including elevated salinity, temperature, TSS and contaminants of concern) of the discharge are predicted to occur as follows when the proposed mitigation measures are implemented: • Water quality will be reduced within the low level of ecological protection (LEP) but will not exceed the defined limits for a moderate LEP at the boundary of the low LEP • Water quality may be reduced within the moderate LEP but will not exceed the defined limits for the High LEP at the Moderate LEP boundary	No indirect impact
Marine Fauna (Operational Light Spill and Intake Pond Impingement)	**Operational Light Spill** Light emissions associated with operational light requirements include facility lighting within the development envelope. Impacts on marine fauna from artificial light may include changes in physiology, altered behaviours, change in the availability of habitat or food resources, and/or increase in predation rates. Operational lighting associated with the Proposal has the potential to contribute to the cumulative sky-glow of the Burrup Peninsula's industrialised landscape. However, the Proponent is committed to implementing the best practice lighting design principles identified in the *National Light Pollution Guidelines for Wildlife including marine turtles, seabirds and migratory shorebirds* (Commonwealth of Australia, 2020) and in the EPA's *Environmental Assessment Guideline for Protecting Marine Turtles from Light Impacts* (EPA 2010). Noting these measures, the Proponent is of the view that potential impacts to transitory marine turtles and sawfish species from new point sources of artificial light associated with the Proposal are unlikely to result in disorientation or mis-orientation of marine fauna movements in the waters adjacent to the operating plant. When considering the current extent of light spill and skyglow, as well as the line of sight analysis undertaken by the Proponent, and the distance to significant marine fauna habitat, it is considered that the Proposal is unlikely to significantly impact marine fauna foraging or transiting within the area.	No indirect impact

[1] A '*casual pathway conceptual model*' (Stressor, Pressure, Receptor [SPR]) approach for potential impacts due to a Proposal (Appendix 1).

Environmental value (receptor)	Potential impacts	
	Direct	Indirect
	Intake Pond Impingement Seawater will be drawn from the artificial seawater intake pond which connects to the open ocean through an existing system of culverts. The culverts are covered by screens with a minimum aperture of 150 mm and are located 100 m for the intake pipes. The seawater intake pond itself is designed to be wider and deeper than the culverts to facilitate a passive mechanism to reduce water velocity and allow TSS to settle before reaching the intake pumps. This will have the same effect on marine fauna species as it does TSS, preventing them from being drawn into the pumps. The estimated velocity of intake water flow through the culverts at the entrance to the intake pond will be within a range of 0.1 to 0.15 m/s. Limiting the flow velocity at the culverts to a maximum of 0.15 m/s speed has been defined as slow enough to allow marine fauna to escape entrapment ensures the protection of 96% of fish species, and is lower than the swim speed of marine turtles. This will ensure flow rates are low enough to allow marine turtles to swim against the current and not become trapped against the enclosure screens. Consequently the risk of impingement of marine turtles at the seawater intake is considered to be low.	

1.3 Condition requirements

The Proposal is currently being assessed under Part IV of the EP Act and EPBC Act. Considering the information provided in the EPA Referral Supporting Document (Rio Tinto 2022c), this OEMP proposes environmental monitoring and management to ensure environmental outcomes for the preliminary key environmental factor of Marine Environmental Quality and Marine Fauna are achieved.

1.4 Approach

This OEMP was drafted in accordance with the Conceptual Framework for the Development of Rio Tinto Environmental Management Plans (internal guidance described in Appendix 1). This conceptual approach to management considers the conservation significance of the environmental value (receptor) based on conservation status at local, state and regional levels. Management level (low, moderate or high) is assigned to achieve the environmental objective and outcome according to the conservation significance of the environmental value and the significance of impact/s predicted over spatial and temporal scales (Table 2-1). Assessment of the pathways over which impacts may occur provides the rationale for choosing provisions and appropriate indicators to measure against the environmental outcome and/or objective.

1.5 Management rationale

This OEMP adopts both outcome-based and objective-based provisions in order to achieve the proposed environmental outcomes and objectives.

Outcome-based provisions are applied where a sufficient level of information exists to establish objective and measurable criteria. Environmental criteria are defined to assess performance against the environmental outcome. These are:

Trigger criteria / Environmental Quality Criteria (EQC) – Measures set at a conservative level to forewarn the approach of threshold criteria and ensure trigger level actions are implemented well in advance of the environmental outcome being compromised.

Threshold criteria / Environmental Quality Standards (EQS) – Framed to represent the limit of acceptable impact beyond which there is likely to be a significant effect on the environment. This indicates there is risk the environmental outcome will not be met.

Outcomes-based provisions are provided for the monitoring and management of Marine Environmental Quality.

Objective-based provisions are applied where a level of uncertainty exists that prevents setting objective and measurable criteria. In this case, management targets are established to measure success of management actions in achieving the environmental outcome.

Objective-based provisions are provided for the monitoring and management of Marine Fauna.

2. ENVIRONMENTAL MANAGEMENT PLAN PROVISIONS

This section of the OEMP identifies the provisions that the Proponent will implement to ensure that the defined environmental outcomes and objectives are met during implementation of the Proposal. Outcome and management-based provisions are detailed in Table 2-1 including monitoring and reporting provisions. Appendix 2 outlines the Marine Environmental Quality Monitoring and Management Plan (MEQMMP) with the details relating to the monitoring programs and sampling design.

Implementation of this OEMP will align with commencement of relevant activities.

Table 2-1 : Environmental Management Plan provisions – Marine Environmental Quality

Rationale: To ensure the Environmental Quality Criteria are met at the boundaries of the low and moderate LEP

EPA Factor: Marine Environmental Quality

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

Outcome: *"to meet the Environmental Quality Criteria defined in this plan for a Moderate Level of Ecological Protection inside of the boundary of the Low Level of Ecological Protection area as defined in Figure A2.4."*

And

"to meet the Environmental Quality Criteria defined in this plan for a High Level of Ecological Protection inside of the boundary of the revised Moderate Level of Ecological Protection area as defined in Figure A2.4."

Key environmental values: Ecosystem Health and Cultural and Spiritual Values.

Key impacts and risks: Discharge of brine and neutralised wastewater through the diffuser.

Outcome-based provisions

Indicators	Response Action	Monitoring	Timing/frequency	Responsible	Reporting
MODERATE LEVEL OF MANAGEMENT – Toxicity					
Trigger criterion (EQC): **1.** At the end of commissioning and during operations dilutions required for a 99% species protection level exceed 1:222. **2.** At the end of commissioning and during operations dilutions required for a 90% species protection level exceed 1:59. **3.** During operations median depth averaged values of salinity during flood tide conditions are less than 29.08 ppt below the salinity of the discharge within 300m of the discharge during summer. **4.** During operations median depth averaged values of salinity during slack tide conditions are less than 29.08 ppt below the salinity of the discharge within 300m of the discharge during summer. **5.** During operations median depth averaged values of salinity during flood tide conditions are less than 28.33 ppt below the salinity of the discharge within 210m of the discharge during winter. **6.** During operations median depth averaged values of salinity during slack tide conditions are less than 28.33 ppt below the salinity of the discharge within 210m of the discharge during winter. **7.** During operations the salinity of the wastewater stream before discharge exceeds 69 ppt.	**Trigger criteria action:** **To reduce the potential toxicity of the discharge:** • Investigate the potential sources of higher than predicted toxicity. • If possible, review and adjust desalination process to reduce brine toxicity. • Increase the dilution of the brine wastewater stream before discharge. • Adjust discharge timing, flow, rate and volume where possible.	**1, 2)** WET Samples will be collected from the effluent before discharge to the ocean. A range finding and toxicity test will be completed on the samples. **3, 4, 5, 6)** The salinity monitoring program will be conducted over a period of three days and two samples per day will be collected from the discharge stream for comparison with the online logger and the current, temperature and depth (CTD) used for the marine monitoring program. The daily median value from the online logger will be used for comparison with the marine monitoring locations. Data at the marine monitoring locations will be collected with a validated and calibrated CTD. **7)** An online salinity monitor will be used to monitor the salinity of the discharge.	**1, 2)** WET sampling will be conducted once the commissioning phase is nearing completion and before commencing operations. The second round of sampling will occur when the plant is operating at the expected capacity, with all chemical processes operational, to ensure they represent the actual operational discharge. WET sampling will also be conducted if there is a significant change to the process or capacity of the plant during operations. Sampling will also be conducted within 12 months of full operations and/or within 12 months of any significant process or capacity changes. **3, 4, 5, 6)** The salinity monitoring program will be conducted once steady state operations are reached with minimal variation in the salinity of the discharge. The program will be completed under both summer and winter conditions. The program will also be completed if there is a change to the desalination process or capacity that may affect the salinity and/or volume of the discharge. **7)** Salinity of the discharge will be monitored daily during operations using an online monitor to determine whether the salinity of the discharge exceeds 69ppt.	Operations Environment team	• The environmental outcome will be reported against the trigger criterion for each calendar year by 30 April in the Annual Compliance Assessment Report (ACAR). • If any trigger criterion was exceeded during the reporting period, the ACAR will discuss potential reasons for exceedance of the trigger criterion and include a description of the effectiveness of trigger level actions.

EPA Factor: Marine Environmental Quality

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

Outcome: *"to meet the Environmental Quality Criteria defined in this plan for a Moderate Level of Ecological Protection inside of the boundary of the Low Level of Ecological Protection area as defined in Figure A2.4."*

And

"to meet the Environmental Quality Criteria defined in this plan for a High Level of Ecological Protection inside of the boundary of the revised Moderate Level of Ecological Protection area as defined in Figure A2.4."

Key environmental values: Ecosystem Health and Cultural and Spiritual Values.

Key impacts and risks: Discharge of brine and neutralised wastewater through the diffuser.

Outcome-based provisions

Indicators	Response Action	Monitoring	Timing/frequency	Responsible	Reporting
Threshold criterion (EQS): **1.** During operations median depth averaged salinity levels at the low/moderate LEP boundary are 0.47ppt above the reference site salinity in summer or 0.42ppt above the reference site data in winter. **2.** During operations median depth averaged salinity levels at the moderate/high LEP boundary are 0.25ppt above reference site data in the summer or 0.29ppt above the reference site data in the winter.	**Threshold criteria action:** **To reduce the potential toxicity of the discharge:** • Calibrate and maintain equipment as required. • Adjust dilution ratio of brine stream before discharge.	• Monitoring will be conducted using a calibrated CTD over a period of three days on both flood and slack tides. The median depth averaged reference site values will be compared with the median depth averaged monitoring site values for both slack and flood tides.	• This sampling program would be conducted in summer and winter after steady-state operations commence or in the event the trigger criteria are exceeded.	Operations Environment team	• In the event that monitoring, tests, surveys or investigations indicate exceedance of threshold criteria, the exceedance will be reported in writing to the CEO within seven (7) days of the exceedance being identified. • The Proponent will provide a report to the CEO within twenty-one (21) days of the exceedance being reported. • The environmental outcome will be reported against the threshold criterion for each calendar year in the ACAR • If the threshold criterion was exceeded during the reporting period, the ACAR will include a description of the effectiveness of threshold contingency action/s that have been implemented to manage the potential impact

Table 2-2: Environmental Management Plan provisions – Marine Fauna

EPA Factor: Marine Fauna
EPA objective: To ensure the biological diversity and ecological integrity are maintained.

Objective: '*No reported negative impacts on marine fauna attributable to the operational lighting requirements of the Proposal'*

And

"Marine fauna impingement is avoided and reduced to as low as practicable."

Key environmental values: Biologically Important Habitat for marine turtle species, protected fish species (sawfish) are known to occur in the area

Key impacts and risks: Behavioural responses to operational light spill, impingement of marine fauna

Objective-based provisions

Management Actions	Management Target	Monitoring	Timing/frequency	Responsible	Reporting
LOW LEVEL OF MANAGEMENT – Operational Light Spills					
1. Operational lighting that does not require to be continually lit will be switched off and/or activated by motion sensors. 2. Operational lighting design will follow the core principles of the State's Guidelines *EAG 5 for Protecting Marine Turtles from Light Impacts* (EPA 2010) guidelines including: ○ 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). 3. To compliment the State's guidelines, the operational lighting design will follow the principles of Commonwealth's *Best Practice Lighting Design outlined in the National Light Pollution Guidelines for Wildlife* (Commonwealth of Australia, 2020), including: ○ Use lighting only where/when needed ○ Direct lighting downwards and away from sensitive habitats (ocean) ○ shield lamps to prevent light spill (vertical and horizontal) ○ All permanent desalination plant outdoor lighting will consist of either low-pressure sodium-vapour and/or amber LED (595 nm) luminaries. **4.** Darksky certified and certified lighting products will be used to minimize the amount of blue light in the night-time environment.	The lighting design for the proposed Desalinisation Plant will meet legislative and regulatory requirements for human safety whilst maintaining the biological diversity and ecological integrity of protected marine fauna species. Reduce the output of light from the Project Area to as low as reasonably practicable. Ensure onshore sources of light are not directly visible at areas of sensitive habitat.	On commencement of the operational phase, undertake a site light inspection under new moon (no natural light) conditions to determine compliance with management actions and identify areas of problematic light. Annual site light auditing prior to turtle season under new moon (no natural light) conditions. Site light auditing to identify problem areas containing issues, including: • Light spill hotspots • Inconsistencies with lighting • No shielding or filters used • Incorrect angling of floodlights • Non-compliant lighting being used.	Operational Phase (Pre-Commencement) Light Audit Annual Light Auditing (Prior to Turtle Season / September)	Operations Environment team	Annual Compliance Assessment Report Annual Site Light Auditing Reporting Operational Hand-over Report
LOW LEVEL OF MANAGEMENT – Intake Pond Impingement					

1. The culverts at the entrance of the intake pond are covered by screens with a minimum aperture of 150 mm. 2. Intake pipe screen mesh size will be of an adequate size that prevents juvenile marine species from entering. 3. Flow velocity at the entrance of the intake pond's system, located 100 m from intake pipes, will be between 0.1 – 0.15 m/s.	Marine fauna impingement is avoided and reduced to as low as practicable.	Quarterly velocity flow measurements at the culvert interface to verify flow velocity is below 0.15 m/s. Opportunistic monitoring for marine fauna within the intake pond during operational phase. Periodic monitoring of intake pond culverts and intake pipe mesh for debris and deceased marine life. Post-cyclone event monitoring of culvert screens and cleaning if required.	Six monthly culvert and intake pipe inspection for debris and deceased marine fauna.	Operations Environment team	Annual compliance report Notify DBCA and DAWE within 48 hours if a protected marine fauna species is found deceased within the intake pond.

Table 2-2: Dampier Seawater Desalination Plant Operational Environmental Management Plan reporting

Key environmental factor: Marine Environmental Quality	
Environmental outcomes and objectives with associated criteria and management targets.	**Reporting periods 1 January to 31 December**
Trigger Criteria:	**Status report:** Trigger criteria not exceeded Trigger criteria exceeded
1. During construction the Median value for TSS and/or iron within the intake pond waters exceeds the 80th percentile of reference site data before opening the culverts.	
2. At the end of commissioning and during operations dilutions required for a 99% species protection level exceed 1:222	
3. At the end of commissioning and during operations dilutions required for a 90% species protection level exceed 1:59	
4. During operations median depth averaged values of salinity during flood tide conditions are less than 29.08 ppt below the salinity of the discharge within 300m of the discharge during summer.	
5. During operations median depth averaged values of salinity during slack tide conditions are less than 29.08 ppt below the salinity of the discharge within 300m of the discharge during summer.	
6. During operations median depth averaged values of salinity during flood tide conditions are less than 28.33 ppt below the salinity of the discharge within 210m of the discharge during winter	
7. During operations median depth averaged values of salinity during slack tide conditions are less than 28.33 ppt below the salinity of the discharge within 210m of the discharge during winter	
8. During operations the salinity of the wastewater stream before discharge exceeds 69 ppt	
Threshold Criteria:	**Status report:** Threshold criteria not exceeded Threshold criteria exceeded
1. During operations the median depth averaged salinity levels at the low/moderate LEP boundary are 0.47ppt above the reference site salinity in Summer or 0.42ppt above the reference site data in winter.	
2. During operations the median depth averaged salinity levels at the moderate/high LEP boundary are 0.25ppt above reference site data in the summer or 0.29ppt above the reference site data in the winter	

Table 2-3: Changes to the Dampier Seawater Desalination Plant Operational Environmental Management Plan

Complexity of changes	☐ **Minor Revisions**	☐ **Moderate Revisions**	☐ **Major Revisions**	
Number of key environmental factors	☐ **One**	☐ **Two to Three**	☐ **More Than Three**	
Date revision submitted to EPA: DD/MM/YYYY				
Proponent's operational requirement timeframe for approval of revision	☐ **< One Month**	☐ **< Six Months**	☐ **> Six Months**	☐ **None**
Reason for operational requirement timeframe:				

Item No.	OEMP Section No.	OEMP Page No.	Summary of Change	Reason for Change

2.1 Reporting

For each calendar year, during the construction, commissioning and operational phases, the environmental outcomes will be reported against their associated trigger and threshold criteria in the Annual Compliance Assessment Report (ACAR) for the Proposal (Table 2-1).

If trigger and threshold criteria are exceeded during the reporting period, the ACAR will include a description of the effectiveness of any contingency actions that have been implemented to manage the impact. A standalone report will also be produced for Department of Water and Environmental Regulation (DWER) within 21 days of reporting against exceedance of the threshold criteria. A follow-up report detailing the adequacy of the response actions will also be submitted within 12 months of the initial notification.

3. ADAPTIVE MANAGEMENT AND REVIEW OF THIS ENVIRONMENTAL MANAGEMENT PLAN

The conceptual framework for developing Rio Tinto OEMPs provides details of the review and adaptive management process (Appendix 1). The approach will include evaluation of:

- Monitoring data and comparison to baseline and reference site data regularly to verify responses to potential impacts
- The effectiveness and relevance of trigger and threshold contingency actions against environmental objectives, annually, to determine if any changes to the criteria, monitoring or response actions are required.

Based on the results of the review process, the Proponent will update and adjust the management measures and strategies in consultation with DWER.

4. STAKEHOLDER CONSULTATION

Consistent with the DWER expectations for this OEMP to align with the principles of environmental impact assessment, the Proponent will consult with stakeholders, including the DWER-EPA Marine Ecosystem Branch during the environmental impact assessment of the Proposal.

5. REFERENCES

Advisian, 2022. Baseline water quality monitoring report. Report prepared for RioTinto.

Commonwealth of Australia, 2014. Environmental Management Plan Guidelines.

Commonwealth of Australia, 2020. National Light Pollution Guidelines for Wildlife including Marine Turtles, Seabirds and Migratory Shorebirds.

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

Environmental Protection Authority (EPA), 2016. Technical Guidance Protecting the Quality of Western Australia's Marine Environment.

Environmental Protection Authority (EPA), 2021a. Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016, Western Australian Government Gazette No. 223.

Environmental Protection Authority (EPA), 2021b. Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans, Environmental Protection Authority, Perth.

Environmental Protection Authority (EPA), 2021c. Interim Guidance for Environmental outcomes and outcomes-based conditions. Environmental Protection Authority, Perth.

Environmental Protection Authority (EPA), 2021d. Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual, Environmental Protection Authority, Perth.

Rio Tinto, 2022a. Dampier Seawater Desalination Plant Cultural Heritage Management Plan.

Rio Tinto, 2022b. Dampier Seawater Desalination Plant – Operational Environmental Management Plan.

Rio Tinto, 2022c. Dampier Seawater Desalination Plant – EPA Referral Supporting Document.

Whittock, P.A., Pendoley, K.L. & Hamann, M. (2016) *Flexible foraging: Post-nesting flatback turtles on the Australian continental shelf*. Journal of Experimental Marine Biology and Ecology, 477, 112-119.

Appendix 1 Conceptual Framework for the Development of Rio Tinto Environmental Management Plans

To develop Environmental Management Plans (OEMPs), a conceptual framework model has been applied (Figure A1). The framework ensures linkages between current understanding, potential impacts, outcomes, adaptive management, and consistent monitoring and management practices. The framework is a stepwise process that considers the environmental values as identified in the Proposal's environmental impact assessment documents, in order to implement appropriate management measures and actions to ensure the environmental objective can be achieved.

The first step of the framework examines in detail the current knowledge of the environmental value(s) associated with the Proposal. This is compiled from information provided in the environmental impact assessment documents, any additional environmental surveys and examined with input from internal experts. Environmental values associated with the Proposal are evaluated based on their conservation status at local, state and regional levels.

The second step of the framework is to define relevant indicators, level of management and type of provisions (outcome- versus management-based) and associated criteria and targets.

A source-pathway-receptor (SPR) conceptual modelling approach is used to inform the selection of indicators, as recommended by national and international guidance (DIIS, 2016). The SPR conceptual model sets out the collective knowledge, experience and perspective on the environmental value (system of interest), and illustrates assumptions about how the value (system) functions and what is believed to be the important or dominant processes and their linkages. This includes factors that are perceived to be driving changes in the value (system) and the consequences of changes in these factors. The conceptual model also includes factors such as spatial boundaries as well as temporal and seasonal variations.

The number and type of indicators selected to monitor and measure changes in individual environmental values will depend on several factors, including the conservation status of the environmental value, the level of management required, the environmental outcome or objectives, location, and the types of pressures and stressors identified.

The required level of management (low, moderate or high) is determined using a matrix assessment with four factors relating to predicted impacts from the Proposal, including likelihood, consequence, spatial extent and temporal duration (Table A1). The higher the level of management, the more lines of evidence may be deemed necessary to meet the environmental outcome or objective (that is, more indicators and more frequent monitoring schedules).

Draft (interim) trigger and threshold criteria and management targets will be determined for each environmental value. Early response criteria (if appropriate) may be defined for indicators for the environmental value (such as groundwater depth) or the environmental value itself (such as vegetation status). Trigger and threshold criteria will directly relate to the environmental value and objective itself.

The number of trigger criteria, and the sensitivity of both trigger and threshold criteria, will be determined by the associated management level for the environmental value.

The third step of the framework is to evaluate the baseline or current data to assess against criteria and determine whether the environmental outcome or objectives are likely to be met with existing proposed indicators. This step should also occur as part of reporting requirements when criteria are exceeded. Where criteria are not being met, the adaptive management process should be implemented.

The fourth step of the framework is to implement the OEMP. To ensure successful implementation, relevant internal and external (regulatory) stakeholders are consulted to ensure the OEMP meets management expectations and can be implemented for the associated Proposal.

The fifth, final step of the framework considers a revision of or alternatives to management objectives, indicators and criteria. This step is considered where monitoring and assessment indicates objectives are not being met. Where data suggests objectives cannot be met using current associated indicators and criteria, repeat the second to fifth step of the framework, with consideration of the additional information gained through monitoring.

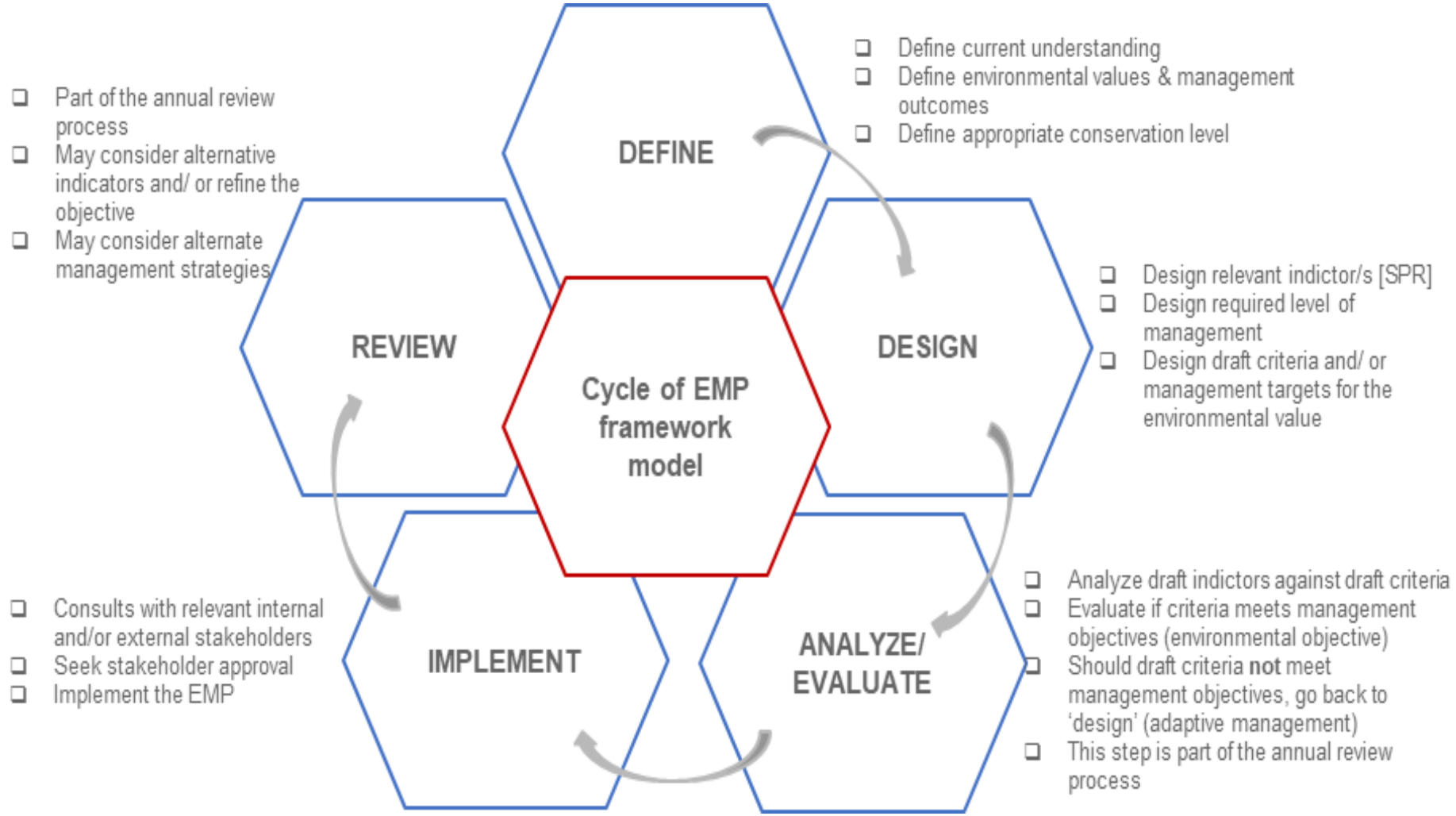


Figure A1: Cycle of the conceptual Environmental Management Plan framework model

Table A1: Management level assessment matrix

Factor	Level of required management (increasing to right)				
Likelihood	Rare	Unlikely	Possible	Likely	Almost Certain
Consequence	Environmental values (species, communities /ecosystems) with no formal recognition for conservation purposes	Environmental values (species, communities /ecosystems) with no formal recognition for conservation purposes but may hold local environmental significance	Environmental values (species, communities /ecosystems) recognised as being of conservation interest	Environmental values (species, communities /ecosystems) directly protected under State and Commonwealth legislation	Environmental values (species, communities /ecosystems) directly protected under State and Commonwealth legislation (with potential severe consequence).
Extent	Immediate	Surrounds	Local	Catchment	Sub-regional
Duration	Days	Months	Years	Decades	Centuries

The factors act independently of one another, and an increased risk of one factor will not necessarily result in other factors with higher risk.

Level/s of management indicate potential importance; however, it is important to note regulatory focus, cumulative impact and heritage values may impact the way the environmental values are treated and managed.

Reference

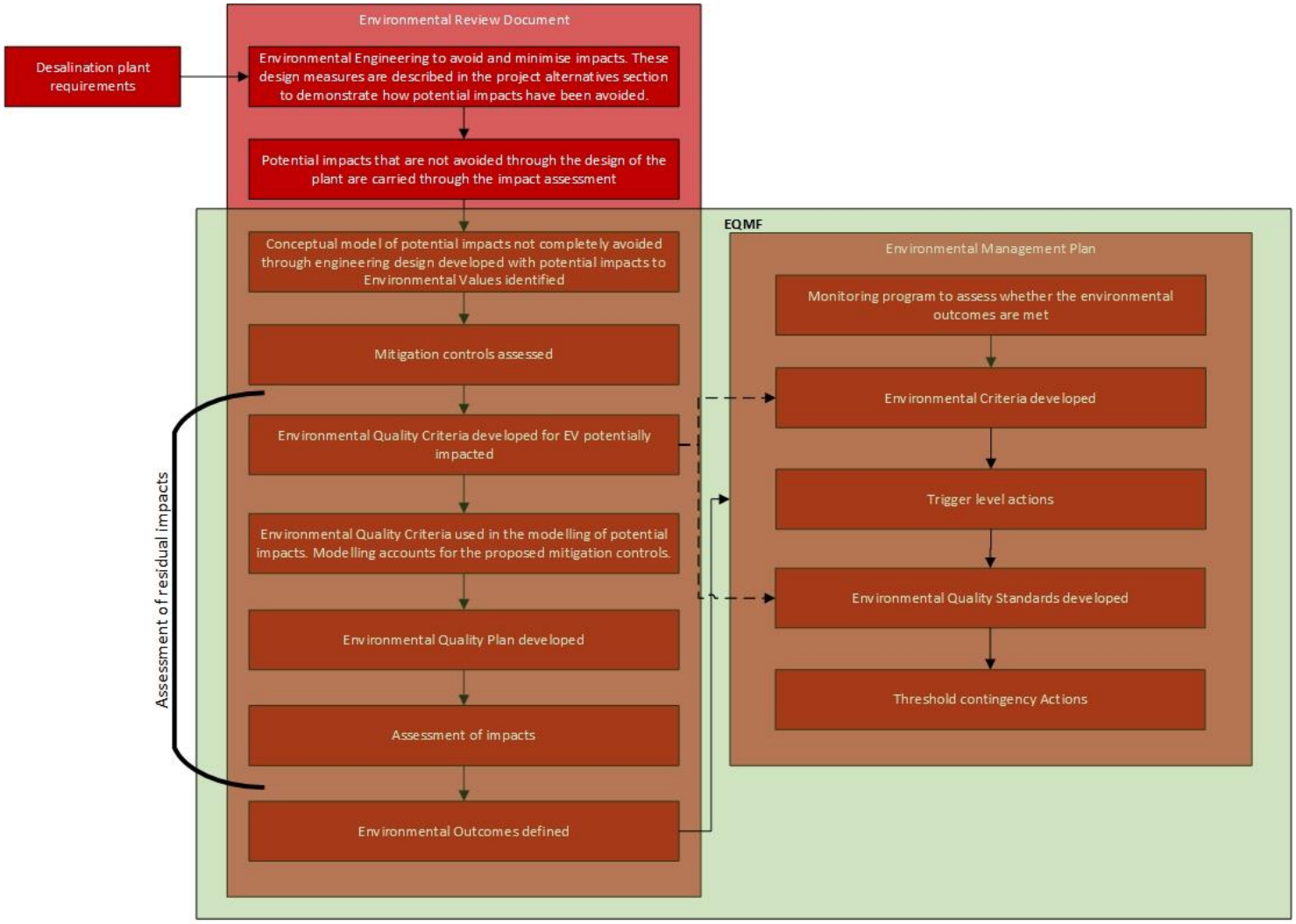
DIIS (2016). Leading Practice Sustainable Development Program for the Mining Industry – Preventing Acid and Metalliferous Drainage Handbook, Department of Industry, Innovation and Science (DIIS), Canberra, Australia.

Appendix 2 Marine Environmental Quality Monitoring and Management Plan

The EPA has prepared an Environmental Quality Management Framework (EQMF) for WA's Coastal Waters (EPA, 2016a). The framework was developed to implement the National Water Quality Management Strategy. Figure A2.1 shows how this framework has been applied to the approvals for this Proposal, including this OEMP.

The purpose of this Appendix is to provide further detail in relation to the monitoring described in Table 2-1. This Marine Environmental Quality Monitoring and Management Plan (MEQMMP) demonstrates how assumptions in the impact assessment will be validated and how residual marine environmental quality impacts and environmental outcomes will be monitored and managed.

The significance of residual impacts has been assessed within the EPA Referral Supporting Document (RioTinto, 2022) and the assumptions and outcomes have been defined for each key environmental factor. Controls to minimise the risks associated with potential impacts are also included within the EPA Referral Supporting Document (RioTinto, 2022). This MEQMMP is an outcomes based plan that includes trigger criteria (EQC), threshold criteria (EQS), trigger level actions and threshold contingency actions consistent with an outcomes-based management plan (EPA 2020).



Note: some EQC used to define limits of environmental impact in the impacts assessment (ERD) are used as EQS in the monitoring program to provide certainty in environmental outcomes for the project

Figure A2-1: Impact assessment process for marine environmental quality

The management and monitoring requirements and sampling design associated with the MEQMMP are presented in Table 2-1 and are further described in this Appendix.

The following monitoring programs are proposed within the Environmental Management Plan for the Dampier Seawater Desalination Plant OEMP.

Marine Monitoring Program 1 – program to ensure the whole effluent toxicity from the operational discharge is below the worst-case dilution criteria used in the impact assessment

Marine Monitoring Program 1 is designed to assess whether the discharge varies from that used to predict impacts in the ERD. The exceedance of the EQC defined in Marine Monitoring Program 1 does not necessarily mean the environmental outcome is not met. Additional monitoring as defined in Marine Monitoring Program 2 will be used to determine whether the environmental outcome and EQS are met.

Marine Monitoring Program 2 – model verification and confirmation that the levels of ecological protection are achieved

The objective of Marine Monitoring Program 2 is to verify the hydrodynamic model has accurately predicted the high level of performance of the diffuser and the EQS will be met at the boundaries of the low and moderate LEPs by confirming:

1. The efficiency of the diffuser and initial dilution of the plume is accurately predicted by the modelling
2. The EQS are met at the boundaries of the low and moderate LEPs.

A2.1 Marine Monitoring Program 1 – Whole of effluent toxicity testing

Marine monitoring program 1 is designed to assess whether the discharge varies from that used to predict impacts in the ERD.

WET testing will be used to determine the actual toxicity of the discharge. Results from this program will be assessed against the EQC defined in Table A2. EQS are not specifically defined for this program as it is possible that the EQC are exceeded but the LEP are not compromised if the model is conservative as determined in Marine Monitoring Program 2.

Table A2: Whole effluent toxicity testing environmental quality criteria

	Dilutions required for a 99% species protection level	Dilutions required for a 90% species protection level
Number of dilutions	1:222	1:59

A2.1.1 Sampling design

Samples should be collected from the comingled effluent before discharge to the ocean. Samples will be collected in laboratory-supplied containers. Samples will be preserved as required by the laboratory.

The required volume of water for diluting the samples will be collected from an area within the high LEP outside of the influence from the proposed discharge.

The sampling program will include the following two processes:

1. A range-finding test to determine if the effluent is toxic and, if so, determine the appropriate concentration range for subsequent tests
2. Toxicity testing to determine the EC50, IC50, LC50 and NOEC values.

Testing should be in accordance with the laboratory National Association of Testing Authorities accredited procedures and methodologies and in accordance with Australian and New Zealand Guidelines (2018) toxicity sampling and testing protocols. The proposed tests are based on locally relevant species[2].

- Forty-eight-hour larval development test: *Soccostrea echinate*
- Ninety-six-hour toxicity test: *Melita plumulosa*
- Eight-day sea anemone pedal lacerate development test: *Aiptasia pulchella*
- Seventy-two-hour sea urchin larval development test: *Heliocidaris tuberculate*
- Ninety-six-hour fish imbalance toxicity test: *Lates calcarifer*
- Seven-hour fish imbalance and biomass toxicity test: *Lates calcarifer*
- Seventy-two-hour marine algal growth test: *Nitzschia closterium*.

[2] Tests should be based on tropical marine species based on their ecological relevance. The recommended species may be changed for other suitable species dependent on availability.

A2.2 Marine Monitoring Program 2 – model verification and confirmation that the levels of ecological protection are achieved

The objective of this monitoring program is to verify the following:

1. The salinity of the discharge is within the modelled limits (section A2.2.1 and A2.2.2)
2. The efficiency of the diffuser and initial dilution of the plume is accurately predicted by the modelling (Section A2.2.2)
3. The EQS are met at the boundaries of the low and moderate LEP (Section A2.2.3).

The spatial boundaries presented for the low and moderate LEP (Figure A2.4) are based on a calibrated and validated hydrodynamic model. The predictive modelling showed the EQC for salinity is expected to be achieved well within the boundary of the revised moderate LEP (Figure A2.2), because the revised limits of the EQP were defined based on the worst-case assumption of toxicity of the discharge. No temperature thresholds were exceeded within the model domain due to the predicted rapid dilution at the diffuser. Therefore, salinity is considered the dominant physical water quality parameter.

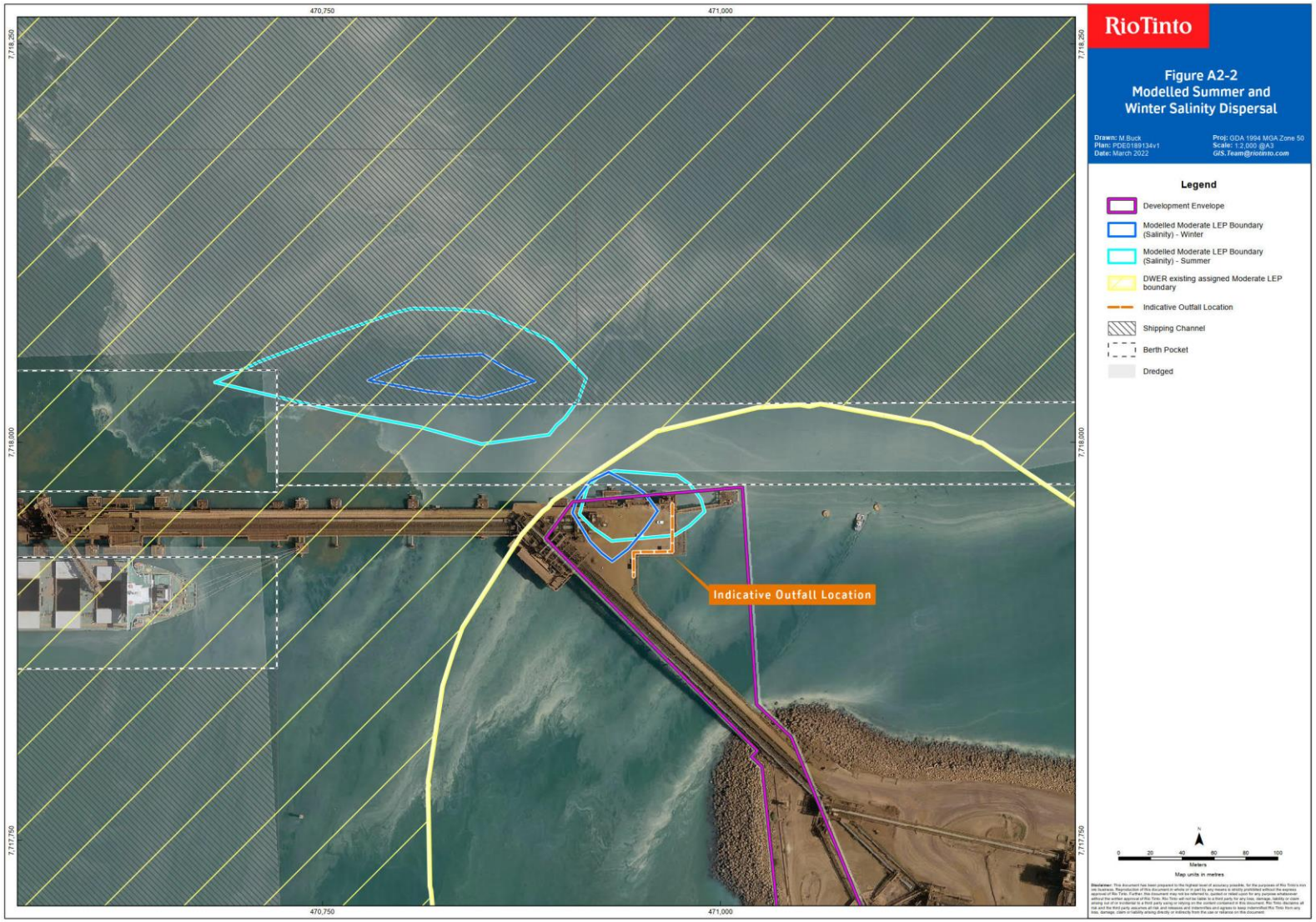


Figure A2.2: Salinity modelling

A2.2.1 Sampling design – salinity monitoring of the discharge

The modelling predicts that the salinity at the discharge must remain below 69 ppt to achieve the EQC at the boundary of the low LEP. Due to the spatial extent of the moderate LEP the moderate LEP is not expected to be compromised if the salinity exceeds 69ppt.

Assuming the discharge remains below 69 ppt and the model is conservative or accurate, it is expected that the EQS for a low and moderate LEP will be maintained. Higher salinity levels at the discharge may be acceptable if the EQS are maintained at the boundaries of the low and moderate LEP.

The salinity of the proposed discharge will be regularly monitored during operations. If the salinity of the proposed discharge exceeds 69 ppt, a reactive monitoring program would be stood up to determine if the EQS is exceeded at the boundary of the low and moderate LEP, as per the monitoring program in Section A1.1.1.

A2.2.2 Sampling Design - Testing of the diffuser efficiency and initial dilution

The spatial boundaries presented for the low and moderate LEP are based on a calibrated and validated hydrodynamic model. To ensure the model is accurate or conservative in its prediction of the spatial extent of these zones, it is important to verify the predicted high performance of the diffuser and that the high levels of initial dilution are achieved during operations. Demonstrating the accuracy of the model provides additional certainty that the LEP will be maintained.

The model does not predict that the EQC for temperature will be exceeded. The EQC for salinity (associated with a moderate LEP) are exceeded at a maximum distance of 300 m from the diffuser in summer and 210 m from the diffuser in winter. Salinity is therefore considered a more appropriate physical water quality indicator to validate the accuracy of the predictive model.

The modelling results are based on an assumed discharge salinity. The actual salinity after commissioning may be slightly higher or lower than the assumed salinity[3].

To verify the model accuracy, a comparison will be made between the discharge salinity and the salinity at 300 m and 210 m from the discharge. The reduction in salinity will then be compared with the reduction in salinity predicted by the model as per the EQC in Table 2-1.

The salinity of the proposed discharge will be regularly monitored during operations. Samples will also be collected from the discharge stream to verify the accuracy of the online salinity logger. This monitoring program will be conducted over a period of three days and two samples per day will be collected from the discharge stream for validation of the results from the online logger. The daily median value from the online salinity logger will be used for comparison with the monitoring locations (Figure A2.3).

The modelling predicts salinity levels would decrease by the following amounts:

- At least 29.083 ppt at a maximum distance of 300 m under summer conditions
- At least 28.334 ppt at a maximum distance of 210 m under winter conditions.

Current, temperature and depth (CTD) profiles will be collected during the flood and slack tides at each location in Figure A2.3 over two days. Median values for slack and flood tides will then be calculated and compared with the median value of the salinity before discharge.

[3] Discharge salinity will be dependent on the actual intake salinity and process adjustments during commissioning.

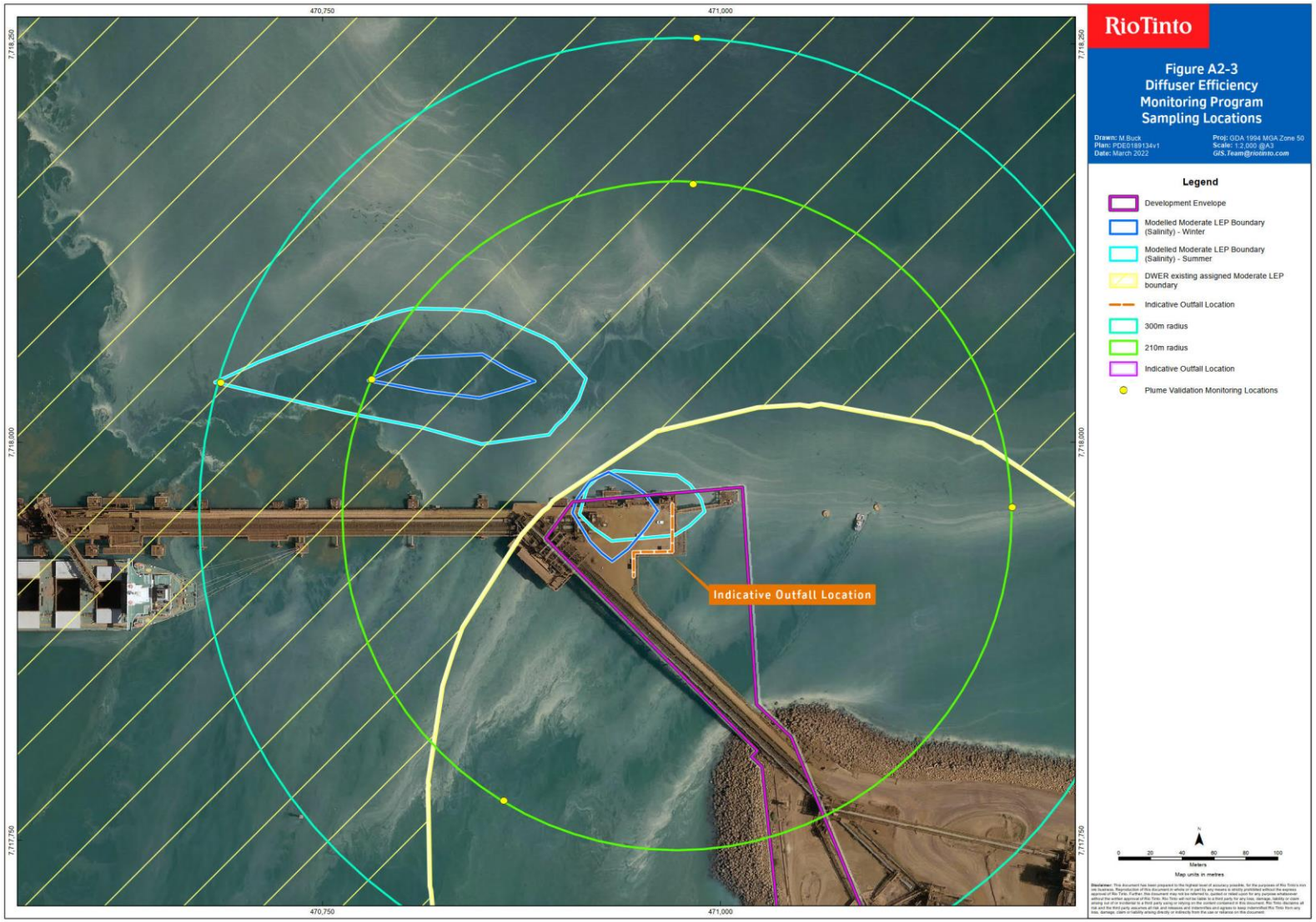


Figure A2.3: Diffuser efficiency monitoring program sampling locations

A2.2.3 Sampling Design - Testing to ensure the environmental quality standards are met at the boundaries of the low and moderate level of ecological protection

The spatial boundaries presented for the low and moderate LEP are based on a calibrated and validated hydrodynamic model. The LEP are expected to be maintained if the trigger criteria are not exceeded.

If these trigger criteria are exceeded, there is potential for an exceedance of the Threshold Criteria/EQS at the boundaries of the low and moderate LEP.

Reference sites within the High LEP[4] will be used to account for small-scale ambient variations in water quality[5] which will affect both discharge and ambient water quality values.

Salinity was the only modelled parameter expected to exceed the thresholds within the model domain. All other parameters did not exceed the thresholds and the risk of exceeding them at the boundaries of the LEP are considered to be extremely low. Therefore, the only physical water quality parameter monitored at the boundary of the low and moderate LEP will be salinity.

Table A3: Environmental quality standards at the boundaries of the levels of ecological protection

Season	Level of Ecological Protection	Environmental Indictor	Baseline water quality value used in the modelling	EQC applied to the modelling	EQS for monitoring program
Summer	Low/moderate LEP boundary	Salinity levels at the low/moderate LEP boundary	36.61	37.08	0.47 ppt above reference site
Winter			35.78	36.2	0.42 ppt above reference site
Summer	Moderate/high LEP boundary		36.61	36.86	0.25 ppt above reference site
Winter			35.78	36.07	0.29 ppt above reference site

Monitoring will be completed using a calibrated CTD over a period of three days on both flood and slack tides on the commencement of steady-state operations or if the trigger criteria (EQC) are exceeded. The median reference site values will be compared with the median monitoring site values for both slack and flood tides.

CTD profiles will be collected daily (over three days) during the flood and slack tides at each location (Figure A2.4). Median values will be calculated for the low/moderate LEP boundary and the moderate/high LEP boundary for both slack and flood tides. These will then be compared with the median value of the salinity at the reference site location for flood or slack tides. If the difference in the median salinity between the reference site and impact site is lower than the values in Table A3, the LEP are considered to be met. If they are higher than the values in Table A3 the LEP may be exceeded.

[4] Areas on Maximum LEP are at least 10km from the proposed discharge and may not be representative of the local nearshore conditions

[5] Water quality changes on a daily, weekly, seasonal and inter-annual scale

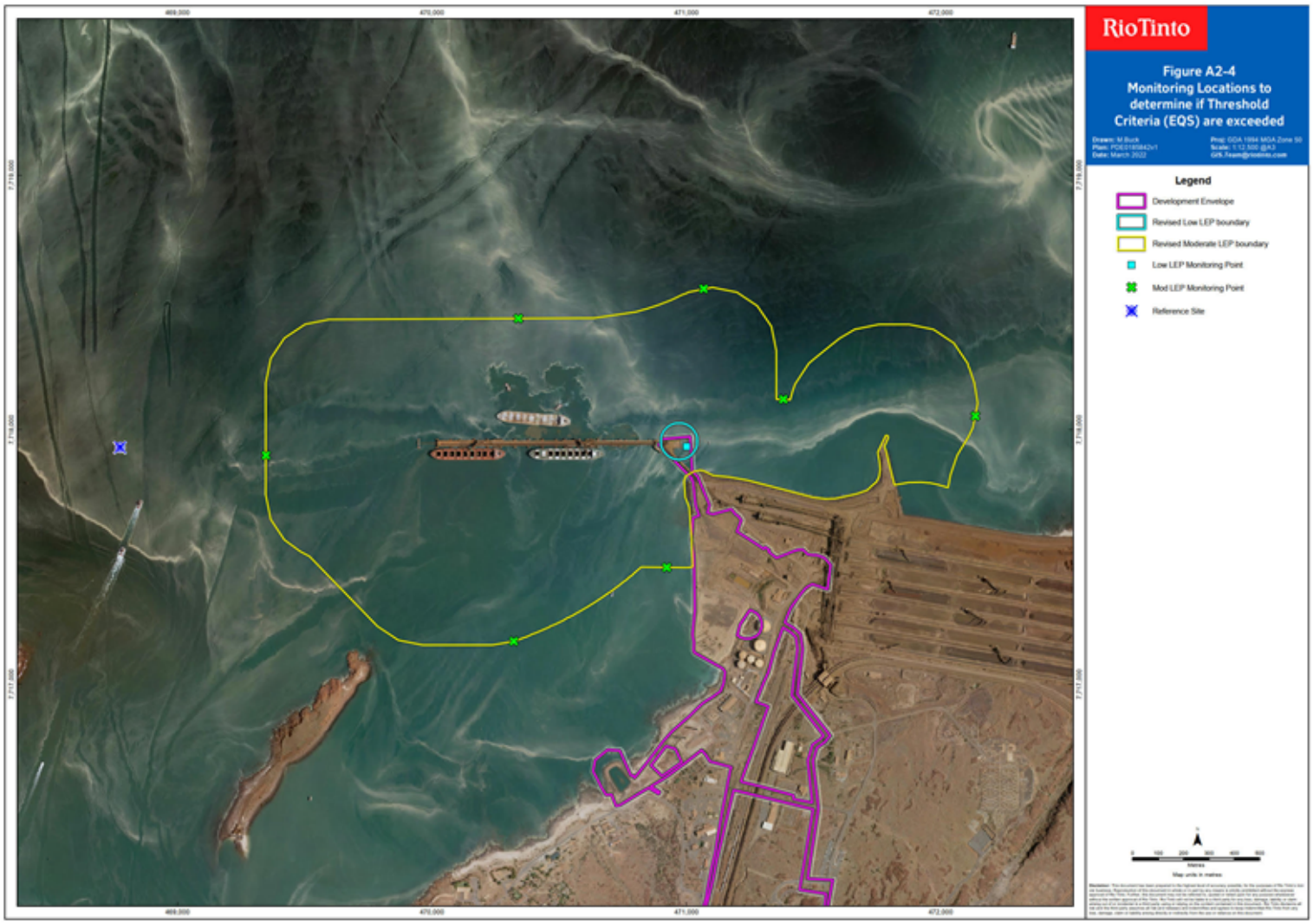


Figure A2.4: Monitoring locations to determine if threshold criteria (EQS) are exceeded

References

ANZG, 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia.

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