

- increase to waste storage capacity within M08/266, M08/123, M08/124 and M08/125 (approved waste rock dumps) and onto additional tenements including G08/54 and G08/63;
- increase to capacity of existing product stockpiles and associated infrastructure at the Port Terminal Facility situated within G08/52;
- construction of two new infrastructure corridors:
 - one of which will extend from the north-south road across tenements G08/53 and G08/74 to the airstrip (located on tenure outside and to the east of the IOPA area), for the purposes of providing transport, power and water supply infrastructure to the airstrip; and
 - the other of which will extend from M08/123 and/or M08/124 across G08/63 (broadly adjacent to L08/20), to connect existing Project power and water supply facilities to facilities outside of and to the east of the IOPA area;
- increase mine dewater discharge from two GLpa to potentially up to eight GLpa into the mouth of the Fortescue River.

The Proposal does not seek to alter existing mining, processing and tailings production rates or increase throughput of the desalinisation plant. The Proposal is limited to addressing constraints which are contained within the existing Project's approvals. The Proposal will ensure continuous operation of the Project.



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Figure 1: Mine Continuation Proposal Development Envelope and Conceptual Footprint





Figure 2: Schematic of Project mining, beneficiation and export terminal operations

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2 Environmental Management System

2.1 Structure

CPM has established and is implementing an EMS to ensure that CPM proactively manages its environmental risks, objectives and targets and meets statutory obligations during the operations phase.

The EMS framework includes the following components:

- Environmental Policy;
- EMS Document;
- Environmental Guidelines;
- Environmental Management Programs;
- Environmental Management Plans (EMPs);
- Environmental Procedures; and
- Environmental Registers.

The OEMP is the key component of the Environmental Management Program tier of the EMS framework for operations and should be read, understood and implemented in conjunction with the requirements of the overarching EMS.

Environmental procedures have also been developed as part of the requirements of the EMS and, where relevant, these procedures are referenced within the OEMP.

Figure 3 summarises the relationship between the OEMP and the overarching EMS.



ACT LEADERSHIP CPM's Visions & Values Environmental Internal & External Interested Parties Policy Context of the organisation Environmental Commitments Leadership PLAN Mining Corrective Actions, Processing Power Plant Environmental Aspects **Desalination Plant** Aspects: Risks Register Port Operations & Opportunities Villages Aerodrome Continuous Improvement Stakeholder Feedback, Regulator Feedback, Business Opportunities **Operational EMP** Licenses to Operate Ministerial Statements Compliance Compliance Legislation Obligation **Obligations & CPM** Objectives Register for Environmental Tenement Conditions Environment **Objectives Clearing Permits** (CORE) Other Approvals **Environmental Monitoring** Performance Indicators DO Documentation Resources Competency Support & Awareness Operations Communication Standards Emergency Response Procedures CHECK Management Review Monitoring Evaluation Inspections Performance Internal Audit Evaluation Environmental Performance Monitoring **Environmental Condition Monitoring** Consultant Reports Targets

Environmental Management System Structure

Figure 3: EMS Structure

2.2 Integration of this OEMP

Table 1 describes the key items within the EMS structure that support the OEMP. All of the items listed are accessible via CPM's Environment Department intranet portal.



Table 1: Key	/ EMS items supporting OEMP
ltem	Description
Environmental Policy	Provides a high-level leadership statement of intent and commitment. It is designed to guide decisions and behaviour across the business in order to manage risks and comply with legislative obligations.
Environmental Guidelines	Developed to set out performance expectations for key activities, which contribute to environmental outcomes.
Environmental Management Programs	High level document that provides environmental management requirements for significant environmental risks and compliance requirements.
EMPs	Detailed plans that address specific environmental aspects and impacts. Many of these are internal documents; however, some are maintained in accordance with external requirements (i.e. Oil Spill Contingency Plan (OSCP)).
Environmental Procedures	Succinct and detailed internal documents that address specific activities that may have an environmental impact.
Environmental Registers	 Numerous registers exist to track and log relevant environmental information. These include: Environmental Aspects and Impacts Register Compliance Obligation Register for Environment (CORE) which is updated to include statutory requirements within approvals as they are obtained. Risk Register



3 Approach and Rationale

3.1 Collation of EMP Requirements

A number of EMPs were developed to allow construction and operation of the Project. The majority were focused on construction risks, which are now either complete or close to completion. The previous approved 2014 OEMP collated the operational management requirements from most EMPs into a single document.

The intent of this OEMP is consistent with the approved 2014 OEMP. This OEMP has collated the operational requirements of numerous EMPs into one clear and succinct document. This version of the OEMP has also included Port EMP requirements. Appendix 1 provides a detailed assessment of management plans required by MS635 and confirms their status with respect to the Project and this OEMP.

It is planned that this OEMP will supersede the 2014 OEMP with respect to operational requirements for the Project once the Proposal is approved.

3.2 Focus on Operational Requirements

The Project is large in scale and complex and as such there are numerous compliance obligations and environmental issues of varying significance. Of the issues that are not managed by other legislation, the focus of this OEMP will be on those deemed to be of highest significance. Minor risks are managed through the EMS and other company processes.

This Plan has evolved from the series of management plans required by MS635 and that have been approved by the EPA. The 2014 OEMP superseded many of the original plans required under MS635. For an assessment of those Plans that have been superseded refer to Appendix 1. Separate Plans have been prepared for Closure.

Since MS635 was published in 2003 there are a number of matters that are now managed more comprehensively under separate legislation (e.g. ballast water management, oil spill management, heritage protection). In this regard, this Plan has sought to remove duplication and not address a number of these issues. The focus of this Plan is on current operational aspects and any related to the future operation of the Proposal.

Broad environmental and related compliance issues are identified as follows:

- Environmental compliance reporting;
- Retaining environmental licences to operate (e.g. monitoring compliance, mitigating harm to the environment); and
- Significant environmental matters identified by regulatory authorities.

3.3 Environmental Factors

The OEMP addresses potential impacts to relevant key environmental factors listed within OEPA guidance documents.

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Table 2 lists the OEPA factors identified as being relevant to the Project, the OEPA's management objectives for these factors and identifies the Section within this OEMP where its management is addressed.

Environmental Factors	OEPA Objective	OEMP Section
Benthic Communities and Habitat	To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained.	Section 4.1
Coastal Processes	To maintain the geophysical processes that shapes coastal morphology so that the environmental values of the coast are protected.	Section 4.2
Marine Environmental Quality	To maintain the quality of water, sediment and biota so that environmental values are protected.	Section 4.34.3 CPM operates under a separate OSCP. Given that marine oil spills at Cape Preston are managed by the Department of Transport this is not addressed in this Plan.
Marine Fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained.	Section 4.4
Flora and Vegetation	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.	Section 4.5
Landforms	To maintain the variety and integrity of distinctive physical landforms sot that environmental values are protected.	Section 4.6
Terrestrial Environmental Quality	To maintain the quality of land and soils so that environmental values are protected.	Section 4.7
Terrestrial Fauna	To protect terrestrial/subterranean fauna so that biological diversity and ecological integrity are maintained.	Section 4.8
Inland Waters Environmental Quality	To maintain the quality of groundwater and surface water so that environmental values are protected.	Section 4.9
Hydrological Processes	To maintain the hydrological regimes of groundwater and surface water do that environmental values are protected.	Section 4.10
Air Quality	To maintain air quality and minimise emissions so that environmental	Section 4.11

Table 2: OEPA Environmental Factors

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Environmental Factors	OEPA Objective	OEMP Section
	values are protected.	
Social Surroundings	To protect social surroundings from significant harm.	Section 4.12 CPM operates under a separate Aboriginal Heritage Management Plan. Given that Aboriginal heritage sites are managed by the Department of Aboriginal Affairs this matter is not addressed in this Plan.

There are some cases where there are no significant risks to a key environmental factor, or the risks were construction-based and have been closed. In this case the relevant management section of this OEMP provides an explanation of the factor and why specific management is not required to be included in the OEMP.

3.4 Document Structure

Management activities are listed against their relevant environmental factors. Each section contains:

- 1. Main findings of the environmental factor;
- 2. Significant impacts associated with the factor;
- 3. A summary of the obligations that are relevant to the impacts;
- 4. Objectives which relate to management actions and how the EPA's objective for the factor will be met on implementation;
- 5. Description of high-level management actions that demonstrate how targets are to be met. Management actions are prioritised using a risk-based approach. The greatest management effort is placed on those activities and environmental aspects that have the highest likelihood of causing environmental impacts or where the consequence of an impact is severe and likely to be irreversible;
- 6. Monitoring to be undertaken to assess the efficacy of management actions against the environmental objective and target. The monitoring is to be aligned with published guidance. Where relevant it will include the location of monitoring sites, reference or control sites, parameters, frequency, timing and methodologies for data collection and analysis, procedures, reporting mechanisms and any other relevant information;
- 7. An outline of actions to be taken where management targets are not met or exceeded. Review and revision of management actions will be undertaken well in advance of likely significant effects on the environment. Review and modification of Project activities may also be necessary to meet the environmental objective; and
- 8. An outline of reporting requirements relevant to the factor.



4 Management

4.1 Benthic Communities and Habitat

4.1.1 Coral and Invasive Marine Pests

Coral-supporting habitat of low to moderate percentage cover occurs as a wide belt along the western side of the Cape Preston platform and gradually thins to a narrow band along the west and north side of Preston Island proximity to the breakwater. This band continues along the slope that passes to the west and north of SW Regnard Island. Most of the habitats in the shallows adjacent to Cape Preston are relatively barren intertidal sand flats or shallow algae dominated pavements.

Offshore from Cape Preston the seabed shelves rapidly descend to depths of greater than 10 m and then to a large basin extending to 17 m depth. The substrate in this area (Fortescue Roads) is a relatively barren silty sand substrate with little macrobiota evident on the surface. In the deeper parts of this basin scattered and, at times, dense patches of *Halophila sp* seagrass occur. Sparse patches of this species of seagrass were also recorded in small areas west of SW Regnard Island and west of Fortescue Island.

Further offshore in waters greater than 22 m depth, the substrate is gravely sand which supports scattered sea whips and fans and the occasional large barrel sponge in low abundance.

No invasive marine pests (IMP) were identified in waters surrounding Cape Preston following construction (GHD, 2013). The Department of Fisheries were notified of the detection of *Didemnum perlucidum* during routine monitoring after it was declared to be found in Dampier 55 km NE of Cape Preston in 2012 (GHD, 2013). *D. perlucidum* is now confirmed as being present in several locations around the coast of Western Australia and management is required by Department of Fisheries (DoF) in high value asset areas. DoF determined that no further action was required in response to the detection at Cape Preston.

There are two main vectors via which IMP and exotic marine organisms can be introduced to Australian waters in association with activities at Cape Preston. These are via the ballast water contained within the ship's tanks or via biofouling of ship hulls, underwater fittings and voids, internal seawater systems or sediments.

IMP and exotic marine organisms originate from vessels which have visited other ports around the world. The IMP and exotic organisms can be transferred to Australian waters when ships discharge ballast water. Additionally, IMP that has fouled ship hulls and other immersed surfaces of the vessel has the potential to spawn or detach and establish in the new location. These organisms then have the potential to migrate through a number of methods into other geographic regions within Australia.

In ecological and economic terms, IMP, which may be translocated in ballast water or as biofouling, can:

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- Out-compete, prey upon, or otherwise displace native species;
- Alter natural ecological and bio-physical processes;

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- Act as vectors for pathogens which can impact upon ecological or human health;
- Degrade or cause the collapse of commercial fisheries and aquaculture enterprises, either through direct competition with target species or via the introduction of a pathogen; and
- Cause problems for industrial infrastructure and navigation aids, for example, by blocking seawater intakes/outlets, impairing the operation of undersea valves, or causing buoys to sink.

IMP and exotic marine organisms threaten the ecological balance of port and marine waters. The presence of IMP has the potential to reduce biodiversity and fish populations and disrupt natural ecosystems.

The movement of vessels, in particular tug boats, has the potential to churn up sediment from the seabed, which may be deposited on benthic primary producer habitat such as seagrass and coral. This sediment reduces the availability of sunlight and can lead to health impacts or death.

Following completion of Cape Preston Port construction the monitoring program and data was reviewed to determine the acceptability of construction impacts (Sino Iron Port Project - Coral Monitoring Program Review, GHD 2014). The assessment determined that 'Cape Preston Port does not represent an unacceptable decline of hard corals within the marine management unit. Total losses from direct and indirect impacts were well below EPA Guidance Statement No. 29 (EPA, 2004) acceptability criteria of >10%'. The assessment also determined the cumulative impacts from the Project's operation were also unlikely to be unacceptable as the breakwater provides a suitable artificial habitat to corals.

4.1.2 Impacts

The following impacts were deemed significant for the operational phase of the Project:

- Introduction of IMP as a result of ballast exchange or hull fouling;
- Sediment smothering of hard corals resulting from:
 - o vessel movements and associated propeller churn;
 - o coastal processes;
 - Fortescue River flows;
 - Port and project runoff; and,
 - Increased sheltering of port structure reducing sediment flushing.
- Habitat loss resulting from marine installations
- Impacts vessel moorings and anchors.
- Note that dredging and construction of the direct ship loading facility has not yet commenced. Prior to construction of these assets a separate Marine Construction and Dredge Management Plan will be prepared and submitted to the OEPA in accordance with Condition 8 of MS635.

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4.1.3 Compliance Obligations

Compliance obligations that may apply to potential impacts to this factor are summarised in Table 3.

Table 3:	Benthic communities and habitat compliance obligations

Impact	Relevant legislation	Addressed in this OEMP Section
Introduction of IMP as a result of ballast exchange or hull fouling.	Ballast water discharge is currently managed in accordance with the Commonwealth <i>Biosecurity Act</i> 2015.	To avoid duplication with other legislative jurisdiction, ballast water management is excluded from this plan.
	Ballast water management requirements will be further strengthened following the International Convention for the Control and Management of Ship's Ballast Water and Sediments (Adoption: 13 February 2004; Entry into force: 8 September 2017) Biofouling IMP risks are also currently managed by the DoF under the <i>Fish Resources</i> <i>Management Act 1994.</i>	Biofouling management requirements are specified in Table 4. IMP monitoring requirements are specified in Table 5.
Sediment smothering of benthic habitats as a result of vessel movements and associated propeller churn.	None.	The management of this potential impact is described within this section of the OEMP.

4.1.4 Objectives

Taking into account significant environmental aspects, associated compliance obligations and key risks, CPM has developed the following Project-specific objectives:

- 1. To avoid ballast water contamination and the introduction of exotic marine organisms from ship hulls.
- 2. Sediment smothering as a result of vessel movements and associated propeller churn is minimised such that coral loss estimates are not exceeded.

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4.1.5 Management Actions and Targets

Management actions within Table 4 have been developed to address the compliance obligations identified within Section 4.1.3.

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Action / control measure	Responsibility	Timing	Target
 International (overseas) vessels are not permitted to undertake cleaning in Cape Preston Port and requests will generally be denied. If cleaning of an international vessel is required to be undertaken in Cape Preston Port the following must occur: Complete risk assessment using the VRASS (refer Appendix 3). Vessels determined to be of medium or high risk to be inspected by qualified and compared mating action for the following must of the median of the following for the following must occur: 	Harbour Master	At all times	No IMP species introduced by international vessels
 experienced marine scientist if recommended by DoF. Provide inspection report to DoF and Dept of Ag and Water 			
 Resources within 48 hrs Retain samples for scientific identification of the biofouling organisms The local Cape Preston Port fleet not generally involved in travel beyond Port limits (including transhippers, tugs, barges and auxiliary work vessels) are considered low risk for IMP transmission. In this regard, these vessels will not be subject to the above 			
requirements. From time to time CPPC vessels will likely require mobilisation to overseas ports for survey or repairs. Prior to departure from the overseas port the vessel will be cleaned free of biofouling and biosecurity risk material, inspected and reported using the Maritime Arrivals Reporting Systems (MARS) to meet Australian Biosecurity requirements. Further actions will be undertaken if required in consultation with the Department of Ag and Water Resources.			
Minimise tug boat movements in proximity to coral communities.	Harbour Master	During low tides	No additional coral loss.

Table 4:	Benthic communities and habitat management actions
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4.1.6 Monitoring

To assess whether targets described within Table 4 have been met monitoring will be conducted as described within Table 5.



able 5: Benthic communities and habitat monitoring						
Target	Monitoring activity	Responsibility	Timing			
No IMP species introduced by international vessels.	Conduct routine IMP monitoring in consultation with DoF at the sites shown in Figure 4: Invasive Marine Pest Sites.	Port Manager Environment Department.	As agreed in consultation with DoF			
No additional coral loss above the estimates presented in the five year monitoring review.	Monitor coral cover and species diversity at established impact and reference sites shown in Figure 5: Coral Impact and Reference Monitoring Sites.	Environment Department	Around May each year and if practicable, after severe cyclones			

Table 5: Benthic communities and habitat monitoring

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Figure 4: Invasive Marine Pest Sites

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4.1.7 Evaluation and Revision

Introduced Marine Pests

The discovery of an IMP at Cape Preston will be reported to DoF. DoF will determine the course of action required to be taken.

Coral Health

Coral health monitoring has been conducted for several years and CPM now has a good understanding of the impacts of the Project on coral health in the area. Coral health monitoring results will be assessed each year against previous monitoring data to determine if there are any new or increased health impacts. If new or increased coral health impacts are determined to be related to port operations the management actions in this OEMP will be reviewed and revised as appropriate to prevent the determined cause of the impact.

4.1.8 Reporting

Section 6 provides details about general compliance and incident reporting. The following information will be reported externally as part of the regular reporting described in Section 6:

- IMP monitoring results; and
- Coral health monitoring results.

If the targets listed in Section 4.1.5 are not met then the applicable agency will be notified. For this factor the relevant agencies are DoF for IMP targets and the OEPA and the Department of Parks and Wildlife (DPaW) for coral loss targets.



4.2 Coastal Processes

4.2.1 Coastal Stability

Cape Preston is exposed to a relatively mild ambient wave climate, typically less than one metre significant wave height, which is predominantly from the westnorth-west during the warm season and from the north to east during the cool season. The effect of tropical cyclones is episodic, with the capacity to produce waves from any offshore direction depending on the path of the system.

The structure of Cape Preston and the adjacent coast is largely determined by the presence of its rock features, including the basalt outcrop that forms the Cape and the limestone shore platform extending around the Cape and adjacent beaches. These features provide resistance to the ambient wave climate and moderate to strong tidal currents that affect the region. The shelter provided by the rock platform is potentially less effective during cyclone events, where the combination of high waves and storm surge is capable of rapid redistribution of large volumes of beach sediment (GEMS, 2008).

The regional structure suggests a net movement of sediment towards Cape Preston, notably with supply from the Fortescue River during cyclonic flooding. This material accumulates on the western side of the Cape, as a series of low profile dunes, Preston Spit and a complex structure of shoals across the extensive rock platform.

Under ambient summer conditions, there is a general low volume northward sediment transport along the outer edge of the shoals, which is reversed under northerly conditions that occur occasionally throughout the year. Instability of the western beach has been observed historically and is further evidenced by the loss of a mangrove stand on the northern part of the beach. However, it appears likely that this destabilisation was caused by a combination of marine and fluvial sediment transport (GEMS, 2008).

Sediment is estimated to accumulate on the south side of the causeway at approximately $15,000 \text{ m}^3$ per annum for the first decade, an average of 5.0 m/yr accretion along the length of the northern beach.

Ultimately, an arcuate beach is expected to develop, approximately 600 m long, up to 100 m shoreward of the existing shore at its northern end.

The response of the beach to the south depends upon the rate of material supply to this section of coast. If no material is available, the southern section of beach will erode at approximately 0.9 m per annum, gradually reducing over the first decade. Subsequently, the beach may be expected to stabilise.

As this is a macro-tidal environment, the planar structure of the beach would be expected to remain, thus having relatively low impact on the value of the beach as turtle nesting habitat. A 10 m retreat corresponds to the width of the existing beach flat, and therefore is unlikely to form a significant beach scarp.

An evaluation of monitoring data collected between 2009 and 2014 was undertaken by GEMS (Cape Preston Coastal Stability Review 2009-2014, GEMS 2015).The monitoring observations have suggested that coastal adjustment to the causeway largely occurred in the first year following construction. Observations generally followed the predicted behaviour (sediment accumulation immediately south of the causeway and erosion of the western beach); however the overall scale of response was smaller and occurred over a shorter time



frame. Subsequent coastal behaviour closely corresponds with the coastal dynamics that existed prior to the port facilities.

Coastal monitoring has been undertaken on a twice yearly basis between 2009 and 2014, including capture of aerial imagery, on-site photographs and beach profile surveys, along 27 fixed transects. From 2014 'high resolution' aerial survey data has been obtained in June annually replacing the on-ground survey.

4.2.2 Impacts

The following impact was deemed to be most significant for the operational phase of the Project:

• Erosion or smothering of coastal habitats as a result of changes to coastal processes due to the presence of the port structure.

CPM submitted a Marine Management Plan in 2008 which detailed the above potential impacts on coastal processes. The Marine Management Plan was approved by the OEPA in accordance with MS635 requirements.

4.2.3 Compliance Obligations

While there is no relevant legislation for this impact, Table 6 summarises what is addressed within the OEMP.

Impact	Relevant legislation	Addressed in this OEMP Section
Erosion or smothering of coastal habitats as a result of changes to coastal processes due to the presence of the port structure	None.	The management of coastal processes is included in this OEMP. This OEMP is intended to address the requirement for marine and port management plans for operations.

Table 6:Coastal processes compliance obligations

4.2.4 Objectives

CPM has developed the following Project-specific objective for coastal processes:

1. To maintain the morphology of the subtidal, intertidal and supratidal zones and the local geophysical processes that shape them.

4.2.5 Management Actions and Targets

The potential impacts to coastal processes are a result of the presence of the port structure, rather than any operational activities. As a result there are no management actions that can be conducted to minimise these impacts.

4.2.6 Monitoring

Monitoring will be conducted as described in Table 7 to assess whether the targets have been met.



	Table 7:	Coastal	processes	monitoring
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Target	Monitoring activity	Responsibility	Timing
No more than 20% (by length) of available nesting habitat along the west coast of Cape Preston is rendered inaccessible to sea turtles as a result of scarping.	Monitor shoreline along the west coast of Cape Preston (Figure 6) in June to quantify impacts from the preceding cyclone season	Environment Department	Annually







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4.2.7 Evaluation and Revision

Coastal process impacts from the port structure are expected to occur over a long-term timeframe. Coastal stability and imagery data will be evaluated every five years to determine the extent of impacts. Data will be assessed against previous monitoring data to determine if there are long-term trends within modelling predictions and to confirm if the 20% scarping trigger level has been exceeded or not.

If the scarping trigger level exceeds 20% then an investigation will be conducted into the cause, and the management actions and monitoring in this OEMP will be reviewed and amended as required.

If the scarping trigger level exceeds 30% then CPM will submit a proposal to DPaW for possible contingency actions which may include of the following contingency actions:

- The use of earthmoving equipment to reshape the fore dune to make it more accessible to turtles; or
- The construction of a small groyne / headland near the northern end of the western beach.

If the above occurs this OEMP will be reviewed and revised to manage and monitor the success of any contingency action that is implemented.

4.2.8 Reporting

Section 6 provides details about general compliance and incident reporting. The following information will be reported externally as part of the regular reporting described in Section 6:

• Coastal processes monitoring results.

If the targets listed in Section 4.2.5 are not met then the applicable agency will be notified. For this factor the relevant agencies are the OEPA and DPaW.



4.3 Marine Environmental Quality

4.3.1 Marine water quality and waste water outfall

The nearshore waters at Cape Preston are controlled by the seawater quality of the regional area. The Cape's waters are well mixed by wind and the large tidal movements that occur in the region.

The waters surrounding Cape Preston are afforded a high level of ecological protection, with the exception of:

- A Moderate Ecological Protection Area (MEPA) that extends 250 m from all points of the port structures; and
- A Low Ecological Protection Area (LEPA) that extends 70 m from all points of the desalination diffuser structure.

The Project desalination plant is authorised to operate at a capacity of up to 44 GL/yr, which equates to up to 57.8 GL/annum being discharged to the marine environment. This brine is typically twice as saline as the receiving waters, and also contains elevated levels of other contaminants.

The brine is discharged via a diffuser, which promotes its mixing and dilution within the boundaries of a LEPA such that the water quality parameters of the surrounding MEPA can be maintained.

Vessel oil spills are generally caused by collisions, either with another vessel or with a fixed structure such as land or the port. Oil spill risks from vessels at the Project are lower than a typical Pilbara port due to the use of 'dumb' barges. In addition, fuel is brought to site via road rather than through the port which removes risks to the marine environment associated with port transfer and bunkering of fuel.

Mine dewater is currently pumped to the Fortescue River mouth at a rate of up to two GL per annum. The current discharge is managed under Part V EP Act licence. The Proposal will increase this discharge to 8 GL/annum. It is proposed that this increase is also managed under Part V of the EP Act.

4.3.2 Impacts

The following impacts were deemed to be of most significance for the operational phase of the Project:

- Increase in salinity, temperature and other contaminants from the discharge of brine from the desalination plant;
- Contamination of marine waters as a result of oil spills from vessels or fuel transfer pipelines;
- Contamination of marine waters and sediment as a result of runoff and spills from the port terrestrial area; and
- Contamination of marine waters and sediment as a result of mine dewater discharge.

4.3.3 Compliance Obligations

In order to address the above impacts, Table 8 summarises the legislation that may apply to the aspect or impact.



Table 8: Marine environmental quality compliance obligations			
Impact	Relevant legislation	Addressed in this OEMP Section	
Increase in salinity, temperature and other contaminants as a result of the discharge of brine from the desalination plant.	The desalination plant is managed in accordance with MS822 and the EP Act Part V Licence.	The criteria for wastewater diffuser performance and monitoring of the wastewater outfall are specified in MS822. The management of the wastewater outfall is included in this OEMP.	
Contamination as a result of oil spills from vessels or fuel transfer pipelines.	Oil spills are currently managed by DoT with input from the Pilbara Ports Authority.	DoT is the key agency for oil spills at the port and as such CPM has maintained a separate OSCP in consultation with DoT. Oil spill management in this OEMP will refer to the OSCP to avoid repetition.	
Contamination as a result of runoff and spills from the port terrestrial area.	EP Act 1986 and Unauthorised Discharge Regulation.	Management of this potential impact is detailed in this section. This OEMP is intended to address the requirement for a port management plan for operations.	
Contamination as a result of mine dewater discharge.	The mine dewater discharge is licensed under Part V of the EP Act.	DER is the key agency for the management of the mine dewater discharge and as such this OEMP will refer to the Part V Licence conditions to avoid repetition.	

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4.3.4 **Objectives**

The OEPA objective for this factor is to maintain the quality of water, sediment and biota so that the environmental values, both ecological and social, are protected. In order to meet this objective, CPM has taken into account significant environmental aspects, associated compliance obligations and key risks to develop the following Project-specific objectives:

- 1. To ensure that desalination discharge is managed such that limits are not exceeded:
- 2. To ensure processes are in place to respond to marine oil spills and runoff impacts are minimised; and
- 3. To ensure that the mine dewater discharge is managed such that Part V Licence limits are not exceeded.

4.3.5 Management Actions and Targets

The management actions listed in Table 9 have been developed to address:

- The significant impacts listed in Section 4.3.2; •
- The compliance obligations listed in Section 4.3.3; and

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Key environmental risks identified in CPM's Risk Register.

Action / control massure	Bosponsibility	Timing	Target
	Responsibility	Timing	Target
The discharge of desalination brine is to be managed in accordance with MS822 and CPM's Part V Licence.	Desalination Plant Manager	At all times	Compliance with MS822 and CPM's Part V Licence
The diffuser will be verified to ensure adequate performance.	Desalination Plant Manager Mine Manager	Ongoing	Compliance with MS 822 and CPM's Part V Licence
Prepare for, and respond to, marine oil spills in accordance with CPM's OSCP.	Port Manager	Ongoing	Compliances with OSCP
Sediment-laden surface water runoff from disturbed areas and ore stockpiles to be directed toward stormwater ponds, where it can be re- used or allowed to evaporate.	Area Supervisor	Ongoing	All discharge of surface water is of equal or less
Maintain the capacity of stormwater ponds such that they are capable of holding 1 in 10 year six hour rainfall event.	Area Supervisor	Ongoing	turbidity to the receiving downstream environment
Maintain stormwater pond overflow drainage such that overflow only occurs when sediment has had sufficient time to settle out of the water column.	Area Supervisor	Ongoing	
Sediment traps are to be emptied of excess sediment to ensure intended retention times are maintained.	Area Supervisor	As required	
All hazardous materials are to be contained in accordance with licence conditions.	Port Manager	Ongoing	No discharges of hazardous
Refuel vehicles at a bunded facility onshore at Cape Preston.	Area Supervisor	Ongoing	materials to the marine
Provide spill kits at defined locations and ensure that personnel are informed of these locations and instructed in their use.	Area Supervisor	Ongoing	No accumulation of
Respond to spills in accordance with CPM procedures.	Area Supervisor	Immediately	contaminants in the
All wharf decks are to drain to sumps to minimise discharges to marine waters.	Port Manager	Ongoing	sediment surrounding the port
Maintain a Hazardous Materials Register for all hazardous materials kept at the port. Maintain in the Register descriptions of materials and their uses, handling procedures, storage regulations and standards, quantities stored onsite and Safety Data Sheets for all materials. Locate this Register onsite and make it accessible to all personnel.	Area Supervisor	Ongoing	operations area
Any water that is visibly contaminated or suspected to be contaminated by hydrocarbons to be collected for treatment through an oil-water	Area Supervisor	As required following rainfall	

Table 9: Marine environmental quality management actions



Plan

Action / control measure	Responsibility	Timing	Target
separator or disposed at a waste water treatment plant or liquid waste facility licensed to accept such waste.		events	

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4.3.6 Monitoring

To confirm whether targets outlined within Table 9 have been met, monitoring will be conducted as described in Table 10.

Table 10: Marine environmental quality monitoring

Target	Monitoring activity	Responsibility	Timing
Compliance with MS822 and CPM's Part V Licence	 In order to verify performance the following parameters are to be measured: Within the desalination pipeline: Salinity Dissolved oxygen Median temperature Volume Flow rates Toxicant concentrations At the boundary between the LEPA and MEPA: Median salinity Ambient dissolved oxygen Median temperature Whole Effluent Toxicity undertaken using a minimum of five species Toxicant concentrations 	Desalination Plant Manager Environment Department	Continuously or at least weekly, for a period of 12 months immediately following commissioning
	The results are to be compared against the requirements of MS822 (conditions 8-2 to 8-4) to verify that the diffuser is achieving the required number of dilutions to meet compliance.	Environment Department	After completion of the minimum 12 month monitoring period
	Ensure monitoring is conducted in accordance with procedures contained in EPA 2005 Manual of Operating Procedures for Environmental Monitoring Against the Cockburn Sound Environmental Quality Criteria EPA Report 21	Environment Department	Continuously or at least weekly, for a period of 12 months immediately following commissioning
	 If monitoring indicates criteria are not being achieved: Ensure diffuser is maintained in working order Ensure plant is operated within design specifications If plants operation/processes are modified, assess if discharge water quality is affected Assess if negative changes in resulting environmental impact is likely 	Desalination Plant Manager	Annually
Compliance with OSCP	Conduct audit against OSCP requirements in consultation with DoT	Environment Department	Annually
No discharges of hazardous	Visual monitoring of stormwater basins for evidence of visible hydrocarbon sheen.	Environment Department	Monthly while stormwater is

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Target	Monitoring activity	Responsibility	Timing
materials to marine	Monitoring is only to occur if safe access is available.		present
environment Conduct site inspections to determine compliance with management actions listed in Table Table 9: Marine environmental quality management actions.	Environment Department	Six-monthly	
No accumulation of contaminants in sediment surrounding port operations area	Sediment sampling to be undertaken in accordance with the 'Sediment and Water Aesthetic Sampling and Analysis Plan', GHD (April 2011) (Appendix 4).	Environment Department	Every five years

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Figure 7: Wastewater outfall monitoring locations



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Figure 8: Sediment monitoring sites

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4.3.7 Evaluation and Revision

Review success of achieving objectives and targets after five years following approval of the Proposal.

In the event that monitoring described within Table 10 indicates that the requirements are not being met or are not likely to be met, CPM shall immediately report such findings to the DER along with a description of the management actions to be taken.

Sediment Sampling

The median sediment total contaminant concentration (analysed using a strong acid extraction) from a defined sampling area should not exceed the Environmental Quality Guideline (EQG) value (ISQG-Low) for high and moderate ecological protection areas. The total contaminant concentration at any individual sample site should not exceed the EQG re-sampling trigger (ISQG-High). If there is an exceedance the sediment will be re-sampled within one month of receipt of the initial results.

If total concentration trigger values for metals remains in exceedance, this will trigger further investigation, which may include analysis of bioavailable metals (analysed by dilute acid extraction) (Appendix 2).

If subsequent monitoring shows that the risk remains unacceptable (i.e. OEPA objectives will not be met), remedial actions will be developed in consultation with DPaW and the OEPA. These may include:

- Modifying port operation processes, such as tighter controls on vessel loading or refuelling operations to ensure that pathways for contaminants into the marine environment are appropriately managed;
- Close monitoring of activities which could result in further inputs to the marine environment (for example spillage of fuel during refuelling);
- Investigating the source of contamination, and resurvey sediments within a three-month timeframe to reconfirm level of contamination; and
- Consulting with DPaW regarding appropriate further remedial actions.

The management response framework in the event of an exceedance of guideline sediment quality trigger levels is shown in Appendix 2.

4.3.8 Reporting

Section 6 provides details about general compliance and incident reporting. The intent of this section is to summarise the information that will be reported relating to this factor.

Brine discharge monitoring results (volume and quality) will be reported externally as part of the regular reporting described in Section 6.

If the targets listed in Section 4.3.5 are not met then the applicable agency will be notified. For this factor the relevant agencies are:

- DER non-compliance with Part V Licence conditions; and
- DoT non-compliance with OSCP.



4.4 Marine Fauna

4.4.1 Turtles

Three out of six listed marine turtles exist in the waters surrounding Cape Preston, including the Green, Flatback and Hawksbill Turtles. Beaches on the southern and eastern side of Cape Preston have been identified as potential nesting beaches.

Marine turtles often utilise natural night light sources to navigate and as such, artificial lighting can cause disorientation during nesting and hatching season. The most significant impact is to turtle hatchlings, which often use the moon's reflection on the ocean to determine which direction water lies. These hatchlings can become disoriented by artificial light and move in the wrong direction towards these lights, resulting in predation or starvation.

Review of turtle survey monitoring data collected since 2000 and that commissioned by CPM from 2008-2010 determined that these beaches are of low significance in the region supporting low density nesting (Pendoley 2010). CPM ceased turtle monitoring following this finding.

Areas of significant coral communities identified in Section 4.1.1 provide highquality habitat for other marine fauna species.

4.4.2 Impacts

The following impacts were deemed to be most significant for the operational phase of the Project:

- Disorientation of nesting turtles and / hatchlings as a result of light spill from port operations areas;
- Increased likelihood of human interaction with turtles as a result of additional personnel being present in the area;
- Alteration of turtle nesting beaches as a result of changes to coastal process due to the presence of the port structure (discussed in Section 4.2.1); and
- Impacts to significant fauna habitats as a result of port operations (discussed in Section 4.1.2).

4.4.3 Compliance Obligations

Table 11 outlines issues that are addressed in this OEMP that apply to the impacts described within Section 4.4.2.

Impacts	Relevant legislation	Addressed in this OEMP Section
Disorientation of turtles as a result of light spill from port operations areas	EPBC Act, EP Act and <i>Biodiversity</i> <i>Conservation Act</i> 2016 (BC Act)	Management of these potential impacts is included in this section. This OEMP is intended to address the requirement for marine and port management activities for operations.
Increased likelihood of human	EPBC Act, EP	

Table 11: Marine fauna management



Impacts	Relevant legislation	Addressed in this OEMP Section
interaction with turtles as a result of additional personnel being present in the area	Act and Biodiversity Conservation Act 2016 (BC Act)	

Objectives 4.4.4

The OEPA objective for this factor is to protect marine fauna so that biological diversity and ecological integrity is maintained. In order to meet this CPM has taken into account significant environmental aspects and key risks to develop the following Project-specific objectives:

- 1. To contain light spill to turtle nesting beaches as low as practicable such that turtle disorientation is avoided or minimised; and
- 2. To prevent impacts on turtle nesting beaches from personnel activities.

4.4.5 **Management Actions and Targets**

Management actions are listed within Table 12.

Action / control measure	Responsibility	Timing	Target	
Install / maintain lighting which is shielded / redirected / lowered / recessed to avoid or minimise light spill towards the southern and eastern beaches.	Area Supervisor	Ongoing	No excessive light spill on turtle nesting beaches from inland light	
Install / maintain lighting which is of low disruptive colour (yellow and red) or long wavelength (e.g. low-pressure sodium vapour lights, or yellow filters / bug lights for larger areas / roads, or red LED lights for paths).	Area Supervisor	Ongoing	sources.	
Access to beaches utilised by nesting marine turtles will be restricted to authorised personnel. Any required interaction with marine turtles is to be in accordance with the DPaW Code of Conduct for interaction with turtles.	Environment Department	Ongoing	No recorded impacts to marine fauna as a result of employee activities.	
Restrict recreational activities by employees in mangrove creeks, beaches and near-shore waters used by turtles and migratory shorebirds, through education and induction programs.	Training Department Environment Department	Ongoing		
Implement feral animal control program (feral cats, foxes, wild dogs) to reduce predation threat.	Environment Department	Ongoing – To coincide with turtle nesting season	Undertake feral animal baiting on identified turtle nesting beaches and locations where high feral animal activity is observed.	

Table 12: Marine fauna management actions



4.4.6 Monitoring

Monitoring will be conducted as described in Table 13 to assess whether the targets set in Table 12 have been met.

Table 13: Marine fauna monitoring

Target	Monitoring activity	Responsibility	Timing
Minimise excessive light spill on turtle nesting beaches from inland light sources	Conduct lighting assessment to determine if new light sources are installed or other activities result in potential for light spill on beaches. If required conduct night inspections and take indicative readings with a light meter.	Environment Department	Annually prior to the beginning of nesting and migratory season (October)
Employees educated about importance of beaches for turtle conservation.	Conduct review of induction material to ensure that it contains information on recreational activity restrictions.	Environment Department	As required.
Hatchlings not impacted by light spill.	Hatchling fan survey on turtle nests or utilise motion sensing cameras to monitor hatchling activity.	Environment Department	Weekly during hatching periods

4.4.7 Evaluation and Revision

<u>Light Spill</u>

Results from the lighting assessment will be evaluated every year prior to the beginning of the nesting and migratory season (October) to determine if potential light spill has changed, and significance of the changes.

If potential for changes to existing light spill is possible and deemed to be significant CPM will:

- 1. Conduct a new lighting assessment;
- 2. Review the assessment results in comparison to previous audits to identify the cause of the light spill;
- 3. Conduct monitoring requirements listed in Table 13; and
- 4. If required, implement modifications to the lighting infrastructure; and
- 5. Conduct follow-up light spill assessment to confirm success of mitigation.

The management actions and monitoring in this OEMP will be reviewed and revised after each lighting assessment if required to ensure that light spill impacts are minimised.

Turtle Hatchling Fan Assessments

Assessments of turtle hatchling activity will be conducted to determine if hatchlings are being impacted CPM's activities. If evidence determines that this is the case an investigation will take place to identify the cause of the impact and actions will be assigned to mitigate potential reoccurrences.



4.4.8 Reporting

Section 6 provides details about general compliance and incident reporting. The intent of this section is to summarise the information that will be reported relating to this factor.

Where monitoring of hatchlings indicates a significant impact to hatchling behaviour as a result of CPM's activities, the information will be included in the annual report.

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4.5 Flora and Vegetation

4.5.1 Groundwater Dependent Ecosystems

Groundwater Dependent Ecosystems (GDEs) are anticipated to be impacted by dewatering activities at the Project. GDEs are often reliant on groundwater for survival and as such mine pit dewatering can result in indirect impacts to these species. Pit dewatering is expected to eventually result in a large groundwater cone of depression around the pit area.

The GDE monitoring program is based on biannual monitoring of three key GDE species (*Eucalyptus victrix, Eucalyptus camaldulensis* and *Melaleuca argentea*) at monitoring sites along three catchments near the project area (Edwards Creek, Du Boulay Creek and Fortescue River).

The 2015 monitoring results indicated groundwater and tree health parameters had remained steady or improved at all but one monitoring location. That location was outside the zone of influence of predicted pit dewatering. No signs of stress have been reported at sites closer to the mine pit and no vegetation loss from pit dewatering has occurred to date.

The depth to groundwater in the GDE area is currently relatively deep (5 - 20 m) and fluctuates seasonally by up to 3 m. The 0.5 m drawdown contour is predicted to extend approximately 5.0 km west of the mine.

4.5.2 Impacts

The following impacts were deemed to be most significant for the operational phase of the Project:

- Direct loss of flora and vegetation as a result of vegetation clearing;
- Loss or a reduction in health of GDEs as a result of a lowering of the water table during mine pit dewatering; and
- Increase and/or spread of Mesquite and other weed populations, resulting in:
 - o Competition with native species in rehabilitation;
 - o Displacement of native vegetation; and
 - Altered ecological systems.

4.5.3 Compliance Obligations

Table 14: Flora and vegetation compliance obligations outlines legislation that may apply to management of this factor.

Aspect and impact	Relevant legislation	Addressed in this OEMP Section
Direct loss of flora and vegetation as a result of vegetation clearing.	Managed under EP Act	This section details how CPM will operate to minimise vegetation clearing and stay within approved limits.
Loss or a reduction in health of riparian vegetation as a result	CPM has a 5C Licence under the <i>Rights in Water</i> and Irrigation Act 1914	This section and the groundwater section together fulfil the requirement for a Pit Dewatering Vegetation Management Plan.

Table 14: Flora and vegetation compliance obligations

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Aspect and impact	Relevant legislation	Addressed in this OEMP Section
of a lowering of the water table during mine pit dewatering.	(RIWI Act) which provides conditions for the appropriate dewatering of the mine pit.	The monitoring of riparian vegetation health is not included within the 5C Licence conditions and therefore is addressed in this section.
Increase and/or spread of Mesquite and other weed populations.	The Biosecurity and Agricultural Management Act 2007 (BAM Act) requires landowners to control and prevent the spread of listed organisms such as Mesquite.	Managed in accordance with the BAM Act. Addressed in this section below.

Objectives 4.5.4

Taking into account compliance obligations and key risks, CPM has developed the following Project-specific objectives:

- 1. Vegetation clearing is minimised as much as possible;
- 2. Indirect impacts to vegetation health from mine pit dewatering are minimised such that loss estimates for the Project are not exceeded; and
- 3. Weed populations or extent do not significantly increase within Project boundaries.

4.5.5 **Management Actions and Targets**

The management actions listed in Table 15: Flora and vegetation management actions have been developed to address:

- The significant impacts listed in Section 4.5.2; •
- The compliance obligations listed in Section 4.5.3; and
- Key environmental risks identified in CPM's Risk Register.

Table 15: Flora and vegetation management actions

Action / control measure	Responsibility	Timing	Target
A Ground Disturbance Permit (GDP) must be obtained prior to any clearing of vegetation.	Any person planning to conduct vegetation clearing.	Prior to commencement of clearing.	Compliance with clearing limits and boundaries described
Each GDP is to be reviewed to ensure it complies with statutory approval(s).	Environment Department.	Prior to commencement of clearing.	within approval documents.
GDP approval process must include an assessment of the remaining clearing allowances and boundaries.	Environment Department.	Prior to commencement of clearing.	
Conditions of the GDP must be complied with.	All personnel.	During the clearing of vegetation.	
Mine pit dewatering is to occur as slowly as possible, commensurate with the	CPM Hydrologist	During mine pit dewatering.	No breaches of 5C Licence. The area of GDE loss



Action / control measure	Responsibility	Timing	Target
requirements of mining, to allow the maximum possible amount of time for tree roots to grow downwards.			does not exceed approved limits.
Comply with the requirements of the BAM Act	All personnel	Ongoing	No new weed species becomes established
Weed control conditions must be considered in all GDPs.	Environment Department	Prior to commencement of clearing	within Project boundaries. No measurable increase
The conditions of CPM's Weed Management Procedure must be complied with.	All personnel	Ongoing	size or extent within Project boundaries.
Undertake herbicide spraying within Project boundaries.	Environment Department	As required	

4.5.6 Monitoring

Monitoring will be conducted as described in Table 16: Flora and vegetation monitoring to assess whether the targets set in Table 15 have been met.

Table 16:	Flora	and	vegetation	monitorina
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Target	Monitoring activity	Responsibility	Timing
Clearing limits and boundaries in approval documents are not exceeded.	Aerial photographs will be assessed to calculate the clearing conducted on site. These areas will be compared against approved GDP polygons.	Environment Department.	Annually.
	Compliance audits are to be conducted as detailed in Section 6.1 to ensure that GDP's are in compliance with statutory approvals.	Environment Department.	Annually.
	Aerial photographs will be assessed to calculate the total amount of clearing conducted on site and to ensure clearing was conducted within the approved area.	Environment Department.	Annually.
	Maintain clearing register to ensure that the measured extent of clearing is regularly updated.	Environment Department.	Ongoing
	Cleared areas are to be inspected for compliance with GDP conditions.	Environment Department.	Prior to close-out of the GDP.
No breaches of 5C Licence.	Refer to Section 4.10 (Hydrological	Processes).	
GDE health impacts do not exceed approved limits.	The following indicators are to be monitored at established GDE and groundwater monitoring sites	Environment Department.	Twice annually, apart from: Digital Multi-

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Target	Monitoring activity	Responsibility	Timing
	 (Figure 9) in order to confirm the extent of mine dewatering impacts: Leaf water potential; Tree health assessment (visual and Digital Multi-Spectral Video); Understorey perennial vegetation community composition; Tree growth; Projected foliar cover; Groundwater level and water quality (temperature, pH and salinity); and Meteorological data. 		Spectral Video monitoring (conducted annually) Meteorological data (conducted monthly).
Any new weed species controlled within Project boundaries. No measurable increase in Mesquite population size or extent within Project boundaries.	Visual monitoring for new weeds around work sites and tracks in inspection protocol.	Environment Department.	Opportunistically





Figure 9: Phreatophytic Vegetation and Groundwater Monitoring Sites

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4.5.7 Evaluation and Revision

In order to ensure that the flora and vegetation objectives are met, CPM will evaluate and revise, if necessary, the management and monitoring detailed in this section. A key purpose of the review will be to evaluate fulfilment of CPM's compliance obligations.

Monitoring detailed in Section 4.5.6 will ensure that CPM is managing clearing conducted on site and can forecast as required to ensure clearing limit are not exceeded. Monitoring will also verify that clearing was conducted within the boundary of approved areas.

Groundwater monitoring outlined in Section 4.10 will be evaluated to assess if the anticipated dewatering impacts are occurring as predicted. If impacts significantly exceed those anticipated, and are attributable to Project operations, contingency measures will be determined in consultation with relevant regulatory authorities. These measures are to be designed to remediate the decline in GDEs. Modelling may be re-run using recent groundwater monitoring data to ensure predicted outcomes are accurate.

Weed monitoring outlined in Section 4.5.6 will be evaluated to assess if there are any significant increases in weed populations or extent. If significant increases are identified, CPM will review its management program and amend as required. If required, relevant regulators may be consulted regarding the best course of action.

4.5.8 Reporting

Section 6 provides details about general compliance and incident reporting. The following information will be reported externally as part of regular reporting described in Section 6:

- Vegetation clearing conducted during the reporting period;
- Total vegetation clearing;
- Summary of groundwater dependent vegetation health monitoring results; and management actions implemented
- Summary of weed monitoring results and management actions implemented.

If targets listed in Section 4.5.5 are not met then the applicable agency will be notified. For this factor the relevant agencies are:

- DoW groundwater management;
- DPaW and Department of Agriculture and Food Mesquite management; and

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• OEPA – vegetation clearing.

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4.6 Landforms

Overburden storage and the tailings storage facility (TSF) are managed to minimise potential environmental impacts from the structure on water resources.

Potential impacts from landforms include:

- 1. Landform erosion and impacts to surface water flows within the Fortescue River floodplain;
- 2. Sediment run-off affecting surface water quality; and
- 3. Leachate causing the contamination of the underlying groundwater.

Landform erosion and potential leachate are addressed during the design phase of the waste dumps and ongoing monitoring will assist with successful batter slopes and cover closure designs.

Sediment run-off from landforms is addressed within Section 4.9 (Inland Waters Environmental Quality).

CPM manages the operation of the waste dumps via a Waste Rock Management Plan and the TSF is managed via the TSF Operating Manual and annual geotechnical audits.

Closure aspects of these landforms will be managed via the Conceptual Mine Closure Plan.



4.7 Terrestrial Environmental Quality

The potential for contamination of the terrestrial environment arises from the storage, transfer and usage of fuel and other liquid substances and their waste products. This aspect is managed in accordance with the DMP *Storage and Handling of Dangerous Goods: Code of Practice* and DER Operating Licence issued under Part V of the EP Act.

Land based spills are managed in accordance with internal procedures. In the event the spill is considered likely to cause environmental harm, CPM will notify the DER as soon as practicable in accordance with the requirements of Section 72 of the EP Act.

Other activities that may contaminate the terrestrial environment include the Class II putrescible landfill facility and the discharge of treated wastewater via dedicated spray irrigation fields. These processes are managed in accordance with DER (Part V Licence) and/or Department of Health statutory requirements.

CPM will continue to minimise impacts to the terrestrial environment by complying with DER requirements and internal procedures.

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4.8 Terrestrial Fauna

4.8.1 Northern Quoll

The Northern Quoll (*Dasyurus hallucatus*) is an endangered species of northern Australia (EPBC Act and Schedule 1, BC Act).

A recent desktop assessment and reconnaissance confirmed that Northern Quoll occurred within the man-made habitat at the port (Ecoscape 2016a). The reconnaissance survey also confirmed that the mine area was not considered to contain populations or critical habitat of the Northern Quoll.

Port Northern Quoll population

A further targeted survey was implemented at the Port within both natural and made-made habitat (Ecoscape 2016b). Whilst the targeted survey identified three male Northern Quolls along the breakwater it did not identify any females which indicated that this population was not stable (Ecoscape, 2016b).

Other records of Northern Quoll activity at the Port include:

- Motion cameras used during the reconnaissance survey observed Northern Quoll at a natural water seep, which is also a registered heritage site; and
- Opportunistic photographic observations by staff at Port workshops and other buildings (Ecoscape 2016a).

The constructed breakwater at the Port appeared to be denning habitat as it is similar to natural boulder piles which are typically an important feature to Northern Quolls (Ecoscape 2016b).

Constructed habitats may be an important management tool to offset negative impacts from resource projects and may also inform criteria for closure. Monitoring of Northern Quoll populations at the port facility may provide valuable information on the viability of constructed habitats for Northern Quolls in the Pilbara.

Within the above context CPM's management focus will be to minimise interactions with Northern Quolls and to avoid unacceptable impacts to this species, whilst collecting information that may be useful and contribute to achieving conservation objectives for this species.

4.8.2 Impacts

With the presence of Northern Quolls confirmed at the Port, management actions will be put in place to minimise potential impacts to this species. Potential impacts may include:

- Reduction in habitat due to implementation of the Project and any future proposals;
- Increase in injury or mortalities as a result of operational activities including vehicle collision with Northern Quolls; and
- Competition and predation on Northern Quolls by feral animals, particularly feral cats and foxes.



4.8.3 Compliance Obligations

Legislation and approvals related to protection of Northern Quoll includes:

- EPBC Act
- EP Act
- BC Act.

This Plan is intended to address potential impacts to Northern Quoll to ensure compliance with legislation and related approvals.

4.8.4 Objectives

CPM's management objectives for Northern Quoll are to:

- 1. Minimise potential for injury or mortality to Northern Quolls;
- 2. Minimise disturbance to Northern Quoll habitat; and
- 3. Increase knowledge of Northern Quoll populations in proximity to the Project.

4.8.5 Management Actions and Targets

The management actions listed in Table 17 have been developed to address the impacts and to ensure CPM's management objectives for this species are achieved.

Table 17:	Northern	Quoll	management	action

No.	Action / control measure	Responsibility	Timing
1	In accordance with CPM's Risk Assessment framework identify high risk areas, including where Northern Quoll species and habitat have been identified and potential impacts are likely. This is to include major project activities within known artificial habitats such as the breakwater.	Environment department Area managers	Ongoing
2	Record Northern Quoll survey results by fauna specialists in GIS systems and ground disturbance approval processes.	Environment department GIS department	Ongoing
3	Update environmentally sensitive areas data within GIS and ground disturbance planning systems to include Northern Quolls confirmed by Fauna specialists. (Access to confirmed Northern Quoll habitat will be restricted.)	Environment department GIS department All personnel	Ongoing
4	Ad-hoc Northern Quoll sightings by personnel will be recorded and reviewed annually.	Environment department All personnel	Ongoing
5	 GDP process to ensure: Disturbance is within approved project footprint; Northern Quoll spatial data and recorded sightings are considered as a part of any constraints assessment completed for GDP applications; 	Area managers GDP Manager Environment department Area supervisors	Ongoing

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No.	Action / control measure	Responsibility	Timing
	 planned clearing is adjusted where possible to avoid disturbance of habitat areas; Inspections and assessment of areas for active denning are completed within potential Northern Quoll habitat; and Disturbance to active Northern Quoll habitat is avoided. 	GDP Manager Environment advisers	
6	To mitigate potential injury or death of Northern Quoll within the Project.	All personnel Environment department area managers GDP Manager Environment department	Ongoing
7	Implement feral animal control program (feral cats, foxes, wild dogs) to reduce competition and /or predation threat. Any control program will consider potential impacts to Northern Quoll.	Environment department	Ongoing
8	Workforce Environmental Awareness Program to include material on Northern Quoll management and protection (examples include induction, toolbox meetings, awareness signs/posters, minimising waste). Awareness is to include hours of activity, likely locations and what the workforce would do if it encounters a Northern Quoll (e.g. allow fauna to move on, don't touch)	Environment department	Ongoing

4.8.6 Monitoring

Monitoring will be conducted as described in Table 18 below to identify new Northern Quoll activity in proximity to the Project. This monitoring will also provide feedback into the effectiveness of management measures and increase knowledge of this species.

Table 18: Northern Quoll monitoring activity

Monitoring activity	Responsibility	Timing
Review Northern Quoll sightings to confirm if there are any new locations where this species has been observed.	Environment Department	Annually
Within potential Northern Quoll habitat that occurs within any GDP applications undertake inspections for active denning activity.	Environment Department	Ongoing

4.8.7 **Evaluation and Revision**

CPM will continually evaluate and review its management of Northern Quoll to identify opportunities to improve management systems and conservation outcomes for this species in proximity to the Project. Table 19 describes review triggers and related actions to ensure that CPM's management of this species is continually improved.



Trigger	Action	Responsibility	Timing
New active Northern Quoll areas detected on project	Confirmation by Fauna specialist. Update GIS active habitats in GIS system. Update Environmental Sensitive Area map Review other actions	Environment Department	Ongoing
Active Northern Quoll dens located in areas to be disturbed by project activities	If dens cannot be avoided, individuals to be relocated by Fauna specialist in consultation with DPaW.	Environment Department	Ongoing
Injury or Mortality to Northern Quoll	Take appropriate measures to manage injured wildlife. To mitigate potential future incidents, reporting and investigate injury or death of Northern Quoll within the Project incident management system.	Environment Department	At time of incident
Unauthorised clearing of Northern Quoll habitat	Investigate incident, identify impacts to Northern Quoll and implement corrective actions as required.	Area managers GDP Manager Environment manager CEO	At time of incident

Table 19: Northern Quoll evaluation and revision triggers to action

4.8.8 Reporting

Table 20 outlines proposed internal and external reporting actions.

Table 20:Northern Quoll reporting actions

Trigger	Action	Responsibility	Timing
Fauna specialist confirms new, active, Northern Quoll den within approved project disturbance footprint and relocation of individuals is required.	Report to regulator DPaW as part of Licence to Take Fauna requirements.	Fauna specialist	At time of monitoring
Northern Quoll monitoring conducted	Summarise in annual report to regulators.	Environment Department	Annual
Evaluation and revision triggered	Review and report to regulator according to CPM incident reporting flowchart, as required by legislation or legislative condition	Environment Department	At time of trigger

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4.9 Inland Waters Environmental Quality

4.9.1 Water Resources

Groundwater

There are three groundwater aquifers which overlap within the Project area:

- Alluvial Surficial Aquifer to the west;
- Yarraloola Conglomerate; and
- Basement Fractured Rock Aquifer.

Groundwater recharge in the area is likely to occur from:

- 1. Direct rainfall infiltration, and
- 2. Surface water flow leading to infiltration through the riverbed (recharge of the alluvial aquifer).

The alluvial aquifer is primarily recharged from the Fortescue River during periods of stream flow. The volume of recharge is controlled by the duration, depth and frequency of flow and storage available in the aquifer (Loomes 2010).

The Lower Fortescue Alluvial (Western Alluvials) borefield was constructed to supply water to the Project. The borefield is located within the DoW's Lower Fortescue Alluvial Groundwater Area.

Recharge to the Yarraloola Conglomerate is presumed to occur through downward leakage from the alluvial aquifer as the water table in monitoring bores is higher in the alluvial aquifer than the potentiometric head in bores screened in the Yarraloola Conglomerate and water level change is similar in both aquifers (Commander 1994).

Groundwater in the basement fractured rock aquifer originates both from direct infiltration of rainfall over outcrop and from infiltration of accumulated runoff through superficial weathered material where fractures or bedding plane partings are in hydraulic connection with the weathered material (Global 2008). Test pumping results and longer-term performance of bores licensed under GWL168819 show that the fractured rock aquifer is of low storage and that bore yields generally diminish relatively quickly with time between recharge events. Quality of groundwater in the basement rock aquifer is variable and mostly marginal to brackish in about the upper 100m.

Groundwater flow through the Project site is broadly to the north and northwest, into the Fortescue River Alluvials and towards the sea. Groundwater quality across the Project area is highly variable from fresh within the alluvials and marginal to hypersaline. Bores with marginal quality drilled within the Brockman Iron Formation, Mt McRae Shale, Maddina Formation and Jeerinah Formation are found to the south and east of the pit. The marginal bores are surrounded by brackish quality water from bores within similar geology and including the Weeli Wolli Formation. Saline water is found moving north through tenement M08/124 within the Brockman and Jeerinah Formations and becomes hypersaline in the very north of tenement M08/123.



Surface Water

Two creeks traverse the Project area and the Fortescue River floodplain lies immediately to the west of the Project. Du Boulay Creek is an ephemeral distributary of the Fortescue River and intersects the south-west corner of M08/125, an area outside of the life of mine pit footprint. Edwards Creek, an ephemeral creek, intersects the north-west corner of M08/123 and is a tributary to Du Boulay Creek; the confluence of these creeks is approximately 2.1 km north of the project area. In essence both creeks skirt the project boundaries.

Eramurra Creek cuts through the Eramurra Lease Area and flows in a northerly direction to discharge onto the Eramurra flood plain. The closest listed perennial pool along Eramurra Creek is Eramurra Pool located approximately 2.6km north of the Eramurra leases.

Ongoing management of the turbidity and sedimentation impacts caused by erosion and run-off have been negated through the implementation of surface water drainage, design of the waste rock dumps and the eventual implementation of a flood bund. Sources of contamination from workshops and the processing plant have been minimised through the construction of purpose built workshops and associated drainage for potentially contaminated water.

4.9.2 Impacts

The following aspects and impacts were deemed to be most significant for the Project:

- Erosion as a result of run-off from waste rock dumps, TSF and other Project components; and
- Contamination of the groundwater as a result of seepage from the TSF and groundwater discharge.

An under-drainage system has been installed in the TSF and this facility is licensed under Part V EP Act; therefore, this potential impact is not discussed further in this OEMP.

4.9.3 Compliance Obligations

Compliance obligations protecting the quality of inland waters are summarised in Table 21.

Impact	Relevant legislation	Addressed in this OEMP Section
Erosion as a result of run- off from waste rock dumps, TSF and other project components	EP Act and Unauthorised Discharge Regulation, TSF Operating Manual submitted to DMP.	This section details how CPM will manage run-off and erosion during the operation of the Project.
Increase in the turbidity and sedimentation of watercourses as a result of run-off from disturbed areas	As above	This section details how CPM will minimise sedimentation due to run-off and erosion during the operation of the Project.
Contamination of the groundwater as a result of seepage from the TSF	As above.	This section refers to Groundwater Licences

 Table 21:
 Inland waters environmental quality compliance obligations



Plan

Impact	Relevant legislation	Addressed in this OEMP Section
and groundwater discharge		

4.9.4 **Objectives**

Taking into account significant environmental impacts, associated compliance obligations and key risks, CPM has developed the following Project-specific objective:

To maintain the quality of groundwater and surface water, sediment and • biota by minimising the sedimentation of surface water run-off, so that environmental values of the groundwater and surface water are protected.

4.9.5 Management Actions and Targets

The management actions listed in Table 22 have been developed to address the compliance obligations described in Section 4.9.3.

Note that Groundwater abstraction is entirely managed under the 5C Licence issued by the DoW.

Action / control measure	Responsibility	Timing	Target
Divert surface water discharge to minimise erosion	Area Supervisor	Ongoing as required.	All discharges of surface water are of equal or less
Direct sediment-laden surface water runoff from disturbed areas, waste dumps and stockpiles through sediment traps, prior to discharge to the downstream environment.	Area Supervisor	Ongoing	turbidity to the receiving downstream environment
Sediment traps are to be emptied of excess sediment to ensure intended retention times are maintained. Where required, sediment to disposed of at bioremediation facility.	Area Supervisor	As required	
Armour any new portions of the waste rock dump that may come into contact with significant surface water flows.	Area Supervisor	As soon as possible following the placement of the waste rock	
Manage surface water and groundwater at the TSF in accordance with the TSF Operating Manual.	Area Supervisor	Ongoing	No non-compliances with TSF Operating Manual.

Table 22: Management actions for inland waters

Monitoring 4.9.6

Monitoring will be conducted as described in Table 23 to assess whether the targets set in Table 22 have been met.



Table 23: Inland wate	Inland waters monitoring			
Target	Monitoring activity	Responsibility	Timing	
All discharges of surface water are of equal or less turbidity to the receiving downstream environment.	Visual monitoring of the Du Boulay and Edward Creeks for excessive turbidity arising from operations. Monitoring is only to occur if safe access is available.	Environment Department	Fortnightly while discharge is occurring (generally after significant rainfall).	
	Inspect all surface water discharge points to ensure they are fitted with erosion controls	Environment Department	After significant rainfall events.	
	Inspect the depths of all sediment traps to determine if they are greater than the minimum depth required for sediment retention	Area Supervisor	After significant rainfall events.	
	Inspect all waste rock faces to determine if they are armoured within areas of known surface water flow	Environment Department	As required	
	Inspect surface water drainage to determine if it is clear of obstructions	Environment Department	Prior to cyclone season (Oct-Nov) and after significant rainfall events	
No non-compliances with TSF Operating Manual.	Compliance audits are to be conducted as detailed in Section 6.1.	Environment Department	Annually	

4.9.7 Evaluation and Revision

The evaluation of this factor includes assessment of recorded impacts (visual turbidity monitoring data) and preventative inspections. The results of the monitoring listed in Table 23 will be evaluated to determine if any significant turbidity is present or likely to be present during periods of significant rainfall, or groundwater water quality indicates the need for prompt action.

If action is needed then CPM will:

- 1. Review the inspection reports to identify the cause of the turbidity;
- 2. Undertake works as required to ensure that targets listed in Table 22 are met;
- 3. Conduct follow-up inspections after significant rainfall to confirm the success of mitigation; and
- 4. Promptly cease groundwater pumping and notify the DoW.

The management actions and monitoring in this OEMP will be reviewed and revised as required to ensure that turbidity impacts is minimised.



4.9.8 Reporting

Section 6 provides details about general compliance and incident reporting. The following information will be reported externally as part of regular reporting:

- Surface and Groundwater quality monitoring results; and
- Summary of any events where elevated surface water turbidity was attributed to the Project.

If the targets listed in Section 4.9.5 are not met then the applicable agency will be notified. For this factor the relevant agencies are:

- DoW surface and groundwater quality.
- DMP TSF operation.
- DER for unauthorised discharge



4.10 Hydrological Processes

4.10.1 Surface water and Groundwater

Two ephemeral creeks traverse the Project area and the Fortescue River floodplain lies immediately to the west of the Project (refer to Section 4.9.1).

Groundwater flow through the Project site is broadly to the north and northwest, into the Fortescue River Alluvials and towards the sea.

Pit dewatering will be required to allow mining activities to occur.

4.10.2 Impacts

Impacts to groundwater include pit dewatering and water quality issues. Pit dewatering impacts include alteration of groundwater regimes as a result of lowering of the water table and potential lowering the water level in pastoral bores and reducing bore yield.

Water bearing fractures in the basement rocks of the area have most frequently been intersected at depths up to approximately 15 to 50 m below ground level (bgl). It is expected that water levels will be drawn down to those depths at production bores over the pumping period with less drawdown at distance from pumping areas.

4.10.3 Compliance Obligation

Groundwater management measures have been developed in accordance with the provisions of the RIWI Act and the EP Act.

DoW plans and manages all water resources throughout WA and regulates the use of water in WA under the RIWI Act. Two types of licences are used by the DoW to administer the use of water in WA.

- Well licences are required under Section 26D of the RIWI Act, to construct or alter any artesian well or non-artesian wells in proclaimed areas. A 26D licence does not on its own give the right to take water from a well.
- Licences to Take Water (Section 5C) allow licence holders to take water in proclaimed or prescribed areas in accordance with conditions outlined in the licence.

DER has responsibilities for discharge of mine dewatering water under Part V of the EP Act.

There are a number of groundwater licences issued under the RIWI Act for groundwater abstraction for the Project. Three groundwater licences contain conditions of compliance with associated Groundwater Operating Strategies, in accordance with DoW. As required by the Project, groundwater licences under the RIWI Act will be maintained during the life of operations.

4.10.4 Objectives

The groundwater management objective is to ensure CPM implements appropriate water management measures during the operation of the Project in accordance with its RIWI Act licenses.



4.10.5 Management Actions and Targets

The management actions listed in Table 24 have been developed to address the compliance obligations listed in Section 4.10.3.

Table 24:Hydrological processes management actions

Action / control measure	Responsibility	Timing	Target
Conduct groundwater dewatering in accordance with the 5C Licence for pit dewatering.	CPM Hydrologist	During mine pit dewatering.	No breaches of 5C Licence
Mine pit dewatering is to occur as slowly as possible, commensurate with the requirements of mining, to allow the maximum possible amount of time for tree roots to grow downwards.	CPM Hydrologist	During mine pit dewatering.	No breaches of 5C Licence. The area of phreatophytic vegetation that experiences health impacts does not exceed approved limits
Confirm appropriate options for alternative water supply for pastoralists.	CPM Hydrologist	Prior to drawdown impacts on pastoralist bores.	Drawdown impacts on pastoralist bores does not occur until alternative water supply options are confirmed with pastoralists.

4.10.6 Monitoring

Groundwater monitoring is a requirement under the conditions in groundwater licences and operating strategies. CPM internal procedures outlining how these monitoring commitments are implemented are listed in the following procedures:

- Hydrogeologic Data Collection Procedure (DR018007);
- Water Quality Sampling Procedure (DR018007); and
- Water Level Logger Installation, Setup and Downloading Procedure (DR029325).

4.10.7 Trigger Levels

Trigger levels represent the change point in a monitoring parameter after which action may be needed to prevent further change. These are set in the Groundwater Operating Strategies and listed as conditions in the Groundwater Licences. They represent the earliest point that an action may be required.

4.10.8 Evaluation and Revision

Groundwater abstraction is entirely managed under the Project 5C Licences and as such there is no requirement for a separate evaluation of monitoring data under this OEMP.

Drawdown impacts on pastoral bores will be evaluated on an annual basis. If impacts are evident then CPM will liaise with affected pastoralists to provide an alternative supply.



4.10.9 Reporting

Reporting will be undertaken in accordance with the requirements within RIWI Act licenses and approved Operating Strategies.



4.11 Air Quality

4.11.1 Nitrogen Oxides (NO_x), Greenhouse Gas and Dust Emissions

The power station has been constructed to 480 MW capacity (approved to 640 MW).

CPM has constructed a combined-cycle, gas fired Power Station, considered the best and most efficient technology available. Three sets of Co-generation units and one open cycle unit are capable of producing 480 MW annually. The plant consists of:

- seven gas turbines with 43.68 MW
- three steam turbines with 39.7 MW
- six heat recovery steam generators with 9.3 MW.

Nitrogen Oxides

Gaseous emission modelling was conducted prior to the operation of the power station. The air quality assessments indicated that in comparison to human health criteria National Environment Protection Measure (NEPM) Standard (National Environment Protection Council, 1998), the predicted gaseous emission concentrations are all below their respective criteria.

Continuous emissions monitoring system (CEMS) monitor power station stack gas temperature, gas emission velocity, carbon monoxide, carbon dioxide, nitrogen oxides (NO + NO₂) and oxygen when turbines are operating.

Greenhouse Gas Emissions

Greenhouse gas emissions are reviewed and reported annually in accordance with the *National Greenhouse and Energy Reporting Act* 2007 (NGER Act). A Greenhouse Gas Management Plan was approved in December 2006 and met the requirements of the Framework Convention on Climate Change 1992 Constitution with National Greenhouse Strategy at the time.

The Project is covered under the Safeguard Mechanism of the NGER Act, where tracking of emissions against a baseline target is required and calculation of emission intensity is part of submissions to the Clean Energy Regulator.

<u>Dust</u>

To address dust impacts of the Project CPM prepared an Operational Dust Management Plan (ODMP) in accordance with condition 2-1, commitment 2 of MS635. The ODMP was included in its entirety as an appendix of the approved 2014 OEMP. Note that the ODMP does not address the DRI plant as it is not constructed. The ODMP will be amended when either or both the DRI and Pellet Plant are constructed. This version of the OEMP incorporates the management actions and monitoring commitments of the 2014 ODMP.

4.11.2 Impacts to be addressed by this OEMP

The impacts to be addressed for the Project are listed below:

 NO_x pollution of the surrounding air shed as a result of the operation of the power station;



- Emission of greenhouse gases as a result of the operation of the power station; and
- Increased dust as a result of the proposal, ore storage and transfer facilities.

4.11.3 Compliance Obligations

Compliance obligations are summarised in Table 25.

Impact	Relevant legislation	Addressed in this OEMP Section
NO_x pollution of the surrounding airshed as a result of the operation of the power station	The power station is licensed under Part V of the EP Act. NEPM (Ambient Air).	Emissions from the power station are regulated by DER as part of the Project's Part V Licence. This OEMP refers to the Licence for details for stack emissions monitoring. For ambient monitoring, the NEPM guideline
		will be referenced.
Emission of greenhouse gases as a result of the operation of the power station	Greenhouse gases are managed under the <i>National Greenhouse</i> <i>and Energy Reporting Act 2007</i> (NGER Act) by the Commonwealth Government (currently the Clean Energy Regulator).	The NGER Act is now the appropriate legislation for the management of greenhouse gas emissions from the power station. This OEMP will therefore refer to the NGER Act for details of management requirements. This OEMP is intended to address the requirement for a Greenhouse Gas Emissions Management Plan for operations.
Increased dust as a result of the mine, ore storage and transfer facilities	EP Act.	The management of dust emissions are described within this section of the OEMP. To avoid duplication with the requirements of the OEMP, other site management plans and EP Act, site licences do not include dust management conditions.

 Table 25:
 Air quality compliance obligations

4.11.4 Objectives

Taking into account associated compliance obligations and key risks, CPM has developed the following Project-specific objectives:

- 1. NOx Ensure emissions meet acceptable standards and requirements from Part V licence requirements.
- 2. Greenhouse gas emissions- Greenhouse gas emissions from the project are adequately addressed; and
- 3. Dust Manage increased dust as a result of the mine, ore storage and transfer facilities to avoid significant environmental impacts.

4.11.5 Management Actions and Targets

The management actions listed in Table 26 have been developed to address the compliance obligations listed in Section 4.11.3.

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Table 26: Air quality manag	ement actions		
Action / control measure	Responsibility	Timing	Target
Manage air emissions from the power station in accordance with the Project Part V Licence.	Power Station Operations Manager	Ongoing	Compliance with the Project Part V Licence
Up to date calculation of greenhouse gas emissions per requirements of the NGER Act.	Production and Planning Environment Department	Annually	Compliance with the requirements of the NGER Act
Up to date estimation of energy efficiency per unit product per requirements of the NGER Act (Safeguard).	Production and Planning Environment Department	Ongoing	
Reporting against a baseline (target) per requirements of the NGER Act (Safeguard).	Production and Planning Environment Department		
 Manage dust emissions across the Project site as summarised below: Maximise efficiency of loads when transporting ore or concentrate (including haul trucks and conveyers). Use dust covers on machinery and water suppressants on exposed areas wherever required. Minimise open area footprint and rehabilitate or cover (using vegetation, rock, water and/or dust suppressant) exposed areas as soon as practicable. Implement good housekeeping practices including ensuring that product spills are cleaned up as soon as possible, and water sprays and emissions control equipment is properly maintained. Reduce vehicle traffic on unsealed roads and other exposed areas, where practicable. Use real time ambient 	Area Supervisors Environment Department		Compliance with the monitoring targets outlined in Table 27
 monitoring to respond to elevated dust emissions associated with the project. Ensure that the Project's workforce is aware of the 			



Action / control measure	Responsibility	Timing	Target
importance of appropriate dust management controls and reporting/actions required when elevated dust emissions are observed.			

4.11.6 Monitoring

Monitoring will be conducted as described in Table 27 to assess whether the targets set in Table 26 have been met.

Table 27:Air quality monitoring

Torret Menitoring estimity Deepensibility Timing			
Target	wonitoring activity	Responsibility	Timing
Compliance with the Project Part V Licence.	Monitoring of power station stack emissions per the requirements of the Part V Licence.	Power Station Operations Manager Environment Department	Annually
Monitoring against NO ₂ NEPM guideline.	Ambient air monitoring.	Environment Department	Ongoing
Monitor PM_{10} dust level and utilise an internal dust trigger limit of $250\mu g/m^3$ over a 1 hour period to facilitate managing the average daily PM10 dust guideline of $70\mu g/m^3$.	Ambient dust monitoring.	Environment Department	Ongoing
Compliance with the requirements of the NGER Act.	Calculate and collate greenhouse gas emission estimates	Environment Department	Annually

4.11.7 Evaluation and Revision

This factor is mostly managed by legislation outlined in Table 27 particularly for NO_x and Greenhouse Gas Emissions.

When planning commences for construction of the DRI / Pellet Plant the OEMP will be reviewed and amended to ensure OEPA requirements are achieved.

4.11.8 Reporting

Section 6 provides details about general compliance and incident reporting. The following information will be provided externally as part of regular reporting:

- Air emissions quality monitoring results as required by Part V EP Act;
- Greenhouse gas emissions estimates as required by NGER Act.

The following will be reported to OEPA as defined in the reporting schedule of Section 6:

• Ambient dust, as PM₁₀ dust level monitoring results.



If the targets listed in Section 4.11.5 are not met then the applicable agency will be notified. For this factor the relevant agencies are:

- DER (Part V Licence; NO₂, NEPM);
- OEPA (PM10); and
- Clean Energy Regulator (NGER reporting targets).



4.12 Social Surroundings

4.12.1 Noise and Recreational Use

<u>Noise</u>

Noise will be generated by mining activity, process plant, power station, conveyor system and port activities. The closest noise-sensitive permanent residence is Mardie Station Homestead, over 20 km from the Project.

The mouth of the Fortescue River, eight km from the Project, is often used for camping; however, this is not a registered camp site and modelling indicated that noise levels would be at or close to ambient at this location.

Noise monitoring results and modelling of operational noise levels have been documented within the Operational Noise Management Plan (NMP) developed to address condition 2-1, commitment 2 of MS635. The NMP was included in its entirety as an appendix of the 2014 approved OEMP.

The NMP modelling concluded:

- There were no exceedances of the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations);
- For the worst case scenario, noise levels at Mardie Station Homestead would not be audible and near background levels at the Fortescue River mouth; and
- Project noise is therefore not considered to be a potential significant impact to amenity.

Noise impacts are addressed through Part V licence requirements via a complaints management system and the Noise Regulations.

Recreational Use

CPM has implemented the 'Leave No Trace' program and induction handbook to ensure project personnel consider the surrounding region when engaging in recreational activities off site. People who are employed on the Project need to complete the 'Leave No Trace' induction if they want to go offsite for recreation purposes in their time off. The induction includes steps to facilitate appropriate fishing practices and measures to protect recreational locations and prevent careless behaviour (note: fishing is prohibited on the Project).

As part of CPM's commitment to managing public amenity, CPM maintains public access to recognised visitor locations including the Fortescue River mouth and permanent pools along the river.

4.12.2 Impacts

Impacts to public amenity include:

- noise emissions from the Project; and
- reduction in general amenity on nearby recreational areas as a result of usage by employees.

4.12.3 Compliance Obligations

Compliance obligations are summarised in Table 28.



Impacts	Relevant legislation	Addressed in this OEMP Section
Impacts to social surroundings as a result of Project noise emissions	The Project is licensed under Part V of the EP Act. The Noise Regulations regulate noise emissions at sensitive receptors for noise during Project operations.	Project noise emissions have been shown to comply with the Noise Regulations and are regulated by DER as part of the Project's Part V Licence via a complaints process.
Impacts to the general social surroundings of the Fortescue River mouth and other recreational areas as a result of usage by employees	Employees that dispose of waste inappropriately can be prosecuted under the <i>Litter Act 1979.</i>	This section details how CPM will minimise potential impacts to social surroundings caused by employees during the operation of the Project.

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Objectives 4.12.4

Taking into account significant environmental impacts, associated compliance obligations and key risks, CPM has developed the following Project-specific objective:

To ensure that impacts to social surroundings are reduced to as low as • reasonably practicable.

4.12.5 **Management Actions and Targets**

The management actions listed in Table 29 have been developed to address the compliance obligations listed in Table 28.

Action / control measure	Responsibility	Timing	Target
Manage noise emissions from the Project in accordance with the Project Part V Licence	Area Supervisors	Ongoing	Compliance with the Project Part V Licence and Noise Regulations
 Include the following information in staff inductions: The impacts that personnel actions may have on (nesting) turtles; Bag limits, no-take zones and netting restrictions as applicable under relevant guidelines; The sensitivity of mangroves to disturbance; The importance of litter removal; Potential impacts resulting from oil spills and dust; The importance of remaining on established tracks wherever possible; Respect for popular visitor nodes; 	Training Department Environment Department	Ongoing	No recorded impact on social surroundings as a result of personnel's off site activities

Table 29: Social management actions



		-	
Action / control measure	Responsibility	Timing	Target
 Appropriate behaviour around neighbouring land users and the potential impact that their behaviour may have; and Responsible fishing practices including waste disposal. 			
All personnel wanting to go offsite for recreational purposes in their time off (e.g. Registered Day Off) must attend a 'Leave No Trace' induction prior to departure.	Training Department Environment Department	Ongoing	
Personnel must dispose of all of their waste from recreational sites appropriately, or take it back to the Project for disposal.	All personnel	Ongoing	

4.12.6 Monitoring

Monitoring will be conducted as described in Table 30 to assess whether the targets set in Table 29 have been met.

Target	Monitoring activity	Responsibility	Timing
Compliance with the Noise Regulations and Project Part V Licence requirements for addressing complaints.	Monitor and record noise complaints.	Environment Department Community Relations Department	As soon as possible following complaint.
No recorded impact on social surroundings as a result of personnel recreational activities off site.	Conduct inspections of public areas for evidence of antisocial behaviour from personnel. Conduct inspections of recreational sites for evidence of personnel waste.	Environment Department	Monthly and as soon as possible following complaint.

Table 30:Social surroundings monitoring

4.12.7 Evaluation and Revision

The monitoring of actual impacts to the social surroundings is often complaintsbased and as such the response to complaints is important for this factor. The results of complaint investigations will be evaluated to determine if there are any underlying and ongoing causes for the social impacts. The results of site inspections will also be used in this evaluation as additional evidence.

The social management actions were developed over the construction period when personnel numbers were at their highest, and were deemed to be successful in meeting the objective for this factor. If circumstances change, these management actions may be scaled up or down to ensure that management always meets the potential risks.

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4.12.8 Reporting

Section 6 provides details about general compliance and incident reporting. The intent of this section is to summarise the information that will be reported relating to this factor.

The following information will be reported externally as part of regular reporting:

• Details of any noise or any other public social surroundings complaints.

If the targets listed in Table 30 are not met then the applicable agency will be notified. For this factor the relevant agencies are DER (Part V Licence and Noise Regulations).



5 Adaptive Management

CPM recognises the dynamic nature of ecosystems and supports adaptive management under this OEMP. Adaptive management involves implementing mitigation measures, monitoring and evaluation against trigger and threshold criteria or management targets and systematically adapting mitigation measures and monitoring from what is learned to more effectively meet the environmental outcome or management objective.

Although the Project has been in operation for several years, there are still some uncertainties that will require ongoing assessment and consideration. Assumptions and model-predicted ecosystem responses will be evaluated against collected monitoring data on a recurrent basis in a process of continual improvement and learning. Examples of adaptive management throughout operations include:

- The introduction of a different / alternative monitoring initiative to better understand parts of an ecosystem responding differently to that expected;
- The identification of more effective trigger level actions in light of more comprehensive monitoring information;
- Updated modelling and revision of trigger criteria in a system responding differently to that predicted in original modelling; and
- Changes in technology.

5.1 Early Response Criteria

CPM has included numerous early response criteria in this OEMP. Early response criteria support the achievement of environmental outcomes in that they provide information on changes, which are precursors to the onset of environmental impact. They also support improved understanding and identification of trends in environmental systems.

Early response criteria initiate early response actions before or at the onset of environmental impact. Early response actions may include investigations to determine the potential causes of exceedances, the analysis of additional data sets, more frequent monitoring and/or the assessment of the condition of a trigger level performance indicator.

Several early response criteria utilised in this OEMP require additional focus due to the potential impacts associated with the exceedance of criteria, these are listed in Table 31.

Section	Early response criteria	Rationale	Action to be taken if criteria exceeded
4.2.6	No more than 20% (by length) of available nesting habitat along the west coast of Cape Preston is rendered inaccessible to sea turtles as a result of scarping.	A 20% threshold is considered to be outside of predicted effects and identifies that the port structure may be having an impact on the available turtle nesting habitat along the west coast of	 Review monitoring results to identify the cause. Continue monitoring. If scarping reaches 30% then liaise with DPaW about contingency actions such as re- shaping the fore dune or constructing a small groyne at the northern end of the western

Table 31: Early response criteria

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Section	Early response criteria	Rationale	Action to be taken if criteria exceeded	
		Cape Preston.	beach.	
4.3.6	Total concentration trigger values for metals in the sediment surrounding the port operations area.	Sediment monitoring provides a long-term method of determining the level of contamination caused by the operation of the port.	 The sediment will be re- sampled within one month of the receipt of the initial results. If the trigger values are still exceeded, this will trigger further investigation, which may include the analysis of bioavailable metals (Table 9: Marine environmental quality management actions). If subsequent monitoring shows that the risk remains unacceptable, remedial actions will be developed in consultation with DPaW and the EPA. 	
4.4.6	Minimise excessive light spill on turtle nesting beaches from inland light sources	Conducting lighting assessments provides information about the level of light spill and allows mitigation prior to the nesting season.	 Review monitoring results to identify the cause. Replace or refit light sources to comply with lighting requirements. Conduct lighting assessment to confirm success of mitigation. 	
4.5.6	Phreatophytic vegetation health impacts do not exceed area stated.	Monitoring of health impacts allows changes due to groundwater dewatering to be detected before permanent loss of vegetation.	 Review groundwater monitoring results to identify the cause Amend groundwater dewatering regime to reduce impacts (i.e. slower drawdown) Continue monitoring to confirm success of mitigation 	

5.2 Benchmarking and Best-Practice

For some environmental factors, environmental outcomes may include compliance with state, national or international standards, guidance or legislation. CPM will conduct ongoing benchmarking against best practice options. Adaptive management in this context may include initiatives to implement improvements in technology and emission control technologies to meet best-practice in the relevant industry, proponent-driven improvements in operations, and keeping upto-date with improvements in monitoring methods and standards for implementation.

5.3 **OEMP** Revision

CPM will amend this OEMP as required to include any adaptive management updates. These amendments will be internal (and not require re-submission to the EPA) unless the information gained through the adaptive management approach demonstrates that an amendment to an approved condition is required.



If CPM has gathered sufficient information through research and long-term monitoring to propose revisions to trigger and threshold criteria, a formal request for amendment of an approved condition may be submitted to the relevant authority.



6 **Project Reporting**

This section describes the general internal and/or statutory reporting requirements with respect to the OEMP. Specific reporting for each factor has been provided in Section 4.

6.1 **Compliance Audit**

An audit program will be implemented and compliance reports will be submitted to the relevant authority, as required, to address the following:

- the implementation of the Project as approved;
- evidence of compliance with approved conditions and statutory • documents; and
- performance of the environmental management plans. •

The compliance report is not intended to contain information on individual management actions, control measures and monitoring. If further management actions are required the proponent will review and update this document in consultation with the OEPA.

Public Availability 6.2

This OEMP will be made publicly available, if required, by regulatory authorities.

6.3 **Incident Reports**

Incidents are defined as breaches or non-adherences to objectives and procedures applied to the Project and prescribed in this OEMP. Incidents are to be reported to CPM's Environment Department by the person responsible for the incident or the first person at the site of an incident.

The Environment Department will assess the type and severity of the incident in accordance with internal procedures. Relevant personnel shall be notified and consulted whether the incident requires notification to regulatory agencies.



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Appendix 1: Summary of MS635 Management Plans


Draft Operational Environmental Management Plan

		T			-		T	
MS Co	635 Condition / mmitment	OEPA/DEC Endorsed Management Plan		Phase	Approved 2014 OEMP		2017 OEMP	
MS	635 Condition	•						
6	Pit Dewatering Vegetation Monitoring Plan	Yes	10- Oct- 2006	Operations	Included	6.1	Included	4.5
7	Marine Management Plan	Yes	27- Mar- 2009	Construction & Operations	Included	8	Included	4.1, 4.2, 4.3
8	Marine Wastewater Outfall	A Wastewater Outfall Management Plan is no longer required. Conditions 8-1 to 8-4 of MS 635 deleted and replaced by conditions 8- 1 to 8-8 of MS 822	N/A	Construction & Operations	Included	8.3	Included	4.3
9	Port Environmental Management Plan	Yes	7- Nov- 2011	Construction & Operations	Included	Appendix C	Included	4.1, 4.3, 4.4
10	Air Emissions (DRI Dust Management Plan)	Not Required at this Stage Project. Construction of th Plant has not commenced	e of the e DRI	Construction	Excluded		Excluded	
11	Greenhouse Gas Management Plan	Yes	15- Dec- 2006	Construction & Operations	Yes	6.8	Included	4.11
12	Construction Noise Management Plan	Yes	13- Oct- 2006	Construction	Excluded		Excluded – refer to Section 4.12.1 for explanation.	
13	Recreational Use Management Plan	Yes	1- Nov- 2006	Construction & Operations	Yes	6.12	Included	4.3, 4.4, 4.12
14	Compliance Audit Program	Yes	27- Nov- 2009	Construction & Operations	Yes	10.2	Included	6
15	Conservation Estate Management Plan	Yes	19- Mar- 2009	Construction & Operations	Yes	9	This Plan is a standalone do approved by the EPA in acc greenhouse gas emissions	ocument that was previously ordance with MS635. It includes tree planting commitment,



Draft Operational Environmental Management Plan

				-		1		
MS Cor	635 Condition / nmitment	OEPA/DEC Endorsed Management Plan		Phase	Approved 2014 OEMP		2017 OEMP	
							conservation tree planting co and conservation estate com to be discussed with EPA.	mmitment, mesquite management mitments. Its ongoing requirement
16	Preliminary Decommissioning and Closure Plan	Yes	19- Oct- 2006	Closure	Yes	6.1, 6.2, 6.4, 6.5, 6.6, 6.7	Excluded	
MS	635 Commitment							
1	Environmental Management System	Yes	17- Apr- 2013	Construction & Operations	Yes	2.3	Included	2
2	Operational Environmental Management Plan	Yes	13- Aug- 2014	Construction & Operations	Approved	d 2014 OEMP	This Document	
4	Vegetation Monitoring Plan	Yes	10- Oct- 2006	Construction & Operations	Yes	6.1, 7.2	Included	4.5
5	Mesquite Control Plan	Yes	19- Mar- 2009	Construction & Operations	Yes	6.3	Included	4.5
6	Fauna Management Plan	Yes	25- Mar- 2009	Construction & Operations	Yes	7.1	Included	4.8
7	Ballast Water Management	Yes	7- Nov- 2011	Construction & Operations	Yes	Appendix C	Excluded – this requirement i (e.g. MARPOL).	s covered under Marine Legislation
8	Surface Water Management Plan	Yes	16- Mar- 2009	Construction & Operations	Yes	6.6	Included	4.9, 4.10
9	Groundwater Management Plan	Yes	12- Jun- 2007	Construction & Operations	Yes	6.7	Included	4.9
10	Spill Contingency Plan	Yes	7- Nov- 2011	Construction & Operations	Yes	Appendix C	Excluded – this requirement	s governed by DoT



SINO Iron Project

Draft Operational Environmental Management Plan

MS Cor	635 Condition / nmitment	OEPA/DEC Endorsed Management Plan		Phase	Approve OEMP	d 2014	2017 OEMP
12	Aboriginal Site Management Plan	Yes	10- Oct- 2006	Construction	Yes	6.11	Excluded – This requirement is governed by the DAA under the AH Act.
16	Subterranean Fauna	Yes [Closed-Out]	3- Dec- 2009	Construction	Excluded		Excluded – this requirement was closed-out with EPA.



Appendix 2: Sediment Monitoring Parameters and Trigger Levels



Figure 18 Management Response Framework in the event of an exceedence of Guideline Sediment Quality Trigger Levels



Appendix 3: Cape Preston Vessel Risk Assessment Score Sheet for Biofouling IMP

Ref:	Completed by:					
Date:	Date: Vessel Name or Number:					
Vessel Ri	sk		~ ~			
Type of Anti-	fouling Control (AFC)			Score		
	AFC type is known, suited to	vessel activity an	id operating speed, and is <2 ye	ears old = 0.0		
	AFC type is unknown, unsuited , absent or >2	years at mobilis	ation = 3.0			
Age of AFC a	t mobilisation date					
Documented age	of AFC	>1 year	old, absent or unknown = 3.0			
	b	etween 6 - 12 mo	onths = 2.0			
	3-6	months = 1.0				
	1-3	months = 0.5				
	<	month = 1.0				
	<	14 days = 0.0		_		
IMS infection	risk - Location of 'home' ports/main s	supply base	since last AFC			
Regions of the ho	me ports or long term supply bases	ropical re	egion = 3.0 Subtraciast errier = 2.0			
since last AFC rer	iewai nave included:		Subtropical region = 2.0			
(use nignest scori	ng region only)	1	remperate region = 1.0	_		
INS infection	risk - number of stationary/slow spee	ed periods ov	/er /			
Number of weeks	anchored or alongside or periods operating at <6	knots in a	No. of 7 day periods d	ivided by 2 =		
port or coastal wa	ters (<100m deep) since last drydocking/slipping f	or cleaning	no. or r day periods d			
IMS infection periods	risk- region of the stationary/slow sp	eed				
Regions of the ho stationary or slow scoring region on	me ports or coastal waters where above speed periods occurred included (use highest v)	Tropical re	egion = 3.0			
			Subtropical region = 2.0			
			Temperate region = 1.0			
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
Remediat	ION					
Remediat Will vessel be	entering WA waters?					
Remediat Will vessel be Yes	entering WA waters?	-	= 1.0			
Remediat Will vessel be Yes No	entering WA waters?		= 1.0 = 0.0			
Remediat Will vessel be Yes No Vessel is based ir	entering WA waters?	evious 3 months	= 1.0 = 0.0 = 0.0			
Remediat Will vessel be Yes No Vessel is based ir IMS biofoulin	entering WA waters?	revious 3 months	= 1.0 = 0.0 = 0.0			
Remediat Will vessel be Yes No Vessel is based ir IMS biofoulin No drydock/slipwa	entering WA waters? region and has been in region continuously for pr g survival risk vy cleaning and inspection prior to mobilisation	revious 3 months	= 1.0 = 0.0 = 0.0 = 1.0			
Remediat Will vessel be Yes No Vessel is based ir IMS biofoulin No drydock/slipwa One independent	entering WA waters? entering WA waters? region and has been in region continuously for pr g survival risk y cleaning and inspection prior to mobilisation in-water inspection within 7 days before mobilisati	evious 3 months	= 1.0 = 0.0 = 0.0 = 1.0 = 0.5			
Remediat Will vessel be Yes No Vessel is based ir IMS biofoulin No drydock/slipwa One independent Two independent	entering WA waters? region and has been in region continuously for pr g survival risk ay cleaning and inspection prior to mobilisation in-water inspection within 7 days before mobilisati in-water inspections within 30 days before mobilisati	revious 3 months on ation	= 1.0 = 0.0 = 0.0 = 1.0 = 0.5 = 0.3			



Above of	checks included seawat	er system flushing or inspection, and niches	check of strain	ners, spuds, Yes = 0.5	
anonon		incirca -		No (or no inspec	ctions) = 1.0
Subseq	uent transfer to site as	deck cargo or road freight or lay-up c	n hardstand,	< 7 days = 1.0	
that will	provide a continuous to	otal haul-out period that is:		7 - 13 days = 0.8	
				14 - 27 days = 0.3	
_				> 28 days = 0.1	
			1	Vessel Risk Score	0
				Mitigation Factor	0
				Total Score	0
Risk L	evel				
Low	If score is <20, risk	is considered low. Vessel details req	uire checks/cor	firmation only	
Mid	If score is 20 to 80,	risk moderate. Independent validatio	n inspection an	d/or cleaning action required	1
High	If score is >80, risk	is high. Premobilisation inspection ar	nd/or cleaning a	actions required	



Appendix 4: Sediment and Water Aesthetic Sampling and Analysis Plan



CLIENTS PEOPLE PERFORMANCE

Citic Pacific Mining Management Pty Ltd

Report for Sino Iron Port Project

Sediment and Water Aesthetic Sampling and Analysis Plan

April 2011



INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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Appendices

A Chain of Custody Documentation

1. Introduction

1.1 Project Background

CITIC Pacific Mining Management Pty Ltd (CPM) is constructing an iron ore mine, downstream processing facility and port at Cape Preston, approximately 80 km southwest of Karratha, known as the Sino Iron Project (the Project) (Figure 1). The Project involves the construction and operation of an open cut iron ore mine and downstream processing facilities, in addition to the development of dedicated coastal infrastructure including a port, trans-shipment facility and a 44 Gl/yr desalination plant. The port facility is to include a 2 km long causeway, breakwater, material offloading facility (MOF) and brine discharge infrastructure near Preston Island (Figure 2).

The Project was assessed by the Western Australia Environmental Protection Authority (EPA) pursuant to Part IV of the Environmental Protection Act 1986 (EP Act) and was approved by the Minister for the Environment in October 2003 under Ministerial Statement 635 (MS 635) with a number of conditions and commitments including Condition 9-1 (Item 1) requiring CPM to *"establish Environmental Quality Objectives which explicitly identify uses and values and where they will be protected, and the appropriate Environmental Quality Criteria required to sustain each Environmental Quality Objective".*

In order to meet this requirement CPM has committed to undertake sediment sampling within the proposed port operational area, prior to production activities commencing.

Similar to that of other operational ports in the Pilbara and consistent with the Western Australia *EPA Report 20 Environmental Quality Criteria Reference Document for Cockburn Sound* (2003 – 2004) and *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC/ARMCANZ, 2000), it is anticipated that the operating areas of the port will be required to maintain a moderate level of ecological protection (i.e. moderate changes in the quality of water, sediment and biota beyond natural variation in ecosystem processes, but no detectable changes from the natural diversity of species and biological communities). The location of the Moderate Ecological Protection Area (MEPA) is proposed to be an area 250m in width surrounding the operating port area. A high level of ecological protection will be maintained outside the boundary of the MEPA.

1.2 Objective

The objective of this Sediment and Water Aesthetic Sampling and Analysis Program (SAP) is to determine the spatial variability in the concentration of potential contaminants in sediments within and at the boundary of the MEPA zone.

This document details the sampling and analysis protocols required to meet this Environmental Quality Objective and has been designed to include:

- Quality assurance (QA) and quality control (QC) measures for sampling and reporting as outlined in Section 1.2.1 of the CPM Request for Quotation (RFQ);
- Visual aesthetic assessment of water quality across thirteen indicative sites within the MEPA zone;

- Surface sediment sampling at the thirteen sites, with five replicate sub-samples collected from the corner points and centre of a 1 x 1m quadrat;
- Sub-sample the top 2-5 cm of each replicate sample and consolidate to five composite samples per site;
- Store samples on ice and transport to a National Association of Testing Authorities (NATA) accredited laboratory for analysis where, initially, three of the five samples will be randomly selected and analysed against the lowest practical analytical limits and achieve sediment quality guidelines (where possible); and
- Provision for the storage of frozen samples remaining for future analysis (as required).

1.3 Study Area

Cape Preston is a prominent rocky headland, located approximately 80 km southwest of Karratha, Western Australia. The Cape is separated from the mainland by a network of mangrove fringed tidal creeks and is surrounded by an extensive intertidal zone and rocky reef inhabited by coral communities. Preston Island is located approximately 1.2 km to the northwest of Cape Preston, and prior to the construction of the breakwater, was separated from the mainland by a shallow sand spit at low spring tides (Figure 2). The seabed in the area is relatively shallow to the east and southwest, with deeper water (~14 m below chart datum, 'CD') located 300 m to the north (LeProvost Environmental, 2008).

Cape Preston experiences a sub-tropical to monsoonal climate with a cool season from May to August and a warm period usually from October to March. During the warmer months, an average of five tropical cyclones pass through the north-west Australian region annually (Pearce *et al.*, 2003). The local ocean environment experiences semi-diurnal tides with a highest astronomical range of 4.75 m, inducing strong currents (up to 1.5 knots) during spring tides (LeProvost Environmental, 2008).



Figure 1: General location of Cape Preston sited along the Pilbara cost of Western Australia.



95500 765	3 4 5 6 7 8 9 10 11 12 13	415259 415701 415890 416377 415631 415918 415951 415638 415441 415690 415883	7698286 7698528 7698198 7697507 7697138 7696773 7697259 7697850 7698206 7698335 7697986							N	1 95500 765	20000
76		415000	415500	416000			416500		417000		92	
	CITIC F MIN	B PACIFIC ING	SINO IRON PROJECT Figure 2 Port Layout and Indicative Sediment Monitoring Current Version 15 General Arrangement inc. Southern Tug Berth Expansion	Department: Sheet Size: Drawn by CB	25 Met 1:10 Datum: Projection: M ENV A3 Requested by MH	0 ers ,000 GDA94 IGA Zone 50 Date: Status: Internal Reference 2347 00 2011	500 12/04/2011 Draft	Legend Indicative Mo Moderate Ec GA Detail (v ²	onitoring Site cological Protection Are	а		_

2. Sampling and Analysis Plan

2.1 Sampling Locations

Thirteen sites were selected for sediment and water aesthetic sampling. These sites are located in regions of potentially polluting activities to assess 'worst case' conditions and on the Moderate/High protection boundary to help demonstrate that the activities of the port are not extending outside the proposed MEPA. The co-ordinates for these sites are provided in Table 1 below.

Site ID #	Easting	Northing
1	415414	7696845
2	415413	7697996
3	415259	7698286
4	415701	7698528
5	415890	7698198
6	416377	7697507
7	415631	7697138
8	415918	7696773
9	415951	7697259
10	415638	7697850
11	415441	7698206
12	415690	7698335
13	415883	7697986

Table 1 Indicative co-ordinates (GDA94 MGA50) for the 13 sediment sampling locations

2.2 Sampling Frequency

The first pre-production sampling event is scheduled for April 2011 to coincide with the coral health monitoring program. The Port EMP proposes that the sediment and water aesthetic sampling will be repeated in the first year following operations, and then every five years (CPM and Oceanica Consulting Pty Ltd, 2009). However the frequency will be reviewed after results from the first year following operations.

2.3 Sediment Sampling

2.3.1 Sample Collection

Sediment samples are to be collected by divers who are commercially trained in accordance with Australian Standard AS2815.1 with dive operations performed in accordance with AS2299.1:2007.

- Divers will collect unconsolidated surface sediment samples at each of the 13 monitoring sites with a 5 cm (internal diameter) polycarbonate core to a depth of <30 cm (pending coral refusal or maximum core length);
- At each site, five replicate sediment samples will be collected. One sediment sample will consist of five sub-samples taken from the corner points and centre of a 1 x 1 m quadrat;
- Sediment cores will then be brought to the surface, where the upper 2-5 cm of each core will subsampled, consolidated and transferred to appropriate storage container as provided by the NATA accredited laboratory (i.e. no influence of the container on the parameter of interest);
- Upon collection, composite samples shall be immediately placed in a refrigerator aboard the vessel and transported to the laboratory in Eskies chilled with ice blocks.

To reduce the risk of cross-contamination between samples, all core tubes, mixing bowls and sample transfer tools shall all be washed with 'Decon 90', a leading cleaning agent and decontaminant, and rinsed thoroughly with distilled water between processing replicate samples. In addition, all personnel onboard the vessel that are handling samples shall wear Nitrile gloves, changed between replicate samples.

A record of the sample shall be kept in the GHD field journal and registered on the Chain of Custody (CoC) documentation.

2.3.2 Sediment Sample Laboratory Analysis

Sediment samples will be sent to a NATA accredited laboratory and analysed for the parameters identified in Table 2 below, which in summary includes:

- Particle-size analysis;
- Organic matter and carbonate content;
- Metals; and
- Organics.

Parameter	EQG value ¹ (ISQG – Low)	EQG re-sampling trigger ¹ (ISQG – High)	Reporting Limit
Metals and Metalloids (mg/kg dry wt)		
Arsenic	20	70	0.5
Cadmium	1.5	10	0.1
Chromium	80	370	1.0
Copper	65	270	0.2
Lead	50	220	1.0
Mercury ²	0.15	1	0.01
Nickel	21	52	1.0
Silver	1	3.7	0.1
Zinc	200	410	0.5
Organometallics (µg Sn	/kg dry wt)		
Tributyltin	5	70	2.0
Organics (µg/kg dry wt)			
Acenaphthene	16	500	10-20
Acenaphthalene	44	640	10-20
Anthracene	85	1100	10-20
Fluorene	19	540	10-20
Naphthalene	160	2100	10-20
Phenanthrene	240	1500	10-20
Low molecular weight PAHs ³	552	3160	10-20
Benzo(a)anthracene	261	1600	10-20
Benzo(a)pyrene	430	1600	10-20
Dibenzo(a,h)anthracene	63	260	10-20
Chrysene	384	2800	10-20
Fluoranthene	600	5100	10-20
Pyrene	665	2600	10-20
High molecular weight	1700	9600	10-20

Table 2Analytes, criteria and reporting limits for sediment sample analysis. (Table adopted
from EPA 2005b)

Parameter	EQG value ¹ (ISQG – Low)	EQG re-sampling trigger ¹ (ISQG – High)	Reporting Limit
PAHs ³			
Total PAHs	4000	45000	10-20
Other			
Particle Size Analysis	N/A	N/A	N/A
TOC (mg/kg)	N/A	N/A	100

Notes ¹Guidelines taken from Cockburn Sound EQC document, Table 3 (EPA 2005b).

³ Low molecular weight PAHs are the sum of concentrations of Acenaphthene, Acenaphthalene, Anthracene, Fluorene, Naphthalene and Phenanthrene; high molecular weight PAHs are the sum of concentrations of Benzo(a)anthracene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Chrysene, Fluoranthene and Pyrene.

The samples are to be analysed by the NATA accredited, ALS Laboratory in Perth. Upon receipt of the sediment samples three of the five samples will be randomly selected and analysed against the lowest practical analytical limits and achieve sediment quality guidelines (where possible). Any remaining samples will be frozen and stored by ALS for future analysis (as required).

2.4 Water Aesthetic Sampling

At each sediment sampling site, a series of visual qualitative aesthetic assessments of water quality will be undertaken across the MEPA zone. Each visual assessment will include recording the presence or absence of the following indicators:

- Nuisance organisms (i.e. algae / plant material) present in excessive amounts (Visual assessment only - Note that any observed nuisance organisms will be reported);
- Large-scale deaths of marine organisms visible (Visual assessment only Note that any observed dead/injured/unhealthy marine organisms will be reported);
- Natural visual clarity of the water not reduced by more than 20% (Measurement of water clarity will be recorded based on secchi depth (cm));
- Noticeable colour variation (Visual assessment based on visual classification against the Munsell colour system);
- Natural reflectance of water not changed by more than 50% (Visual assessment only);
- Oil or other films noticeable as a visible layer on water surface (Visual assessment only);
- Floating debris or dust visible on the water surface (Visual assessment only); and/or
- Detectable objectionable odour associated with water (Any odour detected that is associated with the water will be reported).

² Low level analysis required to meet guidelines.

2.5 Quality Assurance (QA) / Quality Control (QC)

2.5.1 Data Management

Samples and data collected in the field will be managed in accordance with GHD QA/QC procedures. Specific information collected in the field will include:

- Sampling date and time;
- Sampling location (Including GPS Coordinates);
- Field staff conducting the sampling;
- Sampling methods;
- Sample handling, preservation, and storage procedures;
- Dates and times of collection, preservation, and storage.
- Details of any Photographs taken; and
- Any other noteworthy observations on water clarity, meteorological and or sea state conditions.

Upon return to Perth from the field, this data is to be saved to the GHD computer network along with a scanned copy of the field notes from that sampling occasion. The GHD network is automatically backed up on an hourly basis.

All raw (text files) and processed (Microsoft Excel) data will be provided to CPM upon project completion. Along with all relevant photographs obtained throughout the sampling program.

2.5.2 Sampling Equipment – Cleaning, Calibration and Maintenance

All sampling equipment and field instruments will be kept clean and in good working order, and calibrations and preventative maintenance will be carried out, as required, according to GHD's predefined maintenance schedules.

In accordance with the protocols outlined in **Section 2.3.1**, all sediment sampling equipment will be cleaned and sterilised between each sample collection to prevent cross contamination of samples. Evidence of cleaning will be recorded in the GHD field journal and on the CoC documentation.

Records of cleaning and maintenance undertaken during the course of the sampling event will be included in the Survey Event Final Report.

2.5.3 Chain of Custody (CoC) Documentation

All sample information will be documented on GHD's Chain of Custody forms. These forms are recorded in a triplicate carbon copy booklet to ensure that sufficient copies of each CoC are retained by GHD and analytical laboratory. Two copies of the CoC will be sent to the laboratory with the samples in each sample esky. Upon receipt of the samples the laboratory will scan and email a signed copy of the original CoC to provide proof of receipt of the samples.

An example CoC form is provided in Appendix A.

3. Reporting

Following completion of the sampling event a report will be prepared that details the monitoring results and provides a comparative analysis against the Environmental Quality Guidelines of Cockburn Sound (EPA 2005a).

The report will be suitable for submission to relevant regulatory authorities and able to be used as a base document for ongoing monitoring that includes detail on the position of monitoring sites and samples collected and analysed.

4. References

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Appendix A Chain of Custody Documentation

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST



3 31 d . x

GHD CLIENTS PEOPLE PERFORMANCE

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Project			Labor Addre	atory:									Please Note: Please sign white co	oy on		
Client	Client Job No.		Labor	Laboratory Contact:							Samples are delivered Laboratory Address.	ed to On				
Laboratory Quote No. 7 Job Manager (Invoice) E		Turnaround	Time		r/A-Air	/A-Air	Container No Total			Analyses		1	receipt of samples laboratory contact should sign white copy and fax to GHD contact at			
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Sample Conditions:	Remarks:				

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SINO Iron

Fibrous Minerals Management Plan

24/05/2016

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The current approved version of this document can be found on the <u>Health and Safety portal</u>. Updates are distributed in the Daily Safety Alerts (i.e. CPM Site and Contractor Representatives email distribution lists).

For immediate updates of this document, CPM employees can subscribe to Alert Me.

Related documents

Document title	Document ID
Plans	
Dust Operational Management Plan	
Standards	
Selection, use and maintenance of respiratory protective equipment	AS 1715
Other	
Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres, 2nd Edition	NOHSC:3003(2005)
Legislation	
Environmental Protection Act 1986	
Mine Safety and Inspection Regulations 1995	



Document approval

	Name		Signature	Date
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Approved



Introduction

The commitment to occupational health and safety as a core value is entrenched throughout the CITIC Group and embodied in clear mission statements. CITIC Limited, the parent company of CITIC Pacific Mining sets out the required standard: "We run our business in a socially responsible manner while creating economic value for our shareholders. In addition to offering a safe and healthy workplace as well as rewarding job opportunities, we place great emphasis on minimising our environmental impacts and ensuring the well-being of the local communities where we operate"

CITIC Pacific Mining acknowledges the risk posed to employee health from exposure to fibrous minerals at its Sino Iron ore extraction and processing operations and has put into place a significant program to assess and control the hazard. This plan seeks to build upon the foundations that have already been laid, using an increasing body of knowledge and experience, to continue the journey toward best practice and the minimisation of harm to employees, contractors, members of the public and the environment consistent with its statutory obligations.

This document replaces the previous version of the Fibrous Minerals Management Plan which was developed at the commencement of the project to ensure it reflects our current level of knowledge of the type and distribution of fibrous minerals associated with our project and sets out appropriate management strategies. While production is well under way, much of the operation is still in the commissioning phase such that the application of the FMMP will continue to be monitored and amended as required.

In line with our corporate vision and values, and our combined commitment and statutory obligations to the protection of employee health and the environment while achieving productive and profitable outcome for our shareholders, CITIC Pacific Mining requires that exposure to fibrous minerals and related dust emissions be managed, so far as is reasonably practicable. This is to be achieved by the application of the hierarchy of controls in which engineering controls (i.e. suppression, ventilation or exhaust extraction) takes precedence over personal protective equipment.

1 Scope

All personnel engaged in mining and processing activities at Sino Iron.

2 Purpose

The purpose of this document is to:

- identify the risks associated with the fibrous mineral in terms of emission, transmission and exposure
- streamline the framework for the management of fibrous minerals, hazards and risks in terms of control strategies
- establish a program of governance that ensures the goals of the fibrous minerals management plan are achieved and sustained
- ensure compliance with obligations under the Mines Safety and Inspection Regulations 1995 (WA) in relation to contaminant asbestos

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3 Definitions

Term	Definition
Asbestiform Minerals	 Parallel sided fibres Right angle truncations of fibre ends Fibre bundles Fibres typically less than 1.0µm diameter Flexible fibres Heat and corrosion resistant High tensile strength; low electrical conductivity
Asbestos	A commercial term applied to a group of fibrous silicate minerals belonging to the serpentine and amphibole mineral groups. The minerals in this group usually occur in the non-fibrous form. If the mineral occurs as the fibrous variety, it is known as contaminant asbestos
Breathing Zone	The area of 300mm radius extending in front of a person's face and measured from the midpoint of an imaginary line joining the ears
Contaminant asbestos	Crocidolite, chrysotile, grunerite (amosite), or the asbestiform varieties of actinolite, tremolite or anthophyllite present in rock (MSIR)
Designated Area	A workplace where atmospheric monitoring or risk assessment indicates that higher level control measures are required including respiratory protection and potential decontamination
High Efficiency Particulate Air (HEPA)	A type of air filter that must remove 99.97% of all particles greater than 0.3 μm from the air that passes through it
Membrane Filter Method	The technique outlined in the Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres, 2nd Edition [NOHSC:3003(2005)]
Time Weighted Average (TWA)	Time weighted average concentration of an atmospheric contaminant when calculated over a normal 8 hour working period during a 5 day working week
Waste	Material (mineral overburden, detritals, non-mineralised, uneconomic etc.) that may have to be disturbed / moved and relocated



4 **Responsibilities**

Manager / Superintendent / Supervisor

- Familiar with the fibrous minerals management plan and procedures relevant to their scope of operations
- Advise immediately if the controls in place are not effective in accordance with CITIC Pacific Mining's procedures
- Monitor compliance to the requirements

Occupational Hygiene

- · Provide, develop and implement the fibre monitoring program
- · Review effectiveness of controls
- · Provide expert advice in the minimisation of exposures
- Coordinate consultation and communications between key stakeholders

Personnel

- Complete fibrous minerals training and attend awareness programs
- Comply with
 - relevant fibrous minerals procedures and instructions
 - personal protective equipment requirements
 - personal decontamination requirements
- Report unsafe conditions relating to fibre and dust emissions

5 F

Fibrous Minerals Management

The occupational hygiene monitoring program has provided increased insight into fibre concentrations and the relationship to the activities undertaken at Sino Iron. There is high potential for fibre release (in concentrations above the exposure standard) to occur at the mine and processing, a lesser extent at the Port and Marine operations.

5.1 Geology

The magnetite orebody lies within the Joffre Member of the Brockman Iron Formation which in turns forms part of the Hamersley Group. The orebody overlies the Whaleback Shale and Dales Gorge Members. Dolerite intrusions are resent in all geological units as indicated in the diagram



Indicative cross sectional view of the geological units within the mine plan



5.1.1 Fibrous minerals identification

The banded iron formations within the Joffre and Dales Gorge Members contain three of the monoclinic series of the amphibole silicate minerals: actinolite, tremolite (which are included in the definition of "contaminant asbestos" under the Mines Safety and Inspection Regulations 1995 (WA))(*MSIR*) and riebeckite. Mineralogical analysis conducted on drill core samples shows fibrous minerals to be present in both the Joffre and Dales Gorge.

All three amphiboles present in the banded iron formation have a crystal / prismatic morphology including: massive, bladed, acicular, columnar, radiating and asbestiform habits. The occurrence and location of these minerals in the ore body is irregular and non-specific, as is the particular habit in which they take.

5.1.2 Fibrous minerals in the Joffre Member

The composition of fibrous minerals varies throughout the Joffre member. The predominant form of amphibole mineral present in the Joffre is massive riebeckite. Seams of fibrous riebeckite (crocidolite) have not been observed in the mine or exploration drill core in the Joffre member.

The predominant fibres are non-asbestiform prismatic, acicular, columnar and radiating. However, asbestiform actinolite and tremolite may be encountered where dolerite intrusions occur.

5.1.3 Fibrous minerals in the Dales Gorge Member

The Dales Gorge member does not form part of the current target ore body. However, mining and transport to waste of sections of the Dales Gorge member is anticipated to allow economic mining to proceed and to ensure geotechnical stability.

Fibrous minerals in the Dales Gorge essentially replicate that of the Joffre Member, with the addition of asbestiform riebeckite (crocidolite). Analysis of exploration drill core from the Dales Gorge member indicates a crocidolite percentage of approximately 0.2% although a substantial amount has undergone pseudomorphic transition into quartz.

5.2 Risk Assessment

5.2.1 Occupational Hygiene Monitoring

The health effects from exposure to asbestiform fibres are widely known; crocidolite, actinolite, tremolite (present at the Sino Iron project) are classified by the International Agency for Research into Cancer as being carcinogenic to humans (Group 1).

While the majority of fibres encountered in the Sino Iron project and processing operations are non-asbestiform; the potential risk to health from exposure to these fibres are less clear. Non-asbestiform fibres could be excluded from estimations of contaminant asbestos concentrations at the mine.

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As a precautionary and conservative measure, all respirable fibres from atmospheric monitoring meeting the geometric criteria set out in the methodology referenced in the Mine Safety and Inspection Regulations (1995) are included in fibre counts.

5.2.2 Occupational Hygiene Monitoring Program

A significant occupational hygiene monitoring program has been in place for several years at CITIC Pacific Mining which has provided increased insight into fibre concentrations and the relationship to the activities undertaken as the Sino Iron Project. For example, there is high potential for fibre release (in concentrations above the exposure standard) to occur at the mine and processing, and to a lesser extent, port and marine operations, hence the requirement to eliminate or manage releases in accordance with this FMMP.

5.3 Fibrous Minerals Control

The presence of asbestiform and non-asbestiform fibres, the exposure potential and the associated risks require the development and implementation of a control program. The objectives of the program include:

- prevention of fibre and related dust release as far as is practicable
- where prevention is not practicable, capture of emissions
- if emissions cannot be captured, ensure as far as is practicable, suppressions of emissions when they do occur where prevention of fibre and related dust release is not practicable, prevention of worker exposure through use of other controls as provided for in this FMMP
- prevention of exposure to the public through use of controls as provided for in this FMMP
- prevention of environmental harm

5.3.1 Engineering

5.3.1.1 Extraction and ventilation

A high level of protection can be provided by the implementation of dust extraction and collection systems the installation of ventilation and scrubbing systems, and that these should take precedence over lesser controls.

5.3.1.2 Spillage Control

Uncontrolled spillage remains one of the highest sources of fibre emissions across the operation, particularly from conveyor belts and transfer points, as well as throughout the concentrator, TSF and Port areas.

The primary focus of engineering controls centres on the elimination of the potential for any spillage. If spillage does occur, the focus will be on reduction and containment. Controls to prevent any spillage occurring will include;

• improved belt scrapers and belt-wash stations



- improvements to chute design
- · reduction of the height of product discharge during stacking
- · containment of stockpiles
- concrete bunds and sump pumps with facilities for wash down

If any uncontained spillage occurs, the Departmental Director or General / Area Manager must ensure necessary action is taken to protect the health of personnel. This will include that the spillage is to be treated with binder and promptly removed to a designated fibrous waste area.

The Chief Executive Officer will ensure that an assessment of any exposure to airborne asbestos fibres is carried out using the method specified in the MSIR [Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres, 2nd Edition NOHSC:3003(2005)]

5.3.1.3 Isolation

Where practicable, HEPA units (positive pressure, negative pressure, scrubbing) will be fitted to equipment cabins, control rooms, decontamination facilities and crib rooms.

5.3.1.4 Fibre and Dust prevention and suppression

Water sprays, mists and fogging can be used to soak ore to prevent dust from becoming airborne (dust prevention) or by arresting airborne particulate (dust suppression). Where required, additives such as surfactants and binders are to be used to wet and agglomerate the material so that it has a lower tendency to generate dust.

Dust prevention and/or suppression methods will be used for:

- drilling and blasting, loading, transfer of ore and waste
- crusher operations and conveyor transport of ore
- processing operations including management of tailings
- stockpile management
- transfer of concentrate through to transfer onto export vessels

5.3.1.5 Decontamination facilities

Where risk assessment has identified an increased risk for exposure to fibrous minerals, decontamination facilities for personnel and equipment will be required. Some parts of the operation where elevated concentrations of fibre may be present have been defined as "Designated Areas". These areas are required to be clearly delineated and sign posted. Personnel working in designated areas who are exposed to fibrous minerals may be required to undergo personal decontamination.

Decontamination facilities will be supplied including boot wash stations and purpose built shower and change rooms fitted with negative pressure ventilation.

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All plant and equipment exiting a designated area should be inspected, and decontaminated where necessary, or quarantined. Decontamination areas for plant and equipment will be made available at strategic locations throughout the site and provided with the necessary facilities (i.e. power wash equipment, HEPA filtered vacuums, contaminant containment sumps).

5.3.2 Personal Protective Equipment

Personnel working in designated areas are required to wear respiratory protection in accordance with AS 1715. The standard respiratory protection required is P2 non disposable half face respirators with an associated clean-shaven requirement. Higher level protection (powered air purifying respirators) is to be provided where risk assessment indicates additional risk. Where decontamination facilities are not available, disposable overalls can be used.

5.3.3 Administrative

5.3.3.1 Procedure

Guidance related to the management of fibrous minerals has been developed in order to meet the minimum requirements set out in this document.

- Decontamination Unit Procedure DR001882
- Designated and P2 Area Maps DR 031508
- Dust (Environmental) Management Procedure DR018861
- Dust Operational Management Plan DR027769
- Equipment and Plant Tagging and Decontamination Process DR034299
- Fibrous Minerals Management Procedure Mines DR012984
- Fibrous Mineral Management Procedure Port DR030818
- Light Vehicle Cleaning and Decontamination DR032198
- Preliminary Decommissioning and Closure Plan 743000904.08
- Respiratory Protection Program DR016170

5.3.3.2 Training

Personnel are required to complete an online fibrous minerals awareness module. Personnel entering designated areas must undergo training in the use of respiratory protection and decontamination procedures. Permanent employees / embedded contractors required to work in designated areas are, in addition to the online training, required to attend advanced fibrous minerals awareness sessions.

5.4 Environment

The environmental management of fibrous minerals is coordinated by the Environmental Department. The department has established a Dust Operational Management Plan including a register of pollution control equipment fitted to ore processing and handling equipment across the site. Regular audits are conducted to ensure effectiveness of these controls is maintained.

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The objectives of the Dust Management plan, including specified control measures, have been accepted as a licensing condition of the Department regulating the Environmental Protection Act 1986.

The management of tailings dams and waste dumps requires the encapsulation of fibrous minerals within a specific set of engineering guidelines set out in CPM Mine Closure plans. These plans conform to the requirements of the Environmental Protection Authority and Department of Mines and Petroleum for mine decommissioning, closure and rehabilitation.

5.5 Public Health

Public exposure to fibrous minerals is limited by;

- the isolation of the site in terms of distance from populated areas
- security measures that prevents unauthorised access to the lease areas
- separation (including realignment) of public roads from processing and mining areas

The potential for public exposure to fibrous minerals outside of the lease area is limited to contact with potentially contaminated vehicles, plant and equipment. The risk is mitigated by;

- a requirement to inspect and if necessary decontaminate contaminated vehicles, plant and equipment leaving designated areas
- a requirement to inspect and if necessary decontaminate vehicles, plant and equipment leaving site
- provision of decontamination facilities and equipment and procedures
- atmospheric monitoring for fibrous minerals at the Eramurra Village and the application of additional controls if required

6 Governance

The ongoing review and continuous improvement of fibrous minerals management is an organisational priority, led by the Chief Executive Officer (CEO), and delivered through a transparent process where roles, responsibilities and accountabilities are clearly defined.

6.1 Oversight

Responsibility for the development, improvement and oversight of the fibrous minerals management plan rests with the CEO and Board. The CEO and Board will satisfy themselves of the ongoing effectiveness of all aspects of fibrous minerals management through reporting mechanisms from the fibrous minerals management committee, steering committee and departmental fibre matters meetings.



6.2 Fibrous Minerals Management Committee

The Fibrous Management Committee will meet every second month and membership will include;

- CEO
- Senior Legal Counsel, CPM
- Director HSE (Chairperson)
- The four area Registered Managers or their delegates
- Director Port and Marine Operations
- General Manager Health & Safety (Deputy Chairperson)
- Manager Health & Hygiene
- Manager Risk Management
- Manager Sustainability and Environment

The Fibrous Minerals Management Committee will:

- Ensure that the management of fibrous minerals meets legal compliance as a minimum
- Share best practice amongst all members of this group regardless of ownership, providing it's not copy right privileged
- Review all fibrous mineral audits and confirm departmental action plans to ensure ongoing compliance
- Serve as the communication pathway between the departmental fibre management meetings and senior management
- Support the achievement of CPM's HSE goals and objectives that meet regulatory compliance and industry excellence

6.3 Monthly Steering Committee

The results of the fibre control effectiveness reviews will be reported to the monthly steering committee which is presided over by the Chairman of CITIC Limited and the Chief Executive Officer of CITIC Pacific Mining.

6.4 Departmental Fibre Matters meetings

Implementation of the requirements of the fibrous minerals management plan sits with Area Registered Managers and Responsible persons appointed under Section 44 of the MSIA, in consultation with the Ventilation Officer.

Managers will convene monthly meetings to provide a forum for discussion around fibrous minerals, engineering controls and gather employee concerns and suggestions for hazard management and improvement. Health & Safety and Environment representatives will attend all departmental meetings. Where required, actions for rectification or improvement within specified timeframes are to be assigned. Outcomes of these meetings are to be summarised and provided to the Fibrous Minerals Management Committee.


7 Inspection

7.1 Workplace Inspections

Workplace inspection checklists will contain a requirement to check the status and effectiveness of the dust and fibre controls (Procedures, practices and engineering controls) where appropriate.

7.2 Operational Checks

Operational staff will conduct pre-use checks of equipment as required by the training manuals. If controls are not functioning as designed or not operational corrective actions will be applied as defined in the training manuals.

7.3 Maintenance Inspections

The maintenance inspection regime for fibre and dust controls will be developed and documented in SAP. The bimonthly reviews will include reviews of the preventative maintenance optimisation inspection processes.

8 Audit

Document No:

8.1 Control Audit

Hygiene and Environment teams will conduct a joint review of the status of fibre and related dust controls in place every two months using the following rating system:

Hazard Control rating	Status		
Level One:	1. Fully functional and effective with compliance to developed (Inspection, testing and maintenance standards)		
Functional and effective	2. Effective control afforded with actions required		
Level Two:	3. Functioning but no defined standards or logic applied		
Functioning but inadequate or insufficient	4. Functioning but not maintained to required standards		
	5. Functioning but inadequate due to design		
Level Three:	6. Controls in place but not functioning		
Absence of control	7. Control in place but not used		
	8. Controls not considered		



The reviews will be presented to the Registered Managers at the bimonthly Fibrous Minerals Management Committee meeting. The Registered Managers will ensure appropriate follow up and corrective actions are implemented. Any matters requiring urgent attention are reported immediately in accordance with CITIC Pacific Mining reporting procedures. The bimonthly review results are stored in the document management system with access restricted to Committee members.

8.2 Group Internal audit

Group Internal will audit annually to assess the implementation of the Fibrous Minerals Management Plan; the required engineering controls are in place, effective and to identify improvement opportunities. Outcomes of the audit will be provided to the Fibrous Minerals Management Committee for review and implementation of recommendations. Any matters requiring urgent attention will be reported in accordance with CITIC Pacific Mining reporting procedures.

8.3 External audit

An external audit will be conducted by a recognised Fibrous minerals expert every two years. Prior to engagement of the external auditor, the person commissioning the external audit will consult with the Citic Pacific Mining Senior Legal Counsel.

The audit will assess the implementation of the Fibrous Minerals Management Plan; the required engineering controls are in place, effective and to identify improvement opportunities. The audit report and recommendations will be provided to the CEO and Fibrous Minerals Management Committee for review and implementation of recommendations as appropriate.

Any matters requiring urgent attention will be reported in accordance with CITIC Pacific Mining reporting procedures.



SINO Iron Project

Conceptual Closure Plan

January 2017

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Q No	Mine Closure Plan (MCP) checklist	Y/N/NA	Page No.	Comments	Changes from previous version (Y/N)	Page No.	Summary
1	Has the Checklist been endorsed by a senior representative within the tenement holder/operating company?	Y					
Pub	lic Availability	I			I		
2	Are you aware that from 2015 all MCPs	Y					
2	will be made publicly available?						
3	should not be publicly available?	N					
4	information been submitted in a separate document/section?	Y					
Cov	er Page, Table of Contents					-	
5	 Does the MCP cover page include: Project Title Company Name Contact Details (including telephone numbers and email addresses) Document ID and version number Date of submission (needs to match the date of this checklist) 	Y			N/A	N/A	
Sco	pe and Purpose				•		
6	State why the MCP is submitted (e.g. as part of a Mining Proposal, a reviewed MCP or to fulfil other legal requirements)	Y		Part IV Environment Protection Act 1986 assessment	N/A	N/A	Iron Ore Processing (Mineralogy) Agreement Act 2002 is the overarching legislation
Proj	ect Overview	6	Antonomonologio.				Γ
7	 Does the project summary include: Land ownership details (include any land management agency responsible for the land / reserve and the purpose for which the land / reserve [including surrounding land] is being managed) Location of the project; Comprehensive site plan(s); Background information on the history and status of the project. 	Y			N/A	N/A	
Leg	al Obligations and Commitments						
8	Does the MCP include a consolidated summary or register of closure obligations and commitments?	Y		Appendix B	N/A	N/A	
Stak	ceholder Engagement	1			<u>г</u>		L
9	Have all stakeholders involved in closure been identified?	Y	p.19-28	Stakeholders have been identified but consultation in relation to closure has not yet been fully implemented.	N/A	N/A	
10	Does the MCP include a summary or	Y	р. 20-26		N/A	N/A	

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Q No	Mine Closure Plan (MCP) checklist	Y/N/NA	Page No.	Comments	Changes from previous version (Y/N)	Page No.	Summary
	register of historic stakeholder engagement with details on who has been consulted and the outcomes?						
11	Does the MCP include a stakeholder consultation strategy to be implemented in the future?	Y	p.27		N/A	N/A	
Pos	t-mining land use(s) and Closure Objecti	ves	[Comprehensive			[
12	Does the MCP include agreed post- mining land use(s), closure objectives and conceptual landform design diagram?	N		stakeholder consultation on the land use objectives yet to occur.	N/A	N/A	
13	Does the MCP identify all potential (or pre-existing) environmental legacies, which may restrict the post mining land use (including contaminated sites)?	Y			N/A	N/A	
14	Has any soil or groundwater contamination that occurred, or is suspected to have occurred, during the operation of the mine, been reported to DER as required under the	N		None has been identified to date.	N/A	N/A	
Πον	Contaminated Sites Act 2003?						I
Dev	Does the MCP include an appropriate	U VIA					[
15	set of specific completion criteria and closure performance indicators?	Y	p.32-34	are suggested.	N/A	N/A	
Coll	ection and Analysis of Closure Data	1234	Non-International		[[
16	loes the MCP include baseline data (including pre-mining studies and environmental data)?	Y	Appendix C		N/A	N/A	
17	Has materials characterisation been carried out consistent with applicable standards and guidelines (e.g. GARD Guide)?	Y		Integrated Waste Rock Classification is contained in the Waste Rock Management plan.	N/A	N/A	
18	Does the MCP identify applicable closure learnings from benchmarking against other comparable mine sites?	N/A		Not at this stage, benchmarking against other Pilbara sites could be done in the future; however, current knowledge is showing that this is not useful for the Pilbara.	N/A	N/A	
19	Does the MCP identify all key issues impacting mine closure objectives and outcomes (including potential contamination impacts)?	Y			N/A	N/A	
20	Does the MCP include information relevant to mine closure for each domain or feature?	Y	p.37-63				
Iden	tification and Management of Closure Is	sues				1	-
21	Does the MCP include a gap analysis/risk assessment to determine if	Y			N/A	N/A	

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Q No	Mine Closure Plan (MCP) checklist	Y/N/NA	Page No.	Comments	Changes from previous version (Y/N)	Page No.	Summary
	further information is required in relation to closure of each domain or feature?						
22	Does the MCP include the process, methodology, and has the rationale been provided to justify identification and management of the issues?	Y			N/A	N/A	
Clos	sure Implementation	r	I		T	1	I
23	Does the MCP include a summary of closure implementation strategies and activities for the proposed operations or for the whole site?	Y		Four Rehabilitation Management Areas with Domains.	N/A	N/A	
24	Does the MCP include a closure work program for each domain or feature?	Y	p.37-63		N/A	N/A	
25	Does the MCP contain site layout plans to clearly show each type of disturbance as defined in Schedule 1 of the MRF Regulations?	Y			N/A	N/A	
26	Does the MCP contain a schedule of research and trial activities?	Y		Refer to Table 16	N/A	N/A	
27	Does the MCP contain a schedule of progressive rehabilitation activities?	Y	Appendix E	Progressive rehabilitation opportunities are limited at this point in time.	N/A	N/A	
28	Does the MCP include details of how unexpected closure and care and maintenance will be handled?	Y			N/A	N/A	
29	Does the MCP contain a schedule of decommissioning activities?	N		They are considered from a financial perspective, but it is considered too early to derive a decommissioning schedule at this early stage of the Project.	N/A	N/A	
30	Does the MCP contain a schedule of closure performance monitoring and maintenance activities?	Ν		To be developed closer to closure. Performance measures and monitoring programs will be developed on the basis of monitoring that is currently being undertaken as a part of normal mining/construction and rehabilitation operations.	N/A	N/A	
Clos	sure Monitoring and Maintenance	1	1				
31	Does the MCP contain a framework, including methodology, quality control	N		To be developed when closure	N/A	N/A	

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Q No	Mine Closure Plan (MCP) checklist	Y/N/NA	Page No.	Comments	Changes from previous version (Y/N)	Page No.	Summary
	and remedial strategy for closure performance monitoring including post- closure monitoring and maintenance?			criteria finalised			
Fina	ncial Provisioning for Closure						
32	Does the MCP include costing methodology, assumptions and financial provision to resource closure implementation and monitoring?	Y	p.75-76	Financial provision exclude monitoring	N/A	N/A	
33	Does the MCP include a process for regular review of the financial provision?	Y	p.75-76	Driven by annual financial audits	N/A	N/A	
Man	Management of Information and Data						
34	Does the MCP contain a description of management strategies including systems and processes for the retention of mine records?	Y			N/A	N/A	

Corporate Endorsement:

I hereby certify that to the best of my knowledge, the information within this Mine Closure Plan and checklist is true and correct and addresses all the requirements of the Guidelines for the Preparation of a Mine Closure Plan approved by the Director General of the Department of Mines and Petroleum.

Name:		Signed:	
Position:		Date:	

(NB: The corporate endorsement must be given by tenement holder(s) or a senior representative authorised by the tenement holder(s), such as a Registered Manager or Company Director)



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1 Introduction

CITIC Limited (formerly named CITIC Pacific Limited) is the ultimate owner of Sino Iron Pty Limited (**Sino Iron**) and Korean Steel Pty Limited (**Korean Steel**). Sino Iron and Korean Steel were acquired from Mineralogy Pty Limited (**Mineralogy**) and are both parties to the agreement scheduled to the *Iron Ore Processing (Mineralogy Pty. Ltd.) Agreement Act 2002* (as amended) (**IOPA**).

Sino Iron and Korean Steel each hold mining rights and subleases authorising the extraction of a combined two billion tonnes of magnetite ore, from an orebody known as the George Palmer deposit, located in the West Pilbara region of Western Australia, and contained entirely within Mining Leases M08/123, M08/124 and M08/125.

In 2006, CITIC Limited established CITIC Pacific Mining Pty Ltd (**CPM**) to manage development and ongoing operation of its iron ore mine and export facilities at Cape Preston collectively referred to as the Sino Iron Project (**the Project**). CPM conducts those activities on behalf of Sino Iron and Korean Steel in accordance with requirements within Ministerial Statement 635 (**MS635**) which was granted by the Minister for the Environment under Part IV of the *Environmental Protection Act 1986* (**EP Act**) in 2003.

On behalf of Sino Iron and Korean Steel, CPM is seeking approval under the EP Act, for the Sino Iron Mine Continuation Proposal (**the Proposal**). The Proposal does not seek to alter existing mining, processing and tailings production rates or increase throughput of the desalinisation plant. The Proposal is limited to addressing constraints which are contained within the existing Project's approvals. The Proposal will ensure continuous operation of the same Project.

1.1 Purpose and Scope

The Sino Iron Conceptual Closure Plan (**the Plan**) has been prepared to support CPM's referral of the Proposal to the Office of the Environmental Protection Authority (**OEPA**) under Part IV of the EP Act.

The Plan has been prepared in accordance with the Guidelines for Preparing Ming Closure Plans 2015 (EPA/DMP, May 2015) and builds upon CPM's original 2011 Conceptual Closure Plan developed and adopted internally prior to the launch of the joint EPA/DMP guidelines. The Plan describes a decommissioning, rehabilitation and closure framework that will ensure both the Project and the Proposal are closed in an environmentally acceptable manner as required by existing and future approvals.

It is intended that this Plan will supersede the Preliminary Decommissioning and Closure Plan (Maunsell, 2006), which was submitted by Mineralogy Pty Ltd (previous proponent) and which was approved by the OEPA on 19 October 2006 in accordance with Condition 16 of MS635.



1.2 **Project/Proposal Summary**

1.2.1 Approval History

The existing Project and any future proposals are governed primarily by the IOPA which specifically requires that approval be obtained under the EP Act prior to implementation. Key milestones for the Project include:

- 2000 Austeel Cape Preston Public Environment Review (**PER**) submitted to the OEPA. This document is the basis for what is now known as the Sino Iron Project.
- 2002 Austeel Cape Preston, Supplementary Environment Review submitted to the OEPA.
- 2003 MS635 issued by the Minister for the Environment with Mineralogy as the proponent.
- 2006 CITIC Pacific Limited purchased Sino Iron from Mineralogy which holds a mining right authorising the extraction of one billion tonnes (**Bt**) of magnetite ore
- 2006 Preliminary Decommissioning and Closure Plan (Maunsell 2006) submitted by Mineralogy in accordance with condition 16-1 of MS635 and was approved by the OEPA on 19 October 2006.
- 2008 CITIC Pacific Limited purchases Korean Steel from Mineralogy which holds a mining right authorising the extraction of one billion tonnes (Bt) of magnetite ore.
- 2008 The IOPA was amended to allow export of iron ore concentrate.
- 2009 Construction of the Project by CPM commenced.

Mineralogy referred the 'Mineralogy Expansion Proposal' to the OEPA for assessment under Part IV of the EP Act. The MEP referral included a proposal to expand the Sino Iron Project which was under construction at the time. Ultimately the MEP was not assessed by the OEPA however, in the context of that referral stakeholders were consulted in relation to the mine closure planning process for the Sino Iron Project (see Section 3 below).

- 2009 Sino Iron and Korean Steel Concentrate Project Proposals submitted to the Minister for State Development in accordance with IOPA. These proposals allowed for the export of iron ore concentrate in accordance with the amended IOPA.
- 2011 A copy of CPM's Internal Closure Plan was discussed in the 2011 Annual Environmental Report and offered to DMP
- 2012 Commissioning and operation of the Project commenced.
- 2013 First export of concentrate achieved.
- 2016 MS635 was transferred from Mineralogy to Sino Iron and Korean Steel under the EP Act.



1.2.2 Existing Project Overview

The existing Project is focussed on mining iron ore in the form of magnetite at the George Palmer Orebody located at Cape Preston, 80 km south west of Karratha in the Pilbara Region of Western Australia (Appendix A - Figure 1). The existing mining and processing activities are expected to eventually achieve the approved mining rate of up to 95million tonnes per annum (**Mtpa**) and magnetite concentrate production rates of up to 27.6 Mtpa.

Key characteristics of the Project (as defined by MS635) include:

- Mine:
 - Open pit up to a depth of 220 metres (m); and
 - Rate of mining up to 95 Mtpa.
 - o North east, south east and western waste rock dumps.
- Process Plant:
 - o Concentrator rate up to 27.6 Mtpa;
 - Produced waste to tailings storage facility (TSF) up to 67.4 Mtpa;
 - o Pellet production up to 13.8 Mtpa (yet to be constructed); and
 - Direct reduced/hot briquetted iron up to 4.7 Mtpa (yet to be constructed).

• Infrastructure:

- Power station capacity of 640MW;
- North South infrastructure corridor including: access roads, power lines, buried magnetite concentrate slurry pipeline;
- o Dewatering plant at the port;
- East West infrastructure corridor including Project access road and underground gas pipeline;
- o Port iron ore product stockpiles and bulk ship loading facilities;
- 44 gigalitres per annum (GLpa) Desalination plant and disposal of up to 57.8GLpa of brine per annum;
- Accommodation villages; administration, storage and workshops;
- o Groundwater bore field; and
- Pit dewatering and disposal of up to two GLpa to per annum to the Fortescue River.
- Port Terminal Facilities:
 - o Product stockyard capacity of approximately 1 Mt;
 - Rock Causeway to Preston Island and breakwater which allows for transhipment of magnetite concentrate; and
 - Trestle jetty and dredging of up to 4.5 million metres cubed to allow for direct ship loading (yet to be constructed).



Appendix A – Figure 2 provides a description of the Project area approved by MS635.

1.2.3 **Proposal Overview**

The Proposal will involve disturbance of an additional approximate 7,366 hectares (**ha**), potentially increasing the cumulative footprint (including the Project) to 10,100 ha. The Proposal will involve extensions or alterations to existing infrastructure (refer to Appendix A – Figure 2), including:

- Extension of the mine pit to the west within Mining Leases M08/123, M08/124 and M08/125 with an increase in depth from 220 m to 455 m;
- Increase to tailings capacity within M08/264, M08/265 and M08/266 and onto additional tenements including G08/53, G08/63 and G08/74;
- Increase to waste storage capacity within M08/266, M08/123, M08/124 and M08/125 (approved waste rock dumps) and onto additional tenements including G08/54 and G08/63;
- Increase to capacity of existing product stockpiles and associated infrastructure at the Port Terminal Facility situated within G08/52;
- Construction of two new infrastructure corridors:
 - one of which will extend from the north-south road across tenements G08/53 and G08/74 to the airstrip (located on tenure outside and to the east of the IOPA area), for the purposes of providing transport, power and water supply infrastructure to the airstrip; and
 - the other of which will extend from M08/123 and/or M08/124 across G08/63 (broadly adjacent to L08/20), to connect existing Project power and water supply facilities to facilities outside of and to the east of the IOPA area; and
- Increase mine dewater discharge from two GLpa to potentially up to eight GLpa into the mouth of the Fortescue River.

The Proposal does not seek to alter existing mining, processing and tailings production rates or increase throughput of the desalinisation plant. The Proposal is limited to addressing constraints which are contained within the existing Project's approvals. The Proposal will ensure continuous operation of the same Project.

1.2.4 Disturbance Footprints

Table 1 describes the total area and both proposed and current use of tenements associated with the Project and the Proposal. For each of the proposed rehabilitation management areas (**RMA**) (defined within Section 4 and 8 below) Table 2 describes:

- Project and Proposal features;
- Tenements; and
- Conceptual cumulative disturbance footprint of existing and proposed activities.



Tenement ID Current Tenement Holder		Proposed and Current Tenement Use	Total Tenement Area (ha)
G08/51	Mineralogy Pty I td	Shipping Channel	1 186 ha
	End of Term: 29/04/2025	(Note: proposed use does not entail any terrestrial disturbance)	1,100 114
G08/52 Mineralogy Pty Ltd End of Term: 19/12/2024		Desalination plant; port stockpiles; quarantine area; environmental ponds; dewatering plant; administration facilities; communications tower; 220 kilovolt (kV) switchyard; internal access roads; heavy haul and light vehicle road; and service corridor with gas pipeline, power lines and slurry pipeline.	3,268 ha
G08/53	Mineralogy Pty Ltd End of Term: 19/12/2024	Service corridor with gas pipeline; power lines and slurry pipeline; heavy haul and light vehicle road; extension of tailings area and Port accommodation village.	5,138 ha
G08/54	Mineralogy Pty Ltd End of Term: 19/12/2024	Service corridor with gas pipeline; power lines and slurry pipeline; heavy haul and light vehicle road; tailings pipeline and waste rock dump	603 ha
L08/20	Mineralogy Pty Ltd End of Term: 04/03/2025	Service corridor with gas pipeline and heavy and light vehicle access road	120 ha
L08/126	Pastoral Management Pty Ltd End of Term: 17/06/2035	Discharge groundwater pipeline	173.46ha
M08/123	Mineralogy Pty Ltd End of Term: 02/05/2029	East and west mine pit; administration facilities; effluent pond; environmental dam; north east waste dump; heavy haul and light vehicle road; and service corridor with gas pipeline, power lines; tailings pipeline and slurry pipeline.	1,000 ha
M08/124	Mineralogy Pty Ltd End of Term:02/05/2029	East and west mine pit; concentrator plant; thickener; power plant; effluent pond; slurry dump pond; administration facilities; western waste dump; heavy haul and light vehicle road; and service corridor with gas pipeline, power lines; tailings pipeline and slurry pipeline.	1,000 ha
M08/125	Mineralogy Pty Ltd End of Term:02/05/2029	East and west mine pit; heavy mobile equipment workshops; administration facilities; south east waste dump; landfill; bulk fuel storage facility; heavy haul and light vehicle road; and service corridor with gas pipeline, power lines and slurry pipeline.	1,000 ha
M08/264	Mineralogy Pty Ltd End of Term: 13/02/2022	TSF Stage 1 and 2	267 ha
M08/265	Mineralogy Pty Ltd End of Term: 13/02/2022	TSF Stage 1 and 2	524 ha
M08/266	Mineralogy Pty Ltd End of Term: 13/02/2022	TSF Stage 1 and 2; thickeners; heavy haul and light vehicle road; and service corridor with gas pipeline, power lines and slurry pipeline.	360 ha
G08/74	Mineralogy Pty Ltd End of Term: 23/09/2030	Tailings storage	4,999 ha
G08/63	Mineralogy Pty Ltd End of Term: 26/08/2030	Tailings storage and waste dumps	10,705 ha

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Tenement ID	Current Tenement Holder	Proposed and Current Tenement Use	Total Tenement Area (ha)
		TOTAL	30,343.46 ha

Table 2Proposed rehabilitation management areas; project and proposal
features; related tenements and conceptual disturbance footprint

Proposed rehabilitation management area	Project and Proposal Features	Related Tenements	Conceptual Disturbance Footprint.
Artificial Landforms	Mine pit	M08/123, M08/124, M08/125	Approximately 1,000 ha
	TSF Stage 1-2 TSF South East TSF North / NE	M08/264, M08/265, M08/266, G08/53, G08/63 and G08/74	Approximately 4,500 ha
	South East waste dump North East waste dump; South West waste dump West waste dump East waste dump G08/54 waste dump	M08/123, M08/125, M08/124, G08/54 and G08/63	Approximately 2,400 ha
Pastoral	Port accommodation village	G08/53	Approximately 100 ha
	Process Plant and Power Station; Desalination Plant, Dewatering Plant; raw water pond; environmental ponds; water dams; slurry dump pond; turkey's nest; dewatering pipeline; mine facilities workshops & admin; mine administration facilities	G08/52, L08/126, M08/123, M08/124 and M08/125	Approximately 1,300 ha
Shared Infrastructure	East-West Road;	L08/20	Approximately 130 ha
	N-S Service corridor; slurry pipeline; transmission lines; switchyard (220kV); Causeway	G08/52, G08/53, G08/54, M08/123, M08/124, M08/264, and M08/266	Approximately 470 ha
Cape Preston	Port stockpiles; internal access roads; and port administration facilities	G08/51, G08/52	Approximately 200 ha
		TOTAL	10,100 ha



2 **Closure Obligations and Commitments**

Legal obligations and commitments relevant to rehabilitation and closure are described in detail within Appendix B. A list of relevant legislation is provided within section 2.1 and 2.2 below.

2.1 Commonwealth Legislation

Commonwealth legislation considered applicable to closure activities for both the Project and the Proposal include:

- Aboriginal and Torres Strait Islander Heritage Protection Act 1984;
- Environment Protection and Biodiversity Conservation Act 1999; and
- Native Title Act 1993.

2.2 Western Australian Legislation

State legislation relevant to closure activities for the Project include:

- Aboriginal Heritage Act 1972;
- Agricultural and Related Resources Protection Act 1976;
- Bush Fires Act 1954;
- Conservation and Land Management Act 1984;
- Contaminated Sites Act 2003;
- Contaminated Sites Regulations 2006;
- Dangerous Goods Safety Act 2004;
- Dangerous Goods Safety (Road and Rail Transport of Non-explosives) Regulations 2007;
- Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007;
- EP Act;
- Environmental Protection Regulations 1987;
- Environmental Protection (Controlled Waste) Regulations 2004;
- Environmental Protection (Unauthorised Discharges) Regulations 2004;
- Health Act 1911;
- Heritage of Western Australia Act 1990;
- Iron Ore Processing (Mineralogy Pty Ltd) Agreement Act 2002;
- Land Administration Act 1997;
- Litter Act 1979;
- Local Government Act 1995;
- Mines Safety and Inspection Act 1994;

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- Mines Safety and Inspection Regulations 1995;
- Mining Act 1978;
- Mining Regulations 1981;
- Pollution of Waters by Oil and Noxious Substances Act 1987;
- Rights in Water and Irrigation Act 1914;
- Soil and Land Conservation Act 1945; and
- Wildlife Conservation Act 1950 / Biodiversity Conservation Act 2016

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3 Stakeholder Engagement

Table 3 provides:

- A summary of stakeholder engagement undertaken for Proposals at Cape Preston and that relate specifically to closure planning;
- A summary of issues raised by key stakeholders in relation to historical approvals associated with Projects at Cape Preston; and
- An outline of future actions relating to closure management that CPM will acknowledge in its ongoing closure planning for the Project and the Proposal.

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#	Description of Engagement	Key Stakeholder	Stakeholder comments / issue	CPM response
1	Meeting (24.11.2016)	Department of Mines and Petroleum (DMP)	It is considered likely the OEPA will require a revised Closure and Rehabilitation Plan as a component of the Mine Continuation Proposal to be submitted under Part IV of the EP Act.	 CPM has completed review of the: the 2006 OEPA approved Preliminary Decommissioning and Closure Plan (Maunsell 2006); and the existing Project's Closure Plan (URS, 2011) which has formed the basis of this Plan
2	Submission (23.11.2016)	DMP		As committed to during previous consultation with DMP on 12 October 2016, CPM submitted an addendum to the TSF Stage 2 Design Report (Golder Associates), proposing an interim raise of TSF Stage 1B embankment from RL 28.8m to RL 33m.
3	Meeting (12.10.2016)	DMP		 CPM met with DMP representatives to provide an overview of: New CPM management structure; Current TSF operational status and fundamental issues; and Proposed remedial actions.
4	Submission (21.07.2016)	DMP		CPM submitted to DMP the Sino Iron Project Construction Safety Management Plan of the Stage 2 Tailings Storage Facility (Golder Associates).
5	Submission (16.06.2016)	DMP		CPM submitted to DMP the Sino Iron Project Tailings Storage Facility 2015 Technical Audit (Knight Piesold).
6	Submission (07.06.2016)	DMP		CPM submitted to DMP the Sino Iron Project Stage 1B TSF Construction Summary Report (Golder Associates).
7	Submission	DMP	DMP granted approval to commence development	As committed to within the TSF Continued

Table 3 Summary of Stakeholder Engagement

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#	Description of Engagement	Key Stakeholder	Stakeholder comments / issue	CPM response
	(16.12.2015)		and operation of TSF Stage 2 on 9 March 2016.	 Development Approach (DR035358), CPM submitted to DMP the following documentation associated with TSF Stage 2: TSF Stage 2 Design Report (Golder Associates) Technical Review of Design Report for the Stage 2 TSF (Prof Andy Fourie, University of Western Australia).
8	Submission (20.04.2015)	DMP	DMP granted approval to commence development and operation of TSF Stage 1B on 29 June 2015. Operation of TSF1B was subject to conditions. Deposition was not permitted to occur until 'studies on the potential for liquefaction of the tailing stack and embankment foundation are undertaken and the results of those studies provide to the DMP for review and acceptance'. CPM submitted to DMP a Liquefaction Potential Assessment and Updated Stability Assessment of Stage 1 TSF Western Embankment on 17 November 2015. DMP closed-out the corresponding condition of approval on 11 December 2015.	 As committed to within the TSF Continued Development Approach documentation (DR035358), CPM submitted to DMP the following documentation associated with TSF Stage 1B: TSF Stage 1B Construction Management Plan (Golder Associates) TSF Stage 1B Technical Specifications (Golder Associates) TSF Stage 1B Design Report (Golder Associates)
9	Submission (11.02.2015)	DMP		CPM submitted to DMP the Sino Iron Project Tailings Storage Facility 2014 Technical Audit (Golder Associates).
10	Meeting / Submission (24.11.2014)	DMP		CPM met with DMP representatives to discuss the continued development approach for the Sino Iron and Korean Steel Tailing Storage Facility. CPM committed to providing a document detailing the history and proposed approach for the continued development of TSF Stage 1 and 2 consistent with the staged approach detailed within the TSF1 Construction Management Plan (REG ID26719). The TSF Continued Development Approach

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#	Description of Engagement	Key Stakeholder	Stakeholder comments / issue	CPM response
				11document was submitted to DMP 17 Dec 2014 (DR035358).
11	Internal CPM Closure Risk Workshop (14.12.2010)	Mining Manager; Mine Planning Engineer; Technical Services Operations; Approvals Manager; Environment Manager; Senior Environmental Advisor; Site Superintendent; Operations Manager; Deputy Director Operations; and Senior Business Analyst.	Acknowledging the need to ensure that CPM achieved best practice with respect to its mine closure planning activities for the Project URS Corporation was appointed to facilitate a Closure Risk workshop with key CPM stakeholders. This workshop was considered an important input into the review and update of existing Project Closure Pans at that time.	The Workshop identified and discussed issues that were considered to be of greatest significance and that related to closure planning for the Project. The risk assessment identified broad closure objectives and proposed four management areas (described within Section 4 and 8). Within this context, a general closure strategy was also developed from this risk workshop and is described within this document.
13	Submission (18.08.2009)	Department of Environment and Conservation (DEC) – Environmental Management Branch	 Mineralogy Expansion Proposal, Response to Submissions The Mineralogy PER indicates that pit voids greater than 300 m below the water table (page 208) will remain. These pit voids have the potential to result in pit lakes of increasing salinity and possibly increasing concentrations of metals due to evaporation, which could potentially impact on local fauna populations, in particular birds. Recommendation 16: That further information on the closure risks be provided to the satisfaction of DEC (Contaminated Sites). Recommendation 17: That wherever possible pit voids be backfilled to at least two metres above the level of the pre-mining water table to avoid potential long-term impacts on water quality and native fauna. 	 Mineralogy's response: "Mitigation measures with regards to the pit voids include: monitoring during operation and comparison to modelling predictions (page 208 of Expansion Proposal PER) to verify the mine voids as groundwater sinks benched pit walls and establishment of mine abandonment bunds (page 206 of the Expansion Proposal PER and in the Landform and Decommissioning Management component of the PEMP) to ensure public safety and prevent the loss of fauna and livestock fencing will potentially be required around the pit lakes to prevent ingress by stock and fauna, for which there may be an ongoing management requirement post-closure. Monitoring undertaken during the life of the mine will
			The PER indicates that there will be 90 m high waste 'landforms' and that pit voids greater than 300	Monitoring undertaken during the life of the mine will enable appropriate management measures to be determined at the time of closure. The pits are likely

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#	Description of Engagement	Key Stakeholder	Stakeholder comments / issue	CPM response
			m below the water table will remain. DEC recommend a standard environmental approval condition that, in relation to mining below water table, void pits be backfilled to at least two metres above the level of the pre-mining water table to avoid potential long-term impacts on water quality and fauna conservation. Backfilling will also minimise any potential impacts caused by the 90 m high waste 'landforms', such as erosion and deposition of waste material into riverine and near shore marine environments in extreme weather events,	to remain as permanent mine voids, however there may be some backfilling incorporated as mine planning progresses. Where the ore deposit is still open at depth, backfill of pits may not be possible due to sterilisation of ore. Mineralogy does not consider a condition requiring backfilling of the pit voids to within at least two metres above the level of the pre-mining water table is feasible". CPM's 2017 Response: At this stage backfilling is not considered feasible; however, ongoing consideration of backfill will be reviewed in future iterations of this document and as more information becomes available from ongoing mining operations and mine planning activities.
14	Submission (17.12.2009)	DMP	Mineralogy Expansion Proposal, Response to Submissions To ensure the document is of an acceptable standard the DMP requests the commitment be amended to read: 'A Rehabilitation Plan will be developed in consultation with DMP and DEC and their acceptance sought prior to commencement of construction and will come into operation upon	Mineralogy's response: "The Proponent accepts the amended wording of the proposed outcome-based condition." CPM's 2017 response: CPM is committed to ongoing consultation with the DMP and other relevant agencies with respect to the review and development of mine Closure and rehabilitation plans for the Project.
15	Submission (17.12.2009)	DMP	Mineralogy Expansion Proposal. Mineralogy Expansion Proposal, Response to Submissions It is important to ensure that the Waste Rock Landforms (WRL) designs are suitable for the site taking into consideration the nature of materials and climatic conditions associated with the project. Specific information on the geochemical and	Mineralogy's response: "Mineralogy will prepare a Waste Rock Management Plan and Tails Storage Management Plan. The Plan will address the design of Waste Rock Landforms as well as storage of adverse materials" CPM's 2017 response: CPM has developed a Waste Rock Management

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#	Description of Engagement	Key Stakeholder	Stakeholder comments / issue	CPM response
			physical nature of waste should be considered when determining a final design for WRL and justifications as to why this landform design was chosen should be provided. In addition to determining design criteria for the WRL, Mineralogy should commit to ensuring rehabilitation trials are carried out throughout the life of the project to further refine the design.	Plan (WRMP) for the existing Project which has considered outcomes from ongoing material characterisation tests and field trials being undertaken on the Project. A TSF Management Plan (TSFMP) has also been developed for the existing operation, The TSF MP for Stage 2 was provided to DMP for review in December 2015 and subsequently endorsed by DMP in March 2016 (refer to row #7). CPM is also undertaking rehabilitation trials as a part of its existing operations, details on these trials are provided within the relevant annual report.
16	Submission (17.12.2009)	Department of Water (DOW)	Mineralogy Expansion Proposal, Response to Submissions The proponent predicts that the pits are to be groundwater sinks, where very little groundwater through-flow occurs. Evaporation is expected to account for all groundwater inflows to the pits, as well as rainfall and seawater intrusion. If this is the case, the pits will remain dry except after sizable rainfall. Thus the salts will concentrate at the base of each pit during the evaporative phases.	Mineralogy's response: "This statement is correct. Evaporation is expected to account for all inflows, the pits will become groundwater sinks and salts will concentrate at the base of the pits. The assessment has adopted a Pan Factor of 0.6, the typical value that has been adopted in numerous other studies in the Pilbara. At this Pan Factor, evaporation over the base area of the pit exceeds all average inflows and the pit is predicted to remain dry in the long term. Short term shallow pit lakes might develop after the wet season, but these will eventually be evaporated. The salts that accumulate at the base of each pit, will largely remain in place, although, as stated in the response to Item 10.1, there is the potential for saline water to egress from the base of pits if it becomes sufficiently saline (through evaporative concentration) to develop sufficient density contrast to drive gravity induced flow. This would occur through the base of the pits (some 200 to 300 m below surface) and the flow would largely be vertical". CPM's 2017 response: CPM is currently undertaking further groundwater

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#	Description of Engagement	Key Stakeholder	Stakeholder comments / issue	CPM response
				modelling studies for the Proposal. This modelling has considered results from geological assessments and groundwater monitoring associated with the existing open cut mining operation. Results from this modelling exercise will assist in understanding risks and any mitigation required to ensure pit quality is appropriately maintained post closure. Future versions of this Plan will consider the outcomes of this modelling exercise and ongoing groundwater modelling that will occur during the life of the Project.
17	Submission (01.05.2008)	Minister for State Development Deputy Premier and Treasurer, Eric Ripper	2 May 2008 Letter from Deputy Premier and Treasurer, Eric Ripper, Acknowledging receipt of Sino Iron Submission (dated 1 May 2008) and granting approval of the Sino Iron Pellet Project Proposal in accordance with clause 7(1) and (2) of	CPM will prepare and implement a Waste Rock Management Plan in consultation with DoIR representatives prior to establishment of the permanent waste dumps. CPM will ensure the current Fibrous Materials Management Plan is amended (if required) to meet recommendations as published by DoIR and DoCEP. The plan shall ensure that any fibrous materials encountered are adequately managed, particularly with respect to the deposition of tailings
			IOPA.	and construction of waste rock dumps. CPM will prepare and implement detailed plans for its TSF design, tailings management and tailings characterisation in consultation with relevant DoIR and DoCEP representatives prior to tailings deposition.
18	Submission (10.09.2008)	DoIR, Major Projects Branch, Peter King	22 Oct 2008 Letter from DMP to DSD raised the need for further detail around identification management and encapsulation of potentially acid forming (PAF), groundwater monitoring, flood bund protection, use of sediment traps	All matters raised were addressed in the following: 10 Sep 2008 WRMP Rev 0 Submitted to DSD in accordance with clause 7 if IOPA and with consultation from DoIR.

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#	Description of Engagement	Key Stakeholder	Stakeholder comments / issue	CPM response		
			 14 April 2009 Submission of WRMP (Rev 12) received by DMP document titles "Sino Iron Pellet Project, 6 MTPA Iron Ore Pellet Production Facility, Waste Rock Management Plan" dated April 2008"(DMP Registration 21571) 22 May 2009 Letter from DMP to DSD with additional items for CPM to address in the WRMP. DMP Reference: Reg ID 21571 (E0039/200502) Tyler Sujdovic 	 3 April 2009 CPM responded to DSD with letter response to DMP's comments. Your ref: R0317/200702 1 July 2009 Letter CPM to DSD, Comments from DMP noted, but no revised plan provided. 		

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3.1 Identification of Stakeholders

External stakeholders were included as part of the preliminary consultation carried out during the preparation of the PER for the existing Project and included:

- Major industry groups operating in the Pilbara region;
- Local pastoralists on Mardie station (now an internal stakeholder);
- Officers from the Department of Minerals and Energy (now DMP);
- Officers from Department of Conservation and Land Management (CALM) (now Department of Parks and Wildlife (DPaW));
- Officers from Department of Resources Development (now Department of State Development (DSD));
- Pilbara Development Commission;
- Officers from Waters and Rivers Commission (now DoW);
- Officers from Department of Environment Protection (now Department of Environment Regulation (**DER**));
- Officers from Main Roads Western Australia (MRWA);
- Councillors and officers of the Shire of Roebourne (now City of Karratha);
- Regional councillors for the shires of Ashburton, East Pilbara and Port Hedland; and
- Representatives of the local Native Title claimant group, Yaburara and Mardudhunera People (YM).

As required, CPM will continue to consult with these stakeholders in relation to the ongoing development and implementation of its closure planning for the Project.

Furthermore, during its time operating the Project, CPM has identified additional stakeholders that it will consult with respect its ongoing review and development of closure planning, including:

- Mine lease holders (Mineralogy);
- Local community members or groups from surrounding townships including Karratha; and
- Interested non-government organisations.

A more detailed Stakeholder Engagement Strategy and process for agreeing on end land uses will be developed within the detailed Mine Closure Plan which will be developed within 5 years of closure of the Project.

3.2 Traditional Owners

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Indigenous Land Use Agreements (**ILUAs**) have been entered into with three Traditional Owner Groups, being the Yaburara & Mardudhunera People (**YM**), the Kuruma Marthudunera People (**KM**) and the Wong-Goo-Tt-Oo People (**WGTO**). Since these ILUAs were agreed:



- the native title claim made by WGTO was dismissed by the Federal Court of Australia and removed from the National Native Title Tribunal's register of Native Title Claims; and
- KM amended the boundaries of its native title claim so that its claim no longer overlaps with the area the subject of the Approved Proposals or this Proposal.

Pursuant to the current YM ILUA, YM recognises, acknowledges and agrees that the existing and any future mining tenements and titles granted for the purposes of the Project and future Proposals are valid, effective and enforceable under the Native Title Act, the IOPA and otherwise at law.

CPM is committed to ongoing consultation with Traditional Owners with respect to the operation and eventual closure of its operations at Cape Preston.

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4 Post-Mining Land Use and Closure Objectives

This Plan has divided the Project into four proposed rehabilitation management areas (**RMAs**) based on post closure land use. Each RMA has an associated set of domains (defined further within Section 8), which will have similar treatment in closure, for the purposes of developing closure strategies and actions. The RMAs are defined as follows:

- Artificial Landforms; waste rock dumps, tailings storage facilities and mine pit;
- **Shared Infrastructure**; service corridors, port access and haul roads, processing infrastructure that may require negotiation with third parties prior to closure;
- **Pastoral**; land that will return to Mardie Pastoral Station which underlies the Project and the Proposal; and
- **Cape Preston**; as the Cape was previously disconnected from the mainland and contains terrestrial disturbances that border the marine environment.

Objectives and completion criteria will be continually developed and reviewed to ensure that they align with these RMA. The following section provides an outline of the broad closure objectives for these areas.

4.1 Closure Objectives

4.1.1 Artificial Landforms

The broad closure objectives related to artificial landforms are:

- To create a stable landform suitable for an agreed subsequent land use;
- Management of noxious materials to avoid the creation of contaminated areas;
- To minimise the potential risk to cause environmental harm from the cessation of activities on the land once rehabilitation has taken place;
- To minimise long term environmental and public health and safety impacts;
- To ensure adequate resources are set aside to implement environmental plans during operations and closure;
- Revegetation with native vegetation that does not compromise the stability of the landform;
- Constructed tailings storage facilities will be non-polluting / noncontaminating;
- Toxic and or other deleterious materials (e.g. mineral fibres or PAF) will be permanently encapsulated to prevent environmental impacts;



- Any remaining pit void does not cause unacceptable impacts to surrounding environmental values;
- Surface waters and ground water hydrological patterns are not adversely affected; and
- Surface and groundwater levels and quality reflect original levels and water chemistry.

4.1.2 Shared Infrastructure

The broad closure objectives related to shared infrastructure are:

- To ensure that adequate resources are set aside to implement environmental plans during operations and closure;
- To create a stable landform suitable for an agreed subsequent land use;
- To minimise the potential risk to cause environmental harm from the cessation of activities on the land once rehabilitation has taken place;
- No infrastructure left on site unless agreed to by regulators and postmining land managers / owners; and
- Disturbed surfaces rehabilitated to facilitate future specified land use.

4.1.3 Pastoral

The broad closure objective related to pastoral activities are:

- To ensure that adequate resources are set aside to implement environmental plans during operations and closure;
- To minimise the potential risk to cause environmental harm from the cessation of activities on the land once rehabilitation has taken place;
- To create a stable landform suitable for an agreed subsequent land use;
- Vegetation in rehabilitated areas will be suitable for pastoral use; and
- Soil properties will be appropriate to support target ecosystem.

4.1.4 Cape Preston

The broad closure objectives related to Cape Preston are:

- To ensure that adequate resources are set aside to implement environmental plans during operations and closure;
- To minimise the potential risk to cause environmental harm from the cessation of activities on the land once rehabilitation has taken place;
- To create a stable landform suitable for an agreed subsequent land use;
- Rehabilitated areas provide appropriate habitat for fauna;
- Fauna utilisation, abundance and diversity are present in appropriate proportions given the specified post-mining land use;
- Vegetation in rehabilitated areas will have equivalent environmental values as surrounding natural ecosystems;



- The rehabilitated ecosystem has equivalent environmental values as surrounding natural ecosystems; and
- Soil properties will appropriate to support target ecosystem.

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5 Development of Completion Criteria

The purpose of developing completion criteria is to have a means for measuring rehabilitation success and to demonstrate that objectives and environmental values of each management area and related domain have been achieved.

Within the joint "*Guidelines for preparing Mine Closure Plans (*EPA / DMP 2015) government expectations are that completion criteria will:

- Measure rehabilitation success;
- Demonstrate that closure objectives have been met; and
- Be developed for each management area and related domain which consider environmental values

In order for land to be considered "fully" rehabilitated the completion criteria must be auditable. To achieve this, DMP has recommended that they follow the specific, measureable, achievable, relevant and time-bound (SMART) principle, defined as follows:

- **Specific** enough to reflect a unique set of environmental, social and economic circumstances;
- **Measurable** to demonstrate that rehabilitation is trending towards analogue indices;
- Achievable or realistic so that the criteria being measured are attainable;
- **Relevant** to the objectives that are being measured and the risks being managed and flexible enough to adapt to changing circumstances without compromising objectives; and
- **Time-bound** so that the criteria can be monitored over an appropriate time frame to ensure the results are robust for ultimate relinquishment.

At this early Project stage, broad completion criteria have been identified by CPM within the following section. As part of ongoing closure planning, CPM has taken steps to address knowledge and data gaps identified within its 2011 internal Conceptual Mine Closure Plan. Analogue sites representative of affected vegetation communities have been established along with monitoring quadrats to assist with collecting baseline data for development of completion criteria and future comparisons against data to be gathered from rehabilitated areas. During the ongoing development of the Project CPM will continue to undertake further research to ensure that the final set of completion criteria remain consistent with DMP's SMART philosophy.

5.1 Indicative Completion Criteria

Noting that the Project is in the early stages of implementation and that further research needs to be completed to close any knowledge gaps the following indicative completion criteria have been developed. As more information becomes available over time, CPM anticipates that each of these indicative completion criteria will be refined against their relevant objectives specific to each RMA and its related domains.



#	General Project Objectives	Indicative Completion Criteria			
1	To create a stable landform suitable for an agreed subsequent land use.	 Infrastructure that is not required for post-closure use on land surface will be removed; 			
		 Closure design for mine pit and borrow pits meets regulatory standards of the day; and 			
		 Sloping surfaces on exposed benches within the mine pit are stable and are angled appropriately. 			
2	Management of noxious materials to avoid the creation of contaminated areas	 During operations a register of potential contaminated areas is to be maintained; 			
		 Compliance with contaminated sites legislation; 			
		 Topsoil managed to avoid contamination with Mesquite seeds; 			
		 With the exception of infrastructure that will be transferred to third parties, no remaining infrastructure including concrete footings on land surface unless agreed to by stakeholders; and 			
		• All infrastructure and plant that will be handed over to third parties meets necessary requirements for handover.			
3	To minimise the potential risk to cause environmental harm from the cessation of activities on the land	 Closure design for mine pit and borrow pits meets regulatory standards of the day; and 			
	once rehabilitation has taken place	 No remaining rubbish or scrap remains on land surface. 			
4	To minimise long term environmental and public health and safety impacts	Abandonment bund construction design meets regulatory standards of the day.			
5	To ensure that adequate resources are set aside to implement environmental plans during operations and closure	 Annual budget reviews include provision for rehabilitation and research studies linked to closure. 			
6	Revegetation with native vegetation that does not compromise the stability of the landform	• For artificial landforms this will need further research to identify suitable native vegetation species; and			
		 Flora species are representative of target ecosystem in terms of species diversity, coverage and recruitment. 			
7	Constructed tailings storage facilities will be non-polluting / non- contaminating	 Outer batters are stable and constructed to minimise erosion; Final TSF structure is to be designed and audited in accordance with appropriate legislation; 			

Table 4	Summar	y of Ob	jectives	and Indicative	Com	pletion	Criteria

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#	General Project Objectives	Indicative Completion Criteria
		 TSF cover does not allow ponding of water on surface and is non-erosive; No remaining infrastructure on land surface; and No asbestos minerals to be exposed.
8	Toxic and or other deleterious materials (e.g. mineral fibres or PAF) will be permanently encapsulated to prevent environmental impacts	 Identified asbestos minerals and PAF are encapsulated in accordance with Landloch's Landform design recommendations for the Project's waste rock dumps.
9	Any remaining pit void does not cause unacceptable impacts to surrounding environmental values	• To be updated following further studies and outcomes of ongoing groundwater monitoring.
10	Surface waters and ground water hydrological patterns are not adversely affected	 No long term impact to marine water, surface water and groundwater quality compared to baseline quality measurements; and No change to regional surface water drainage patterns after rehabilitation.
11	Surface and groundwater levels and quality reflect original levels and water chemistry	• TSF will not create long term impact to surface water and groundwater quality compared to baseline quality measurements.



6 **Collection and Analysis of Closure Data**

Information on the environmental and social context of the site is presented within Appendix C. This information has been used in formulating the risk assessment, conceptual closure criteria, strategies and actions presented within Section 8. Appendix C also provides a summary of baseline studies which were completed on the Project during the development of the PER (Maunsell, 2000) and Supplementary PER (Maunsell, 2002). Where relevant, information from more recent studies has also been included within Appendix C. These studies provide a comprehensive baseline context for the development of conceptual closure criteria for the Project. Disciplines for which these studies relate to include:

- Geology and geomorphology;
- Topsoil characteristics and quantities; •
- Geotechnical properties;
- Soil and waste materials characterisation;
- Hydrogeology and groundwater quality;
- Surface hydrology studies; .
- Terrestrial and marine flora and fauna;
- Mangrove communities;
- Identification of introduced flora species; and •
- Social parameters.

A table listing the studies conducted, describing the information contained within them, and to which domain(s) they apply is provided within Section 11.


7 Identification and Management of Closure Issues

The purpose of risk assessment in closure is to help focus attention on those issues that have the greatest potential to result in a failure to meet closure objectives, and to identify where key data gaps and uncertainties might occur. A risk assessment has been developed for both the existing Project and the Proposal and is detailed within Appendix D. It builds primarily upon a workshop run by URS in 2011 which identified risks from operational activities at this time.

The key risks identified from this workshop included:

- 1. Ensuring construction of landforms is completed to the specified design guidelines;
- 2. Ownership of rehabilitation during life of operations;
- 3. Exposure of potential fibrous material from pit walls located above the final pit lake water level;
- 4. Water quality and volumes within any potential pit lake interacting with surrounding alluvial aquifer and the Fortescue River; and
- 5. Capping of TSF to minimise dust and potential asbestos mineral exposure.

7.1 Relinquishment

At the time of preparation of this Plan the process for lease relinquishment has not been formally agreed between CPM, DSD, Mineralogy and other relevant agencies a (e.g. DMP and Department of Lands). This process will be developed and confirmed with relevant government agencies and stakeholders prior to closure of the Project.



8 **Closure Implementation**

As outlined in previous sections, this Plan has divided the Project into four proposed RMAs based on anticipated post closure land use as described in Section 4.1. For the purposes of developing closure strategies and actions each RMA has a corresponding set of domains (previously identified by URS (2011)), which will have similar treatments in closure. These domains have been retained at this stage as they feed into the assumptions adopted for annual rehabilitation cost estimates. The domains for each of the four proposed rehabilitation management areas are described as follows:

1. Artificial Landforms

- o Mine Pit;
- o TSF; and
- Waste Rock Dumps and Stockpiles.

2. Pastoral Land

- Process and Power Station;
- Water Storage Ponds and Dams;
- o Accommodation Village; and
- Workshops Laboratories, Materials Storage and Administration Buildings.

3. Cape Preston

• Port Stockyard and Port Facilities.

4. Shared Infrastructure

- Haul Roads and Access Roads; and
- Pipelines, Power lines and Service Corridor.

Descriptions of the main features, preliminary closure actions, schedule or works and criteria associated with each domain are provided within Section 8.1 - 8.4. Closure actions and criteria that apply site wide are discussed within Section 5.1. A progressive rehabilitation update is provided in Appendix E. This shows examples of rehabilitation trails to date.

8.1 Artificial Landforms

8.1.1 Mine Pit

This domain includes the mine pit, bulk sample pit, mobile crushers, vehicle laydown areas and haul and access roads. To date, approvals have been obtained and operations have progressed with a focus on developing the eastern portion of the mine pit (**East Pit**). As part of the Proposal the mine pit will be extended to the west (**West Pit**) remaining wholly within Mining Leases M08/123, M08/124 and M08/125. The features within the Mine Pit domain are shown on Appendix A – Figure 3.



The final pit is planned to be formed by benches with ultimate pit wall angles of 45 to 50 degrees. The base of the West Pit will be the deepest, reaching approximately 400 m below relative level (**RL**).

The pit design has minimised exposure of Dales Gorge member in the final pit shell. Figure 1 presents the areas where the Dales Gorge member will be exposed. Based on the depth of the pit wall (i.e. approximately -400m RL) it is unlikely that any asbestiform material would leave the mine pit. The groundwater re-entering the pit void and forming a pit lake is expected to help mitigate the risk of any exposed material. Other management methods such as covering the exposures with clean fill or other material will be assessed to minimise the risk of exposing asbestiform material for long periods.



Figure 1: Final pit shell and location of potential fibrous material exposure associated with the Dales Gorge member

It is assumed that the final void will be formed from the East Pit and West Pit and that these will remain as open voids at closure that will gradually fill with water to form a pit lake at a level defined by the long term balance between inflows and outflows. The East and West Pit will remain divided by a ridge with a crest at approximately -118m AHD. On the cessation of mining operations (assumed 2060), the West Pit is expected to fill relatively quickly in comparison with the East Pit. This is expected to be related to groundwater inflows from the weathered material along the western margin of the pit and the connection of the pit with the adjacent superficial alluvial aquifer. Final water levels are expected to be approximately -300m AHD in the East Pit and approximately -160m AHD in the West Pit (CloudGMS 2017).

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Management of local surface and groundwaters through entrainment toward an evaporative terminal pit lake may provide a best-case scenario for protection of regional water resources required by typical mine closure time scales of hundreds to thousands of years (McCullough, et al., 2012). The water quality of evaporative sink lakes is expected to show increases in various concentrations (notably salinity in the Pilbara) over time through accumulation of solutes introduced through groundwater inflows, surface catchment run-off and direct rainfall to the developing lake surface. The deterioration of water quality over time through evaporation and the consequent entrapment of solutes, although not desirable in itself, indicates that the pit lake is functioning as it should as an evaporative 'terminal' sink and protecting the surrounding environment (McCullough, et al., 2012).

The possible impacts on the groundwater quality after mining have been assessed using the Proposal groundwater model (Cloud GMS, 2017) and backward streamline analysis which has been modified from Haig (2009). Backward streamlines are determined by releasing a number of particles from seeding points (in this case the nodes within the pit), the particles move against the hydraulic gradient (upgradient) until exiting the model at an inflowing boundary (or ending up in a zone without significant flow velocity). In this way backward streamline tracks can be used to obtain a catchment area for boundary conditions or sink features. The streamline length of 36500d (100 years) is shown in Figure 2 and supports that the pit is a sink following development of the pit lake. It also appears that the poorer quality groundwater will not be drawn into areas of better groundwater quality. For example, although the saline and hypersaline groundwater to the north and northwest of the pit are drawn to the northern extent of the pit, the path line is through similar quality groundwater. Conversely, it is indicated that the groundwater quality in the vicinity of Tom Bull Pool will be the same, or slightly improved by the migration of better groundwater quality to the south and west.

Groundwater from all salinity categories (fresh to hyper saline) will be drawn into the final pit-lake. The resulting water quality residing in the pit lake will evolve to become hypersaline through evapoconcentration processes. To understand the evolution of the water quality in the pit-lake, a study similar to that completed for the Mount Goldsworthy pit-lake (Sivapalan, 2005) can be completed as the mine pit develops.





Figure 2: Backward streamlines indicating the source of groundwater entering the pit after 100 years of recovery following the end of mining (ie year 2160).

Broad closure criteria have been identified to meet the conceptual closure objectives:

- Infrastructure that is not required for post-closure use on land surface will be removed;
- Closure design for mine pit and borrow pits meets regulatory standards of the day;
- Abandonment bund construction design meets regulatory standards of the day;
- Sloping surfaces on exposed benches within the mine pit are stable and are angled appropriately

A summary of the key information pertaining to the closure of the Mine Pit domain is provided within Table 5.



Table 5	Domain	Closure	Descri	ption -	Mine Pit
		0100410			

Domain – Mine Pit	
Description	Mine pit, bulk sample pit, mobile crushers, vehicle laydown areas, explosives magazine, and in-pit haul and access roads.
CLOSURE CONCEPT: The mine pit wi infrastructure will be removed and distu pit rehabilitated. It is anticipated that the AHD in the East Pit and approximately In-pit areas that will remain exposed on and to form a stable landform at closure	Il remain as an open void following closure. It is expected that all rbed areas used for laydown areas and access and haul roads into the e mine pit will gradually fill with water to depths of approximately -300m 160m AHD in the West Pit. ce the pit has refilled with water will be contoured to meet safety criteria e.
CLOSURE PARAMETERS:	
Total Area	Bulk sample pit = to be determined (ha) Mine Pit = to be determined (ha) Vehicle laydown areas = to be determined (ha) Haul and access roads = to be determined (ha)
Earthworks required	Bund construction = to be determined (ha) In-pit earthworks = to be determined (ha) Area to re-profile = to be determined (ha)
Topsoil coverage area	To be determined (ha)
Area to rip and seed	In-pit = to be determined (ha) Laydown areas = to be determined(ha) Haul road = to be determined (ha)
Materials coverage required (include source, quantity available and quantity required)	None
Infrastructure to be retained	None
CLOSURE ISSUES: Source – Risk Ass	sessment (Appendix D)
 Existing studies, preliminary assessment acceptably managed; however, they will implementation phases of mine closure Pit wall stability; Safety of the final landform; Materials characterisation (fibrous a Pit lake water quality and long term) 	nts and mine planning indicate that the following issues can be I require ongoing management and consideration during planning and : and potentially acidic materials); and n effects of salinity and limnology .
CLOSURE ACTIVITIES: Source - Clos	ure works required (Sino Iron Revised Cost Estimates – AECOM, 2015)
 Engineering Works: Remove all remaining plant and inf Remove fences from around laydor Contour sloping walls and benches Construct a non-trafficable perimet 	rastructure including, crusher, portable buildings and storage buildings. wn areas (if applicable). within mine pit during operations to control erosion of pit walls. er bund from large rock.
Environmental Works:	
All haul roads, laydown areas and water infiltration and windblown set	compacted areas under removed infrastructure will be ripped to promote ed capture.
Accessible in-pit benches and floor Design and implement a past class	s that will remain above the final pit void water level will be stabilised.
Design and implement a post-clost Demolition Works:	are momenting program to momer in-pit surface water.
To be determined, none have been ass	igned to date.
DATA AND KNOWLEDGE GAPS:	<u> </u>



Domain - Mine Pit

Engineering Works:

- Refine pit dimensions and measurements for engineering and rehabilitation works.
- Refine expected angles to minimise erosion on sloping walls and benches in the mine pit. •
- Confirm source of suitable materials for construction of abandonment bund (a number of options are • expected to be available).

Environmental Works:

- Refine area requiring environmental works including topsoil placement ripping and seeding.
- Verify rehabilitation strategy for in-pit works. •
- Further studies into pit lake development over time; e.g. (Sivapalan, 2005). .
- Re-assess potential impacts to groundwater from any saline void water that may potentially occur. •
- Continually monitor recovery of topsoil and confirm location and availability of topsoil resources for mine closure.
- Finalise post-closure monitoring requirements for in-pit surface water and revegetation monitoring.

Demolition Works:

Continue to refine the inventory of infrastructure that will require decommissioning or demolition within the domain area.

8.1.2 Tailing Storage Facilities

This domain includes the TSF footprints located on M08/264-266. North on G08/53, North East on G08/74 and South East on G08/63. The features in the TSF domain are shown on Appendix A – Figure 3.

The TSFs are designed as downstream paddock type tailings facilities which are considered highly stable. External wall angles during operation are expected to be 3H:1V with final rehabilitated walls to 5H:1V, utilising the profile identified by Landloch in their 2009 on site studies. This conceptual closure strategy and actions apply to the TSF area and associated laydown areas and cleared areas only.

Broad closure criteria have been identified to meet the conceptual objectives:

- Outer batters are stable and constructed to minimise erosion; .
- Final TSF structure is to be designed and audited in accordance with . appropriate legislation;
- TSF cover does not allow ponding of water on surface and is non-erosive:
- No remaining infrastructure on land surface;
- No long term impact to surface water and groundwater quality compared • to baseline quality measurements; and
- No fibrous materials to be exposed.

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A summary of the key information pertaining to the closure of the TSF domain is provided in Table 6.

Table 6 Domain Closure Description - TSF

Domain – TSF	
Description	TSFs, bunds, quarry and laydown and other cleared areas.



Domain – TSF

CLOSURE CONCEPT: Re-construct batter slopes to prevent erosion and encourage water shedding with minimal gully erosion. External wall angles will be profiled to a 5H:1V slope. Construct a tailings cover comprising waste rock. The cover will be progressively advanced over compacted tailings and profiled to an angle of three to seven degrees to minimise erosion and encourage water shedding.

After removal of the seepage collection system it is expected that any further seepage will report to the mine pit. The external drainage channel diversions will remain to drain flood waters away from the TSF. It is expected that some maintenance to the external walls will be required.

CLOSURE PARAMETERS:	
Total Area	Stage 1 TSF = to be determined (ha) TSF bunds = to be determined (ha) Laydown and other cleared areas = to be determined (ha)
Earthworks required	Reconstruct batter slopes to 5H:1V angle = to be determined (m bund length) Construct TSF cover = to be determined (ha) Re-profiling assumed to be 10% of cleared areas = to be determined(ha)
Topsoil coverage area	Topsoil on cover = to be determined (ha) Soil amelioration assumed for 10% of rehabilitation area = to be determined (ha)
Area to rip and seed	Ripping compacted surfaces = to be determined (ha) Seed (assumed to be 75% of total area) = to be determined (ha) Spread vegetation (over 25% of total area) = to be determined (ha)
Materials coverage required (include source, quantity available and quantity required)	Competent rock for cover (D_{50} approx. 100mm) = to be determined (m^3) Topsoil for cover = to be determined (m^3) Waste rock for outer bunds = to be determined (m^3)
Infrastructure to be retained	None

CLOSURE ISSUES:

Existing studies, preliminary assessments and planning indicate that the following issues can be acceptably managed; however, they will require ongoing management and consideration during planning and implementation phases of TSF closure:

- Floodwaters creating geotechnical instability;
- Seepage of pore water into groundwater causing local mounding and potential contamination. Potential water quality issues include iron (Fe) and aluminium (AI);
- Exposure of fibrous materials between operations and closure or erosion occurring during high-intensity rainfall; and
- Ability of cover design to achieve closure outcomes for infiltration and vegetation.

CLOSURE ACTIVITIES: Source - Closure works required (Sino Iron Revised Cost Estimates – AECOM, 2015)

Engineering Works:

- Remove all discharge pipelines and seepage recovery system.
- Construct concave slopes on outer bund walls to angles of 5H:1V using waste rock.
- Construct TSF cover comprising a 400 mm layer of competent rock (D₅₀ approx. 100mm) and topsoil. Profile surface to three to seven degree angle.
- Re-profile slopes and cleared areas to reinstate regional drainage.

Environmental Works:

- Shallow rip compacted surfaces where required.
- Place topsoil to a depth of 100 200 mm over cleared areas, add soil amelioration treatments if necessary.
- Replace vegetation debris where possible.

Demolition Works:

To be determined



Domain – TSF

DATA AND KNOWLEDGE GAPS:

Engineering Works:

- Confirm final dimensions and measurements of TSF for engineering and rehabilitation works.
- Determine detailed engineering works associated with decommissioning structures, pipework and any other infrastructure that required decommissioning or removal.
- Ensure availability and location of waste rock and competent rock for engineering works.
- Verify final TSF cover design is consistent with closure objectives.

Environmental Works:

- Verify that final TSF cover design is erosion resistant such that any potential fibrous materials are appropriately encapsulated within the final rehabilitated landscape.
- Modelling of the final surface treatments to assess their potential for stability and minimising erosion to
 acceptable levels
- Continually monitor recovery of topsoil and confirm location and availability of topsoil resources for TSF closure.
- Confirm if soil amelioration of topsoil stores is necessary.
- Undertake further studies and trials during life of Project to confirm appropriate analogues and determine revegetation methods and targets for rehabilitation works and other landform areas within this domain;
- Confirm final TSF cover design can support vegetation which meets closure objectives.
- Based on ongoing operational monitoring determine post-closure monitoring requirements for groundwater, surface water and revegetation monitoring.
- Develop contingencies in unlikely circumstance that seepage and contamination exceed acceptable levels.

Demolition Works:

• Continue to refine the inventory of infrastructure that will require decommissioning or demolition within the domain area.

8.1.3 Waste Rock Dumps and Stockpiles

This domain includes the South East and South West waste dumps on M08/125, the North East waste dump on M08/123, the Western waste dump located on M08/123-124, the Eastern waste dump on G08/63 and G08/54, low grade stockpiles, borrow pits, and the domestic and industrial landfills. The features in the Waste Rock Dumps and Stockpiles domain are shown on Appendix A – Figure 3.

The Waste Rock Dump and Stockpiles domain is primarily located to the east of the main pit area with the western areas overlying a portion of the Fortescue River flood plain. The final waste dump height is estimated to be 100 m with concave batter slopes constructed in two levels. Field trials and modelling undertaken by Landforms Solutions in 2007, Outback Ecology in 2009 and most recently by Landloch in 2009 have identified the following criteria. The upper levels will have final slope angles of less than 17 degrees (30%) and the lower levels will have final slope angles of less than 12 degrees (20%). The top of the final landform will be divided into one to three hectare cells by cross bunding which will to be approximately 0.75 m in height and two metres wide. All external bund walls will be covered with 0.2 m rock and 0.2 m topsoil and will be ripped on the contour (Landloch, 2009).

Cells within the waste dump containing potentially acid-forming and/or asbestiform mineral waste will be placed no less than 10 m from the surface and will be covered with at least three metres of compacted oxide material to a width of no less than 50 m beyond the horizontal extent of the cell (refer to Figure 3).





Figure 3 Batter slope rehabilitated profile and conceptual design of encapsulation cells

Borrow pits, topsoil storage stockpiles and low grade stockpiles are also incorporated into this domain. The main topsoil storage stockpile is located between the North East and South East waste dumps.

The domestic and industrial landfill is located on the north east corner of the South East waste dump. It will be designed and closed in accordance with appropriate legislation. Closure of the landfill is anticipated to be incorporated into the final waste dump landform.

Broad closure criteria have been identified to meet the draft closure objectives:

- No remaining infrastructure on land surface;
- Waste rock landforms are stable and constructed with concave batters in order to minimise erosion with a 30% slope above 50 m RL and a 20% slope below 50 m RL;
- Batter sheeting material to use rock with a D50 of approximately 100 mm and with a density greater than 2.7 grams per centimetre cubed (g/cm³) is ideal. Sufficient rock should be added such that approximately 20-30% cover is achieved. This is likely achieved by mixing a 0.2 m deep layer of rock into approximately 0.2 m of soil.
- No long term impact to surface water and groundwater quality compared to baseline quality measurements;
- No potential for fibrous materials to be exposed; and



• No significant change to regional surface water drainage patterns.

A summary of the key information pertaining to the closure of the Waste Rock Dump and Stockpiles domain is provided in Table 7.

Table 7 Domain Closure Description - Waste Rock Dumps and Stockpiles

Domain – Waste Rock Dumps and Stockpiles					
Description	South East waste dump, South West waste dump, North East waste dump, Western waste dump, Eastern waste dump, stockpiles, borrow pits, and domestic and industrial landfills.				
CLOSURE CONCEPT: Waste dumps tops constructed with perimeter and cro	will be constructed and closed to resemble the rounded hills with domed oss-bunding to manage rain events.				
The perimeter bunds should be: at leas profile and have the same surface treat metres; and their inner face sloping gra	t one metre high; have their outer face continuous with the outer batter ments applied to it; a width across the top of the bund of at least two dually inwards at a gradient of 1V:10H.				
Dump top cross bunding will be used to bunds are 0.75 m high- two metres wic landform; the land surface within each o excess close to its point of origin.	prevent flow concentrations, and constructed such that: compacted le across the top – to create cells of 1-3 ha in area on the top of the cell is as close to level as possible; and surface ripping will hold rainfall				
All potentially acid-forming and fibrous dumps, situated no less than 10 m from of compacted oxidised materials. Furthe compacted oxidised material to act as s	materials will be contained within encapsulated cells within the waste in the surface of the final landform and covered with at least three metres er non-compacted oxidised material should be placed over the subsoil.				
The final landform will be stabilised with between 100 to 50 m RL and gradient of	n external concave slopes with gradients of 30% on the upper slopes of 20% on the lower slopes below 50 m RL.				
Batter sheeting material to use rock with a D50 of approximately 100 mm and with a density greater than 2.7 g/cm ³ is ideal. Sufficient rock should be added such that approximately 20-30% cover is achieved. This is likely achieved by mixing a 0.2 m deep layer of rock into approximately 0.2 m of soil.					
The external walls will have rock armoured toes to prevent erosion from flood waters. Drainage diversion structures will remain in place after closure to direct surface waters around edges of waste dump landforms. Materials contained within the topsoil and low grade ore stockpiles will either be utilised in rehabilitation					
activities or incorporated into the waste rock dump landforms.					
Closure strategies for the landfills have	not vet been developed.				
CLOSURE PARAMETERS:					
Total Area	South East waste dump = to be determined (ha)				
	North East waste dump = to be determined (ha)				
	Western waste dump = to be determined (ha)				
	Eastern waste dump = to be determined (ha)				
	Topsoil stockpiles = to be determined (ha)				
	Low grade stockpiles = to be determined (ha)				
	Borrow pits = to be determined (ha)				
Earthworks required	Construct better alonge to be determined (ha)				
	Cover hatter slopes with waste rock and topsoil – to be determined (m				
	length)				
	Rock armour toes of external walls = to be determined (m length)				
	Construct crest bund = to be determined (m length)				
	Construct cross-bunds (assumed to be 0.1% of surface) = to be determined (ha)				
Topsoil coverage area	Topsoil on outer batter slopes = to be determined (ha)				
	Soil amelioration assumed for 10% of rehabilitation area = to be determined (ha)				



Domain – Waste Rock Dumps and Stoo	ckpiles
Area to rip and seed	Shallow rip outer batters along the contours = to be determined (ha) Deep rip top surface of the waste dump = to be determined (ha) Seed (assumed to be 75% of total area) = to be determined (ha) Spread vegetation (over 25% of total area) = to be determined (ha)
Materials coverage required (include source, quantity available and quantity required)	Waste rock for outer batters (D ₅₀ approx. 100mm) = to be determined (m^3) Topsoil for outer batters = to be determined (m^3) Waste material for crest bund = to be determined (m^3) Waste material for cross bunds = to be determined (m^3)
Infrastructure to be retained	None
CLOSURE ISSUES: Source - Closure	works required (Sino Iron Revised Cost Estimates – AECOM, 2015)
 The key issues to be managed during c Structural stability of the waste dun Erodibility of the waste dump walls Operational monitoring to ensure d 	closure are: np; ; and lumps are built to meet (Landloch) design principals.
CLOSURE ACTIVITIES: Source - Clos	ure works required (Estimate Details Spreadsheet - URS, 2011)
 Engineering Works: Construct concave batter slopes wi 20% (less the 50 mRL). Maximum Cover outer batter sloped with a 0.4 Construct crest bund of compacted consistent with outer batter slope. I Construct cross-bunds of compacted into one to three ha cells. Rock armour toes of outer walls to Re-profile borrow pits to reinstate r Environmental Works: Shallow rip (less than 0.2 m depth) Deep rip top surface of waste dump Add soil amelioration treatments to Seed with local provenance seed n Beplace vegetation debris where p 	ith upper gradients of 30% (50 mRL to 100 mRL) and lower gradients of height is 100 m with radius of curvature on corners of 100 m. 4 m layer of competent rock (D ₅₀ approx. 100mm) and topsoil. 4 stable material (one m high) to contain runoff. Outer face profile is to be Inner face slope of 10H:1V. ed material (0.75 m high and two m wide) to divide waste dump surface prevent erosion from floodwaters. egional drainage.
Demolition Works:	
DATA AND KNOWLEDGE GAPS:	
 During implementation of the Proje rehabilitation works. Confirm closure strategy for waste Refine use of waste materials in re Confirm location and availability of 	ect refine dimensions and measurements for engineering and dumps. habilitation activities (materials balance). waste rock for construction of required features.
Refine conceptual strategies and d	efine specific closure strategies and actions for borrow pits and landfill.



Domain – Waste Rock Dumps and Stockpiles

Environmental Works:

- Continually monitor recovery of topsoil and confirm location and availability of topsoil resources for mine closure.
- Confirm amelioration of topsoil stores is necessary.
- Undertake studies and trials to identify appropriate analogues and determine revegetation methods and targets for rehabilitation works and other landform areas within this domain.
- Determine post-closure monitoring requirements for groundwater, surface water and revegetation monitoring, based on operational monitoring.
- Develop contingencies if contamination of surface water and/or groundwater exceeds acceptable levels.

Demolition Works:

• Continue to refine the inventory of infrastructure that will require decommissioning or demolition within the domain area.

8.2 Shared infrastructure

For Shared Infrastructure the same broad closure criteria have been identified for all domains in order to meet the conceptual closure objectives:

- Unless otherwise agreed with third parties, no remaining infrastructure including concrete footings on land surface;
- All infrastructure and plant that will be handed over to third parties meets necessary requirements for handover;
- No remaining rubbish or scrap on land surface;
- Minimal erosion of re-profiled areas;
- No access to closed roads;
- No long term impact to surface water and groundwater quality compared to baseline quality measurements;
- No change to regional surface water drainage patterns; and
- Flora species are representative of target ecosystem in terms of species diversity, coverage and recruitment.

The location of the domains associated with the Shared Infrastructure areas are depicted in Appendix A – Figure 4.

8.2.1 Haul Roads and Access Roads

The roads constructed and closed as part of the Project will comprise general traffic, ore truck (haul), mine access East-West road, North-South road, and Port internal access roads.

The East-West road is a nine km road connecting the Project site with the North West Coastal Highway. The road provides access for all vehicles used on site.

The North-South Road is a 29 km access road connecting the mine processing facilities with the export terminal facilities at Cape Preston. It is known as the Causeway where it traverses from the mainland across the mangroves and tidal inlet connecting to Cape Preston.

Once it reaches the Port area the North –South Road becomes a service road through the Port and across the breakwater which extends from Cape Preston

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across Preston Island into the marine environment. It is understood that the service road in the Port area and across the breakwater will remain in place after closure and may be relinquished to third parties.

Within the Port area, the roads will be designed to be sealed, all-weather roads with a heavy haul road, conveyor and service lane with culverts placed where required.

The Fortescue River Access Road is also considered part of this RMA as it is needed to provide public access to the river mouth.

A summary of the key information pertaining to the closure of the Haul and Access road domain is provided in Table 8.



Table 8 Domain Closure Description – Haul Roads and Access Roads

Domain – Haul Roads and Access Roads				
Description	Heavy haul and light vehicle roads, Haul road, East West road, North-South road and Fortescue River road.			
CLOSURE CONCEPT: All roads and tr maintenance activities will be rehabilitat removed.	acks not required for use during post-closure monitoring and ted. Concrete, asphalt, and all culverts and drainage structures will be			
All surfaces will be re-profiled, ripped an vegetation and soil mounds at the entra	nd seeded. Access to the tracks will be prevented by the construction of ances to tracks.			
CLOSURE PARAMETERS:				
Total Area Total length	Heavy haul and light vehicle roads = to be determined (ha) Haul road = to be determined (ha)			
	East-West road = to be determined (ha) Fortescue River road = to be determined (ha) Service corridor road = to be determined (ha)			
	Causeway = to be determined (m length) Culverts = to be determined (m length) Port access roads = to be determined (ha) TSF Haul Road = to be determined (ha)			
Earthworks required	Re-profiling and re-grading surfaces (30% of total area) = to be determined (ha) Constructing vegetation and soil mounds = to be determined (ha)			
Topsoil coverage area	Topsoil = to be determined (ha) Soil amelioration assumed for 10% of topsoil coverage = to be determined (ha)			
Area to rip and seed	Deep rip (assumed 70% total area) = to be determined (ha) Seed (assumed to be 75% of total area) = to be determined (ha) Spread vegetation (over 25% of total area) = to be determined (ha)			
Materials coverage required (include source, quantity available and quantity required)	Spoil for windrows = to be determined (ha) Vegetation and soil mounds = to be determined (ha)			
Infrastructure to be retained	To be determined			
CLOSURE ISSUES:				
 The key issues to be managed during closure are: Compaction of soil inhibiting vegetation establishment; Sediment discharge into the marine environment; and Re-establishment of surface drainage and tidal fluctuations. 				
CLOSURE ACTIVITIES: Source - Clos	ure works required (Sino Iron Revised Cost Estimates – AECOM, 2015)			
 Engineering Works: Remove culverts and re-grade wine Re-profile road surfaces to reinstat Mitre or cross banks to be designed discharge surface water on undisturbave a fall gradient <0.5% along te 	drows across road surface. e regional drainage. d and constructed at regular intervals across tracks and roads to irbed ground adjacent to the track/road to prevent erosion. Banks are to noth to minimise ponding of surface water			

- Remove any contaminated soils (if required).
- Construct mounds of soil and/or vegetation across rehabilitated tracks to prevent access to closed areas.



Domain – Haul Roads and Access Roads

Environmental Works:

- Deep rip compacted surfaces along the contour, to a depth of one m at two m intervals.
- Spread topsoil to a depth of between 100 and 150 mm across disturbed areas.
- Add soil amelioration treatments to rehabilitation material if necessary.
- Seed with local provenance seed mix at four to six kg/ha.
- Replace vegetation debris where possible.

Demolition Works:

• Remove all infrastructure that will not be retained.

DATA AND KNOWLEDGE GAPS:

Engineering Works:

- Identify culverts or other surface water diversion structures along the roads that require removal.
- Confirm design of mitre or cross banks.
- Confirm availability of material to construct engineering structures.
- Confirm schedule of road rehabilitation to enable access to areas identified for post-closure monitoring activities.

Environmental Works:

- Investigate extent and depth of any potential contamination requiring removal and remediation.
- Continually monitor recovery of topsoil and confirm location and availability of topsoil resources for closure.
- Confirm amelioration of topsoil stores is necessary.
- Undertake trials to determine revegetation methods and targets for rehabilitation works.
- Determine post-closure monitoring requirements for surface water drainage and revegetation monitoring.

Demolition Works:

- Continue to refine the inventory of infrastructure that will require decommissioning or demolition within the domain area.
- Prepare inventory of infrastructure to be handed over to third parties.

8.2.2 Pipelines, Power lines and Service Corridor.

This domain includes the gas, tailings discharge, tailings return, water supply and dewatering pipelines; all power lines and power distribution infrastructure; the communications tower; and all other services running along the service corridor with the exception of the roads. The features in the Pipelines, Power lines and Service Corridor domain are shown within Appendix A – Figure 4.

The services contained within the service corridor include the slurry pipeline, gas pipeline, a 220kV power line, and water supply and return water lines connecting the facilities at the port area to the power station and process plant. The slurry and water pipelines are situated approximately two metres below ground level (**mbgl**).

Power transmission lines connect the power station on M08/123 to the port with a 220kV power switchyard and communications tower are also located within the Port area on G08/52. A gas pipeline runs adjacent to the East-West road to the power plant. A summary of the key information pertaining to the closure of the Pipelines, Power lines and Service Corridors domain is provided within

Table 9.



Table 9 Domain Closure Description – Pipelines, Power lines and Service Corridor

Domain – Pipelines, Power lines and Service Corridor				
Description	Service corridor (including gas pipeline, 220 kV power line, slurry pipeline), power lines, power supply infrastructure, gas pipelines, communication tower, tailings discharge pipeline and tailings return pipeline, water supply and distribution pipelines.			
CLOSURE CONCEPT: All infrastructur infrastructure may be handed over to th remain in situ at closure. The gas pipeli end.	e will be decommissioned and removed as appropriate. Some nird parties. The slurry pipeline is situated 2 m below ground level and will one may remain in place and be filled with inert gas and marked at each			
Tailings and waste discharge pipelines and leaks to occur. Investigation of nati soils will be carried out prior to closure.	(although unlikely) have potential for contamination associated with spills ure and extent of potential contamination and removal of contaminated			
CLOSURE PARAMETERS:				
Total Area	Service corridor cleared area = to be determined (ha)			
	Service corridor = length to be determined (ha)			
	Slurry pipeline = to be determined (ha)			
	Communications tower = to be determined (ha)			
	Power lines = to be determined (m)			
	Switchyard = to be determined (ha)			
	Tailings pipeline = to be determined (m)			
	Gas pipeline = to be determined (m)			
	water supply pipeline = to be determined (m)			
Earthworks required	Re-profiling and re-grading surfaces (15% of total area) = to be determined (ha)			
Topsoil coverage area	Topsoil = to be determined (ha)			
	Soil amelioration assumed for 10% of topsoil coverage = to be determined (ha)			
Area to rip and seed	Shallow rip (assumed 30% total area) = to be determined (ha)			
	Seed (assumed to be 75% of total area) = to be determined (ha)			
	Spread vegetation (over 25% of total area) = to be determined (ha)			
Materials coverage required (include source, quantity available and quantity required)	Waste rock for burial of foundations = to be determined (m^3)			
Infrastructure to be retained	To be determined			
CLOSURE ISSUES: Source - Closure	works required (Sino Iron Revised Cost Estimates – AECOM, 2015)			
The key issues to be managed during of	slosure are:			
Potential contamination of soil arou	und tailings, return water and slurry pipelines;			
Compaction of soil inhibiting veget	ation establishment; and			
Re-establishment of surface draina	age, tidal fluctuations and sediment load.			
CLOSURE ACTIVITIES:				
Engineering Works:				
Bury foundations with waste rock a	and fill from waste rock dumps or borrow pits.			
Remove fencing around infrastruct	ure (if required).			
Remove contaminated soil (if appli designated area.	cable) and dispose of in landfill or waste rock dump, or remediate in a			
Prior to rehabilitation treatments, ir appropriate waste disposal site.	nspect affected areas and remove all rubbish and debris to an			
Re-profile surfaces to blend in with	surrounding landscape and reinstate regional drainage.			



Domain - Pipelines, Power lines and Service Corridor

Environmental Works:

- Rip compacted hardstand surfaces and ground beneath infrastructure.
- Spread topsoil to a depth of between 100 and 150 mm across disturbed areas.
- Add soil amelioration treatments to rehabilitation material if necessary.
- Seed with local provenance seed mix at four to six kg/ha.
- Replace vegetation debris where possible.

Demolition Works:

• Remove all infrastructure.

DATA AND KNOWLEDGE GAPS:

Engineering Works:

- Refine dimensions and measurements for engineering and rehabilitation works.
- Determine detailed engineering works associated with decommissioning structures.
- Prepare detailed inventory of fencing, concrete, refuse and any materials that require removal.
- Determine requirements for drainage pathways and density.

Environmental Works:

- Investigate potential contamination and confirm any remediation requirements.
- Continually monitor recovery of topsoil and confirm location and availability of topsoil resources for closure.
- Confirm if amelioration of topsoil stores is necessary. Undertake studies and trials to identify appropriate analogues and determine revegetation methods and targets for rehabilitation works and other landform areas within this domain.
- Design and implement a post-closure monitoring program to monitor surface water drainage and revegetation.

Demolition Works:

• Continue to refine the inventory of infrastructure that will require decommissioning or demolition within the domain area.

8.3 Pastoral Management Area

Broad closure criteria have been identified to meet the conceptual closure objectives:

- Unless otherwise agreed with third parties, no remaining infrastructure including concrete footings on land surface;
- All infrastructure and plant that will be handed over to third parties meets necessary requirements for handover;
- No remaining rubbish or scrap on land surface;
- No long term impact to surface water and groundwater quality compared to baseline quality measurements;
- No change to regional surface water drainage patterns outside of approved alterations;
- Flora species are representative of target ecosystem in terms of species diversity, coverage and recruitment.

The location of the domains associated with the Pastoral Management areas are described within Appendix A - Figure 5.



8.3.1 **Process and Power Station**

This domain includes:

- all process plant areas, including concentrator and thickeners and facilities located at Cape Preston (pellet plant, dewatering plant and desalination plant); and
- power station.

A summary of the key information pertaining to the closure of the Process and Power Station domain is provided in Table 10.

Table 10	Domain Closure	Description -	- Process a	and Power	Station
	Domain Closure	Description -	1100033		Station

Domain – Process and Power Station					
Description	Concentrator, thickeners, power plant and adjacent power plant expansion area.				
CLOSURE CONCEPT: Closure of this that will not be retained post-closure. It facilities. Investigation of nature and ex out prior to closure and an appropriate	domain will involve decommissioning and demolition of all infrastructure is possible that contamination will be present around the process tent of contamination and removal of contaminated soils will be carried remediation plan developed.				
The dewatering plant, pellet plant and o in the Port area.	The dewatering plant, pellet plant and desalination plant make up the Cape processing facilities and are located in the Port area.				
All infrastructure that is to be handed to requirements for relinquishment.	third parties will be modified (if required) to meet applicable				
CLOSURE STRATEGY:					
Total Area	Concentrator = to be determined (ha)				
	Concentrator expansion = to be determined (ha)				
	Thickener = to be determined (ha)				
	Power Station = to be determined (ha)				
	Future Power Station expansion = to be determined (ha)				
	Miscellaneous areas (process area) = to be determined (ha)				
	Dewatering Plant = to be determined (ha)				
	Future Dewatering Plant = to be determined (ha)				
	Pellet Plant = to be determined (ha)				
	Desaination plant = to be determined (na)				
Earthworks required	Burial of foundations assumed to be 10% of total area and 60% of desalination plant area = to be determined (ha)				
	Re-profiling assumed to be 10% of total area = to be determined (ha)				
Area of contaminated soil	Assumed to be 5% of total area = to be determined (ha)				
Topsoil coverage area	Topsoil = to be determined (ha) Soil amelioration assumed for 15% of topsoil coverage = to be determined (ha)				
Area to rip and seed	Rip compacted areas assumed to be 10% of total area = to be determined (ha)				
	Seed (assumed to be 75% of total area) = to be determined (ha)				
	Spread vegetation (over 25% of total area) = to be determined (ha)				
Materials coverage required (include source, quantity available and quantity required)	Waste rock for burial of foundations = to be determined				
Infrastructure to be retained	To be determined				
CLOSURE ISSUES:					



Dor	nain – Process and Power Station
The	key issues to be managed during closure are:
•	Compaction of ground surface and presence of concrete footings and foundations preventing re- establishment of vegetation; and
•	Potential contamination of soils.
CLO	DSURE ACTIVITIES: Source - Closure works required (Sino Iron Revised Cost Estimates – AECOM, 2015)
Eng	ineering Works:
•	Remove contaminated soil (if required) and dispose of in landfill or waste rock dump, or remediate in a designated area.
•	Prior to rehabilitation treatments, inspect affected areas and remove all rubbish and debris to an appropriate waste disposal site.
•	Bury foundations, to a minimum depth of one m, with waste rock and fill from waste rock dumps or borrow pits.
•	Re-profile surfaces to blend in with surrounding landscape and to create a free-draining, stable landform.
Env	ironmental Works:
•	Shallow rip compacted hardstand surfaces and deep rip compacted ground beneath infrastructure
•	Place topsoil to a depth of $0.1 - 0.2$ m, add soil amelioration treatments if necessary.
•	Seed with local provenance seed mix at four to six kg/ha.
•	Replace vegetation debris where possible.
Der	nolition Works:
To b	pe determined
DA	TA AND KNOWLEDGE GAPS:
Eng	ineering Works:
•	Refine dimensions and measurements for engineering and rehabilitation works including extent of foundations requiring burial and extent of compacted areas.
•	Determine if any works are required prior to transfer of infrastructure that is to be retained.
•	Determine detailed engineering works associated with decommissioning structures, pipework, fuel and chemical storages, underground services and any other infrastructure that required decommissioning or removal.
•	Finalise inventory of concrete, refuse and any materials that require removal.
•	Determine optimal landform profiles and drainage characteristics.
Env	ironmental Works:
•	Investigate type, extent and depth of potential contamination around infrastructure requiring removal and remediation.
•	Continually monitor recovery of topsoil and confirm location and availability of topsoil resources for closure.
•	Confirm if amelioration of topsoil stores is necessary.
•	Undertake studies and trials to identify appropriate analogues and determine revegetation methods and targets for rehabilitation works and other landform areas within this domain.
•	Determine post-closure monitoring requirements for groundwater, surface water and revegetation monitoring.
Der	nolition Works:
•	Prepare an inventory of any infrastructure that will require decommissioning or demolition within the domain area.
•	Identify any infrastructure that is to be retained and determine relinquishment requirements.

Water Storage Ponds and Dams 8.3.2

This domain includes the raw water pond, two slurry dump ponds, a turkey's nest, the effluent pond, the environmental dam and the environmental pond located at the Port. The features in the Water Storage Ponds and Dams domain are described within Appendix A – Figure 5.



The raw water pond, effluent pond and environmental dam are located to the north of the process plant area and are used for collection and storage of desalination water, process water, TSF return water, cooling tower return water and stormwater respectively. The slurry dump ponds are located to the north and south of the thickener and receive concentrate slurry. The turkeys nest is also located in the process area. The environmental pond and environmental dam located at the Port also received storm water. Each of the water storage ponds and dams are approximately four metres deep with the exception of the turkeys nest which is approximately two deep.

A summary of the key information pertaining to the closure of the Water Storage Ponds and Dams Domain is provided in Table 11.

Description Raw water pond, slurry dump ponds, turkey's nest, effluent por environmental dam, and Port environmental pond and environr dam. CLOSURE CONCEPT: All water storage ponds and dams will be drained and any sediment or sludge w disposed of to appropriate areas. All liners will be removed and disposed of to landfill. Any contaminated	nd and mental vill be d soil ally filled will be
CLOSURE CONCEPT: All water storage ponds and dams will be drained and any sediment or sludge w disposed of to appropriate areas. All liners will be removed and disposed of to landfill. Any contaminated	will be d soil ally filled will be
underlying the ponds and dams will be removed and disposed of, or remediated. The dams will be partial and have banks pushed in and will be re-profiled to reinstate regional drainage. Topsoil and vegetation placed and windrowed to prevent erosion.	
CLOSURE PARAMETERS:	
Total AreaRaw water pond = to be determined (ha, m³) Slurry dump ponds = to be determined (ha, m³) Turkey's nest = to be determined (ha, m³) Effluent ponds = to be determined (ha, m³) Environmental dam = to be determined (ha, m³) Port environmental pond = to be determined (ha, m³) Port environmental dam = to be determined (ha, m³)	
Earthworks required Push in dam banks and surfaces (10% of footprint) = to be determined (ha) Spread and level dam surface = to be determined (ha)	ermined
Topsoil coverage areaTopsoil = to be determined (ha)Soil amelioration assumed for 10% of rehabilitation area = to be determined (ha)	e
Area to rip and seedSeed (assumed to be 75% of total area) = to be determined (has spread vegetation (over 25% of total area) = to be determined	a) (ha)
Materials coverage required (include source, quantity available and quantity required)Fill material = to be determined	
Infrastructure to be retained None	
CLOSURE ISSUES:	
 The key issues to be managed during closure are: Potential contamination of soils; and Availability of space to dispose of liners. 	4 2015)

Table 11 Domain Closure Description – Water Storage Ponds and Dams



Domain – Water Storage Ponds and Dams

Engineering Works:

- Drain/pump water from all dams and ponds.
- Remove any sediment or sludge in bottom of dams and ponds, and liners and dispose to waste dump or landfill.
- Remove any contaminated soil (if required) beneath liners and dispose of to waste dump or landfill.
- Re-profile dam banks and dam surface and fill with appropriate material if required.

Environmental Works:

- Add soil amelioration treatments to rehabilitation material if necessary.
- Seed with local provenance seed mix at four to six kg/ha.
- Replace vegetation debris where possible.

Demolition Works:

To be determined

DATA AND KNOWLEDGE GAPS:

Engineering Works:

- Refine dimensions and measurements for engineering and rehabilitation works.
- Determine the need to remove and dispose of liners.
- Confirm availability of disposal space for liners, sediment and contaminated soils if required.
- Determine requirements for drainage pathways and density.

Environmental Works:

- Investigate extent and depth of potential contamination beneath liners requiring removal and remediation.
- Undertake studies and trials to identify appropriate analogues and determine revegetation methods and targets for rehabilitation works and other landform areas within this domain.
- Design and implement a post-closure monitoring program to monitor surface water and groundwater quality, surface water drainage and revegetation.

Demolition Works:

 Continue to refine the inventory of infrastructure that will require decommissioning or demolition within the domain area.

8.3.3 Accommodation Village

This domain includes the M08/123 accommodation village and G08/53 Port Accommodation camps (yet to be constructed), and sewerage treatment facilities. The features in the M08/123 Accommodation Camp domain are described within Appendix A – Figure 5. M08/123 Accommodation Camp is currently located north of the mine pit and process areas on M08/123 and historically housed up to 1,500 personnel. This camp site will eventually be incorporated into the final mine pit footprint.

Infrastructure includes buildings, water distribution and other underground services, recreational facilities, reverse osmosis treatment plants, 1,000 m3/day sewerage treatment plant with spray irrigation field, mess areas, amenities, fuel storage and other service buildings.

The detailed design for the G08/53 Port Accommodation Village has not been confirmed; however, it is expected to accommodate up to 500 people and require overhead power, permanent water pipelines and an access road from the North-South corridor. A summary of the key information pertaining to the closure of the Accommodation Villages Domain is provided within Table 12

Table 12 Domain Closure Description – Accommodation Villages



Domain – Accommodation Village					
Description	Accommodation village construction camps and sewerage treatment facilities.				
CLOSURE CONCEPT: All infrastructur	re that is not to be retained will be decommissioned and demolished.				
CLOSURE PARAMETERS:					
Total Area = to be determined (ha)	G08/53 Port Accommodation village = to be determined (ha) Camp 123 = to be determined (ha) Sewerage treatment area = to be determined (ha)				
Earthworks required	Re-profiling and re-grading surfaces (10% of total area) = to be determined (ha)				
Topsoil coverage area	Topsoil = to be determined (ha) Soil amelioration assumed for 10% of topsoil coverage = to be determined (ha)				
Area to rip and seed	Shallow rip (assumed 10% total area) = to be determined (ha) Seed (assumed to be 75% of total area) = to be determined (ha) Spread vegetation (over 25% of total area) = to be determined (ha)				
Materials coverage required (include source, quantity available and quantity required)	Waste rock for burial of foundation = to be determined				
Infrastructure to be retained	None				
CLOSURE ISSUES:					
None identified					
CLOSURE ACTIVITIES: Source - Clos	ure works required (Sino Iron Revised Cost Estimates – AECOM, 2015)				
Engineering Works:					
Bury foundations with waste rock a	and fill from waste rock dumps or borrow pits.				
Remove fencing around laydown a	ireas.				
 Remove contaminated soil (if required designated area. 	ired) and dispose of in landfill or waste rock dump, or remediate in a				
 Prior to rehabilitation treatments, ir appropriate waste disposal site. 	nspect affected areas and remove all rubbish and debris to an				
Re-profile surfaces to blend in with	surrounding landscape and to reinstate regional drainage patterns.				
Environmental Works:					
Shallow rip compacted surfaces.					
Spread topsoil to a depth of betwe	en 0.1m and 0.15m across disturbed areas.				
Add soil amelioration treatments to	o renabilitation material if necessary.				
Seed with local provenance seed if Boplage vegetation debris where if	TIIX AL IOUT IO SIX KG/NA.				
Demolition Works:	มของเมเซ.				
DATA AND KNOWLEDGE GAPS:					
Engineering Works:	ante for engineering and rehabilitation works				
Reline dimensions and measurem Determine detailed engineering was	ents for engineering and renabilitation works.				
storages, underground services ar	 Determine detailed engineering works associated with decommissioning structures, pipework, fuel and storages, underground services and any other infrastructure that required decommissioning or removal. 				
Determine detailed inventory of co Determine requirements for drains	ncrete, refuse and any materials that require removal.				
Determine requirements for draina Define specific closure strategies f	ye paniways and density.				
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Domain – Accommodation Village

Environmental Works:

- Investigate extent and depth of potential contamination requiring removal and remediation.
- Continually monitor recovery of topsoil and confirm location and availability of topsoil resources for closure.
- Confirm if amelioration of topsoil stores is necessary. Undertake studies and trials to identify appropriate analogues and determine revegetation methods and targets for rehabilitation works and other landform areas within this domain.
- Design and implement a post-closure monitoring program to monitor, surface water drainage and revegetation.

Demolition Works:

• Continue to refine the inventory of infrastructure that will require decommissioning or demolition within the domain area.

8.3.4 Workshops Laboratories, Materials Storage and Administration Buildings

This domain includes mine facilities; workshops, administration buildings, laboratories and material storage areas (including fuel and chemical storage). The features within the Workshops, Laboratories, Materials Storage and Administration Buildings domain are shown on Appendix A – Figure 5.

The mine workshops and administration areas are located south of the concentrator and east of the mine pit. The buildings may comprise machine workshops, wash down bays, testing laboratories, staff amenities, administration and construction buildings and fuel and chemical storage buildings, bunds and pads. A summary of the key information relating to the closure of the Workshops, Laboratories, Material Storage and Administration Building Domain is provided in Table 13 below.

Table 13Domain Closure Description – Workshops, Laboratories, MaterialStorage and Administration Buildings

Domain – Workshops, Laboratories, Materials Storage and Administration Buildings				
Description Mine facilities, workshops and administration buildings, mine construction office, laboratory, and fuel and chemical storage.				
CLOSURE CONCEPT: Closure of this domain will involve decommissioning and demolition of all infrastructure removal of all fuel storage infrastructure and fencing surrounding outdoor material storage areas. It is expected that contamination will be present around machine workshops and potentially around materials storage areas. Investigation of nature and extent of contamination and removal of contaminated soils will be carried out prior to closure.				
CLOSURE PARAMETERS:				
Total Area	Mine facilities and admin buildings = to be determined (ha) Warehouses = to be determined (ha) Workshops = to be determined (ha) Mine construction office = to be determined (ha) Fuel and chemical storage = to be determined (ha) Fenced area = to be determined (m perimeter)			
Earthworks required	Re-profiling and re-grading surfaces (5% of total area) = to be determined (ha)			
Topsoil coverage area	Topsoil = to be determined (ha) Soil amelioration assumed for 10% of topsoil coverage = to be determined (ha)			

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Domain – Workshops, Laboratories, Materials Storage and Administration Buildings						
Area to rip and seed	Shallow rip (assumed 50% total area) = to be determined (ha) Seed (assumed to be 75% of total area) = to be determined (ha) Spread vegetation (over 25% of total area) = to be determined (ha)					
Materials coverage required (include source, quantity available and quantity required)	Waste rock for burial of foundations = to be determined					
Infrastructure to be retained	None					
CLOSURE ISSUES:						
The key issues to be managed during of	closure are:					
 Compaction of ground surface and establishment of vegetation; and 	presence of concrete footings and foundations preventing re-					
Potential contamination of soils.						
CLOSURE ACTIVITIES: Source - Clos	ure works required (Sino Iron Revised Cost Estimates – AECOM, 2015)					
Engineering Works:						
Bury foundations with waste rock a	and fill from waste rock dumps or borrow pits.					
 Remove tencing around laydown a Remove any contaminated soil (as landfill or waste rock dump, or rem 	reas. sumed to be removed to a depth of between 0.5 m) and dispose of in ediate in a designated area.					
• Prior to rehabilitation treatments, ir appropriate waste disposal site.	nspect affected areas and remove all rubbish and debris to an					
Re-profile surfaces to blend in with	surrounding landscape and reinstate regional drainage.					
Environmental Works:						
 Shallow rip compacted hardstand surfaces and ground beneath infrastructure. 						
Spread topsoil to a depth of between 0.1 m and 0.15m across disturbed areas.						
 Add soil amelioration treatments to rehabilitation material if necessary. 						
 Seed with local provenance seed mix at four to six kg/ha. 						
Replace vegetation debris where p						
Demolition works:						
Remove an infrastructure.						
DATA AND KNOWLEDGE GAPS:						
Engineering Works:						
Reine dimensions and measurem	ents for engineering and renabilitation works.					
chemical storages, underground se removal.	ervices and any other infrastructure that required decommissioning or					
 Determine detailed inventory of con Determine requirements for drainal 	 Determine detailed inventory of concrete, refuse and any materials that require removal. Determine requirements for drainage pathways and density. 					
Environmental Works:						
Investigate extent and depth of potential contamination requiring removal and remediation.						
Continually monitor recovery of top	Continually monitor recovery of topsoil and confirm location and availability of topsoil resources for closure.					
Confirm if amelioration of topsoil st	Confirm if amelioration of topsoil stores is necessary.					
 Undertake studies and trials to identify appropriate analogues and determine revegetation methods and targets for rehabilitation works and other landform areas within this domain. 						
 Design and implement a post-closure monitoring program to monitor surface water and groundwater quality, surface water drainage and revegetation. 						
Demolition Works:						
Continue to refine the inventory of infrastructure that will require decommissioning or demolition within the domain area.						



8.4 Cape Preston

Broad closure criteria have been identified to meet the conceptual closure objectives for the Cape:

- With the exception of infrastructure that will be transferred to third parties, no remaining infrastructure including concrete footings on land surface;
- All infrastructure and plant that will be handed over to third parties meets necessary requirements for handover;
- No remaining rubbish or scrap on land surface;
- No long term impact to marine water, surface water and groundwater quality compared to baseline quality measurements;
- No change to regional surface water drainage patterns;
- Flora species are representative of target ecosystem in terms of species diversity, coverage and recruitment; and
- Fauna species are representative of target species diversity and habitat availability, in the case of listed species they will be managed in accordance with agreed closure criteria.

The location of the domains associated with the Cape Preston areas are described within Appendix A - Figure 6.

8.4.1 Port Stockyard and Port Facilities

The Port stockyard areas are transitory storage area for ore prior to shipping. They are located south of the breakwater and take up the largest portion of the Port area. The Port administration buildings are located to the east of the stockyard area and north of the dewatering plant. The Port loading facilities are located north of Preston Island, and are accessed by the breakwater. Other infrastructure located in the Port area includes: the control centre and workshop.

Long term management strategies for the Port post-mine closure will be confirmed at a later stage of the Project, along with expectations for the condition of the infrastructure at end of mine life. Rehabilitation strategies will also be confirmed at a later stage of the Project; however, it is expected to be consistent with the long term management strategies for the Port.

The dewatering plant, and desalination plant are located in the Port area at Cape Preston. The dewatering plant is located to the east of the stockyards on a higher elevation to the other infrastructure. The desalination plant is located to the east of the breakwater. A summary of the key information pertaining to the closure of the Port Stockyard and Port Facilities Domain is provided in Table 14.

Domain – Port Stockyard and Port Facilities				
Description	Port stockyard, Port administration buildings and control centre, workshop, breakwater, Port loading facilities and other Port infrastructure.			

Table 14 Domain Closure Description – Port Stockyard and Facilities

Г



Domain – Port Stockyard and Port Facilities						
CLOSURE CONCEPT: All infrastructur	CLOSURE CONCEPT: All infrastructure that is to be handed to third parties will be modified as needed to meet					
applicable requirements for relinquishmediate	ent.					
All infrastructure that is not to be retained	ed will be decommissioned and demolished and rehabilitation actions					
incorporated into the ongoing Port man	agement strategy.					
CLOSURE PARAMETERS:						
Total Area	Port stockyard = to be determined (ha)					
	Fenced area = to be determined (m perimeter)					
	Port construction office = to be determined (ha)					
	Breakwater = to be determined (ha)					
Earthworks required	Burial of foundations = to be determined					
	Re-profiling = to be determined					
Topsoil coverage area	Topsoil = to be determined (ha)					
	Soil amelioration assumed for 10% of topsoil coverage = to be					
	determined (na)					
Area to rip and seed	Rip compacted areas (area assumed) = to be determined (ha)					
	Seed (assumed to be 75% of total area) = to be determined (ha)					
	Spread vegetation (over 25% of total area) = to be determined (ha)					
Materials coverage required (include	Waste rock for burial of foundations = to be determined					
quantity required)						
Infrastructure to be retained	Not known					
The key issues to be managed during a						
The key issues to be managed during to	processory of constrate factings and foundations proventing re-					
 compaction of ground surface and establishment of vegetation; 	presence of concrete rootings and roundations preventing re-					
Changed surface water drainage c	haracteristics have the potential to impact the marine environment; and					
Potential contamination of soils and	d surface water.					
CLOSURE ACTIVITIES: Source - Clos	ure works required (Sino Iron Revised Cost Estimates – AECOM, 2015)					
Engineering Works:						
Bury foundations with waste rock a	nd fill from waste rock dumps or borrow pits.					
Remove fencing around laydown a	reas.					
 Remove contaminated soil (if required area. 	red) and dispose of in landfill or waste rock dump, or remediate in a					
 Prior to rehabilitation treatments, in appropriate waste disposal site 	spect affected areas and remove all rubbish and debris to an					
appropriate waste disposal site. Re-profile surfaces to blend with surrounding landscape and to protect the marine environment						
Environmental works:						
 Shanow np compacted hardstand surfaces and deep np compacted ground beneath initialflucture. Spread topsoil to a depth of between 100 and 150 mm across disturbed areas 						
 Add soil amelioration treatments to rehabilitation material if necessary 						
 Add solit amenoration treatments to renabilitation indicental if necessary. Seed with local provenance seed mix at four to six ka/ba 						
Beplace vegetation debris where possible.						
Demolition Works:						
 Remove all infractructure that will not be retained including the fance around the lavdown aroas. 						



Domain – Port Stockyard and Port Facilities

Engineering Works:

- Refine dimensions and measurements for engineering and rehabilitation works.
- Determine detailed engineering works associated with decommissioning structures, pipework, fuel and chemical storages, underground services and any other infrastructure that required decommissioning or removal.
- Determine detailed inventory of concrete, refuse and any materials that require removal.
- Determine requirements for drainage pathways and density.
- Determine any engineering works required for relinquishment of infrastructure to third parties.

Environmental Works:

- Investigate extent and depth of potential contamination requiring removal and remediation.
- Continually monitor recovery of topsoil and confirm location and availability of topsoil resources for closure.
- Confirm if amelioration of topsoil stores is necessary.
- Undertake studies and trials to identify appropriate analogues and determine revegetation methods and targets for rehabilitation works and other landform areas within this domain.
- Undertake studies to identify appropriate fauna targets (if any) for this domain
- Design and implement a post-closure monitoring program to monitor marine water, surface water and groundwater quality, surface water drainage and revegetation.
- Determine any environmental works required for relinquishment of infrastructure to third parties and document in a written agreement.

Demolition Works:

- Continue to refine the inventory of infrastructure that will require decommissioning or demolition within the domain area.
- Determine any demolition works required for relinquishment of infrastructure to third parties.

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9 Closure Monitoring and Maintenance

The purpose of this section is to provide detail on the post-closure monitoring and maintenance activities that are expected to be implemented post closure and that will:

- Measure and prove closure outcomes at the completion of decommissioning and rehabilitation works;
- Address rehabilitation failures: and
- Maintain infrastructure required for rehabilitation (e.g. fences and signage).

It is intended that the final monitoring program will be developed in conjunction with the development of detailed closure criteria and will be included within the detailed final closure plan (required by MS635) that will be completed well before closure of the Project. The closure monitoring program will:

- Use recognised and acceptable methods and standards;
- Recognise all receiving environments and environmental receptors relevant to the Project;
- Incorporate quality control actions to achieve consistency and comparability of results over the long-term;
- Show trends related to achievement of completion criteria and rehabilitation targets;
- Enable trajectory criteria to be established which provide confidence to relevant stakeholders that final completion criteria will be achieved thereby facilitating early relinquishment; and
- Provide contingency strategies if it is recognised that closure actions are not meeting the expected outcomes.

9.1 Accountabilities & Responsibilities for Closure

Key accountabilities and responsibilities for closure are shown in Table 15. The positions and accountabilities outlined below are to be reviewed and properly assigned during the development of the detailed mine closure plan that will be completed well before closure of the Project.

Role	Responsibility / Accountability
Site Manager	Accountable for:
	• The review, update and implementation of the actions in the Plan; and
	 Incorporating actions to progress closure into annual budgets.
Mine Planning Manger	Responsible for:
	 Incorporating closure considerations into mine planning and updating the plan to reflect mine planning changes.

 Table 15
 Accountabilities and Responsibilities for Closure

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Role	Responsibility / Accountability		
Processing Manager	Responsible for:		
	 Identifying process changes that may impact closure (e.g. nature of tailings being discharged) and feeding these into the update of the Plan; and 		
	• Measuring actual tailings and process waste characteristics (geochemical, consolidation etc.) and feeding in to the update of the Plan.		
Community Manager	 Consulting with stakeholders on closure and feeding outcomes into the update of the Plan; and 		
	Developing and implementing the Social Investment Strategy.		
Environment Manager	Responsible for:		
	 Initiating the review and revision of the Plan on a regular basis or upon major change of the inputs; 		
	 Developing and implementing a Closure Research and Study Action Plan; 		
	• Reviewing and revising the Closure Research and Study Action Plan on an annual basis or upon major change of the inputs;		
	 Organising multi-disciplinary risk workshops to review and revise risk assessments and uncertainties in data to be incorporated into Plan updates; 		
	 Reviewing and updating the following information in the Plan: Legal requirements; 		
	 Closure objectives and criteria; 		
	 Closure concepts, assumptions, risks, strategies and actions; 		
	Closure execution schedule;		
	Post closure management, maintenance and monitoring; and Closure cost estimate; and		
	Liaising with stakeholders on technical matters		

9.2 Unplanned Closure

In the event of unplanned closure, or temporary closure (care and maintenance) certain closure actions will need to be implemented, usually within a short time-frame, to address the non-operational state of the site. Actions taken in the event of unplanned or temporary closure will be based on the closure actions outlined in Section 8 (to the extent relevant), and may focus on the higher risk features and rehabilitation strategies.

CPM actively recovers topsoil and vegetation ahead of all mining activities. This material is stored in designated locations and records of the volumes and source of this material is maintained. At drafting, there was adequate material available for TSF and waste rock landforms to be secure and non-polluting in the event of an unplanned closure.

A strategy for dealing with unplanned closure will be developed for the site. Financial provision is estimated for disturbances to date but a specific strategy to implement has not yet been developed. The strategy will include consideration of:

- Actions required to make the mine safe;
- Immediate measures that will be taken to stabilise the site and prevent pollution while the fate of the site is decided; and



• Actions for reviewing the closure needs of the site at the time of the unplanned closure and developing and implementing the Closure Plan in a timely manner.

Addressing knowledge and data gaps as part of work undertaken to develop the detailed closure plan (discussed above), or during operations will aid in developing the unplanned closure strategy and will reduce risks associated with unplanned or temporary closure (e.g. material balance calculations, tailings closure concepts and extent of contamination). In addition, the outcomes and issues relating to closure that result from stakeholder engagement will help to highlight the key actions to be implemented in the event of any unplanned closure.

High risk issues that were identified during the risk assessment that will require specific actions in the event of unplanned or temporary closure include:

- The open mine void will present a risk to public safety.
- Uncapped tailings have the potential to erode during high-rainfall or high wind events and may expose fibrous minerals.
- Waste rock dumps left uncapped and/or without treatment may release potentially acid and metalliferous drainage and/or fibrous minerals.
- Process areas, workshops, fuel and other chemical storage areas may pose a risk of leaks and spills which may cause risk of contamination to groundwater and surface water quality.
- Low grade stockpiles may present a risk to surface water contamination.
- Non-vegetated areas may be unstable or prone to erosion.
- Sedimentation may present a risk to surface water drainage patterns and the marine environment.
- Surface water drainage and tidal flow may be interrupted by infrastructure.

9.3 Action Plan for Addressing Knowledge and Data Gaps

The purpose of this section is to record knowledge gaps that were identified during the development of this Plan. It is expected that closure of these gaps will take place during the life of operations and prior to the development of the detailed Final Closure Plan. CPM propose to undertaken an internal review this plan and its actions every five years to ensure up to date information is available for inclusion in the detailed Final Closure Plan. The knowledge gaps and actions identified are discussed in detail within Table 16: Knowledge gaps previously identified within the Sino Iron Project Conceptual Mine Closure Plan (URS) – 2011. As these knowledge gaps were previously identified from the internal Conceptual Closure Plan (URS 2011) prepared for the Project some of the actions have progressed and an update against those actions has been provided.



Table 16: Knowledge gaps previously identified within the Sino Iron Project Conceptual Mine Closure Plan (URS) – 2011

No.	Data Gap Area	Action	Timing	Documentation Required	2016 Update
1-1	Legal	Engage a qualified legal professional to undertake a comprehensive review of legal requirements.	Prior to stakeholder consultation and preparation of the detailed closure plan	Legal review findings document	In accordance with the requirements outlined within this Plan CPM will complete a periodic legal review of the project
1-2		Identification of any obligations to third parties including lease relinquishment procedures and closure obligations. Capture of any changes to compliance obligations over the life of mining.	Prior to stakeholder consultation and preparation of the detailed closure plan Ongoing throughout life of mine at least every five years	Inclusion in the detailed Final Closure Plan	As per above comment.
2-1 2-2	Social	 Undertake preliminary stakeholder consultation including: Identification of internal and external stakeholders; Communication of intended final land use; Capture of stakeholder concerns around the proposed final land use and closure objectives; and Identify stakeholder perception of risks and issues associated with closure strategies and outcomes. Ongoing stakeholder consultation throughout the life of mine. 	Prior to the preparation of the detailed closure plan Ongoing throughout life of mine	Outcomes of the consultation will be incorporated into the review of the closure objectives and criteria as part of the ongoing review of this Plan and development of the detailed Closure Plan	As described within Section 3, CPM has identified key stakeholders to be consulted in the ongoing review and implementation of this Plan.
3-1	Engineering works	Definition of all dimensions of features and parts of features requiring earthworks.	During and after construction, and during operations.	Updated detail in Domain tables/sections of the detailed Closure Plan	Dimensions are known for one waste dump. The north east waste dump will change with life of mine approvals. TSF 1 remains under construction

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		and its final landform has not been designed. Additional TSF and WRD are subject to further OEPA approvals. Prior to implementation of these landforms detailed designs will be prepared which will form the basis for any future closure planning.
3-2	Calculation of a materials balance for all waste rock, fill, spoil and topsoil and other materials required for rehabilitation activities.	CPM currently monitors and maps the recovery and location and volumes of topsoil stockpiles. This will continue throughout the life of the Project. Waste rock materials balance is currently being developed as a part of CPM's detailed mine planning processes.
3-3	Confirmation of optimal angles, slopes, drainage characteristics and structures and construction parameters for all rehabilitated surfaces.	CPM has completed a number of studies to confirm the optimum landform profile and cover for its waste rock and tailings landforms. As these structures are able to be progressively rehabilitated CPM will conduct monitoring to confirm if these design parameters (slope, angle, drainage etc.) are appropriate.
3-4	Definition of any engineering works required for infrastructure that will be retained (e.g. burial of pipelines, painting etc.).	Too early in Project life to address this knowledge gap. This matter will be addressed within the detailed Closure plan for the Project.
3-5	Definition of detailed engineering works associated with decommissioning structures, pipework, fuel and chemical storages, underground services and any other infrastructure that required decommissioning and subsequent demolition.	Too early in Project life to address this knowledge gap. This matter will be addressed within the detailed Closure plan for the Project.
3-6	Review of options for liner disposal considering long-terms risks to the	Too early in Project life to address this knowledge gap.

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		environment and volume of industrial landfill.			
3-7		Verification that engineering parameters for the TSF cover design will enable closure objectives to be achieved.			CPM has completed a number of studies to confirm the optimum landform parameters for a number of its future landforms. During current operations and prior to closure CPM will conduct monitoring of rehabilitated landforms to confirm if these design parameters (slope, angle, drainage etc.) are appropriate
4-1	Environmental works	 Development of knowledge and undertaking research relating to ecological function of rehabilitated landforms including: Establishment of analogue sites; Identification of baseline conditions for surface water, marine water and groundwater flow patterns and quality in each domain; Development of monitoring plans during operations to measure non-project attributable changes in baseline conditions; Revegetation requirements including diversity, cover, recruitment, structure etc.; and Expected species diversity and population numbers for terrestrial and marine fauna following re-establishment of habitat. 	During and after construction, during operations, and ongoing during closure	 Baseline environment reports Site rehabilitation and/or revegetation action plan Environmental monitoring reports Updated detail in Domain tables/sections of the detailed Closure Plan 	 i. CPM installed rehabilitation analogue sites in 2015 and 2016. All other factors are dependent on the outcome of ongoing monitoring of these sites. ii. Since 2008 baseline conditions for surface water; marine water and groundwater has been completed for the Project iii. Monitoring programs for a range of environmental factors is driven primarily by Ministerial Statement 635 and CPM Operational Environmental Management Plan. This is reported annually to the EPA and DMP via annual compliance reports. iv. It is anticipated that the establishment of analogue sites in 2015 will be able to provide data to refine revegetation requirements suitable for the site

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				 More work is required on the re-establishment of fauna species and diversity and will be addressed in the future
4-2	Development of rehabilitation trial studies (rehabilitation action plans) to determine optimal rehabilitation strategies for the represented landforms: including topsoil depths, ripping depths, seeding rates and the need for soil amelioration treatments.	During site operation and ongoing during closure	 Site rehabilitation and/or revegetation action plans Environmental monitoring reports Updated detail in Domain tables/sections of the detailed Closure Plan 	Landloch were engaged in 2009 to undertake site field trials to determine optimal rehabilitation for Artificial Landforms. In 2016, CPM engaged Astron to undertake monitoring of selected sites and assess the success of rehabilitation undertaken since 2010. This work has primarily assessed sites within the Rehabilitation Management Areas of: • Shared Infrastructure; • Pastoral; and • Artificial Landforms. It is hoped the ongoing monitoring will help to identify optimal rehabilitation strategies.
4-3	Definition of all dimensions of features and parts of features requiring environmental works including topsoil placement, ripping and seeding.	In conjunction with engineering works (identified above) and prior to closure	Updated detail in Domain tables/sections of the detailed Closure Plan	Too early in Project life to address this knowledge gap. This matter will be addressed within the detailed Closure plan for the Project.
4-4	Development and audit of topsoil management strategies to protect viability of topsoil and prevent weed species from establishing on stockpiles.	During site operation and ongoing during closure	 Site rehabilitation and/or revegetation plan Audit reports Updated detail in Domain tables/sections of the detailed Closure Plan 	CPM has developed and implemented topsoil management procedures for the Project.
4-5	Investigation of the extent and depth of contamination around infrastructure requiring removal and remediation and development of remediation action plans to be implemented at optimal times in	During site operation and in conjunction with engineering works (identified above)	 Site contamination reports Remediation action plans Updated detail in Domain tables/sections of the detailed 	Although high risk locations have been identified for the Project it is too early in Project life to describe a detailed list of contaminated sites. This matter will be properly

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		the mine life.		Closure Plan	investigated and addressed within the detailed Closure plan for the Project.
4-6		Verification of final void strategy and confirmation of the assessment of potential impact related to the predicted salinity of final void water.	Prior to closure	 Void assessment report Updated in the detailed Closure Plan 	Final void strategy will be developed as the project progresses and both modelling and ongoing groundwater monitoring of the final void water is confirmed.
4-7		Verification of the TSF cover design in relation to addressing the potential risks associated with fibrous materials, saline pore water, acid metalliferous drainage and other materials properties which may present a risk to achievement of closure objectives.	Prior to closure	 TSF cover assessment report Updated detail in Domain tables/sections of the detailed Closure Plan 	Too early in Project life to address this knowledge gap. This matter will be addressed within the detailed Closure plan for the Project.
5-1	Decommissioning works	 Undertaking an inventory of all infrastructure and features requiring demolition, decommissioning and removal from site or burial at site to develop an assets register, including: Description of the feature and materials used in construction; Dimensions of the feature; Location and photographs; Description of type and depth of foundations and/or support structures associated with the feature; and Any other information related to the use and timing of decommissioning of the feature. 	During site operation and in conjunction with engineering works (identified above)	Assets Register Updated detail in Domain tables/sections of the detailed Closure Plan	CPM has reviewed its decommissioning costing for the Project in 2015. This review considered current infrastructure as approved under MS635. This costing schedule will be updated once the Mine Continuation Proposal has been approved.
5-2		Developing a demolition strategy and plan, including engaging a demolition contractor.	Following engineering and environmental works At least two years prior to closure	Demolition plan Updated detail in Domain tables/sections of the detailed Closure Plan	A plant and material demolition schedule exists to assist with determining closure estimated, but it will need to be refined during operations for accuracy and as assumptions change.

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5-3		Keep records of all infrastructure that is to be retained and/or handed over to third parties and determine requirements for relinquishment of features.	Ongoing through construction and operations	Records of all infrastructure that is to be retained and/or handed over to third parties. Updated detail in Domain tables/sections of the detailed Closure Plan	Too early in Project life to address this knowledge gap with regards to third parties. This matter will be addressed within the detailed Closure plan for the Project.
6-1	Development of closure strategies and criteria	 Review of existing closure obligations, objectives and actions stated in the PER. Closure strategies to be refined in relation to the agreed closure objectives, including developing closure strategies for features and domains which currently have no specific closure strategy. Completion criteria will need to be refined to the extent possible, using the available data. Timing of implementation of closure strategies and specific actions. 	Following further stakeholder consultation and risk assessment and prior to the development of the detailed Closure Plan Ongoing through construction and operations	Updated detail in Domain tables/sections of the detailed Closure Plan Rehabilitation Management Plan	Legal obligations and commitments relevant to rehabilitation and closure are found within Appendix B. They have been summarised from legislation listed in section 2.1 – 2.2. Closure commitments stated within MS635 and Mineralogy's Preliminary Closure Plan (approved under MS635) are described within Appendix B. Section 4 of this Plan provides an outline of the broad closure objectives for the four rehabilitation management areas identified for the Project. Over the life of the Project these objectives and completion criteria will be continually reviewed and refined and integrated into the final Detailed Closure Management Plan for the Project.
6-2		Identification of measurement tools and quantitative standards or performance criteria against which the closure objectives and completion criteria may be measured.	Prior to the development of the detailed mine closure plan. Detail to be refined through construction and operations.	Inclusion in the detailed Closure Plan	CPM has implemented studies to assist in defining the final monitoring methodology for closure of the Project. The final closure monitoring program will be included within the detailed Closure Plan for the Project.
6-3		Development of unplanned closure actions and strategies. Including the identification of key issues and priority	Prior to the development of the detailed mine closure	Inclusion in the detailed Closure Plan	CPM has completed a risk assessment which has identified high risk issues that will require specific

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		actions in the event of unplanned or temporary closure	plan. Detail to be refined through construction and operations.		actions in the event of unplanned or temporary closure of the Project (refer Section 9.2). If required a detailed Care and Maintenance Plan will be developed and implemented.
7-1	Post-closure monitoring and maintenance	 A post-closure monitoring programme should be developed to assess the achievement of completion criteria and closure outcomes. Monitoring should include: Final Pit void Surface water drainage re- establishment including flow patterns, sedimentation and quality; Groundwater quality and groundwater level re-establishment; Tidal flow patterns and marine water quality; and Ecological function and landform function analysis. The post-closure monitoring programme should reference monitoring techniques, baseline assessment methodology and requirements for reporting of progress against closure performance criteria. 	During site operation and ongoing during closure	Post-closure monitoring programme Inclusion in detailed Closure Plan	CPM has implemented studies to assist in defining the final monitoring methodology for closure of the Project. The final closure monitoring program will be included within the detailed Closure Plan for the Project which will be developed well before completion of the Project.
8-1	General knowledge gaps within the Conceptual Closure Plan	Review and assignment of positions and accountabilities for review and revision of the Plan.	Prior to the development of the detailed Closure Plan	Inclusion in the detailed Closure Plan	Section 9.1 provides an outline of responsibilities and accountabilities for closure of the Project. This will be refined over the life of the Project.
8-2		Development of an internal management system to manage information and data related to closure.	As soon as practicable	Management system structure Appointment of responsible persons/custodians	Internal management system is developed and will be revised as the project evolves.
8-3		Review and update of environmental baseline data summary contained within the Closure Plan (Appendix C). This should be continued throughout the life	Prior to the development of the detailed Closure Plan, and ongoing during	Inclusion in the detailed Closure Plan and updates of the Plan	Environmental baseline information is reviewed annually with summaries provided to the EPA and DMP via their respective annual compliance

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or mining as new data is received and	operations	reports. where possible all data is
knowledge gaps are closed.		transferred to GIS database and
		mapped for access by environmental
		staff.

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10 Financial Provision for Closure

Decommissioning, closure and rehabilitation cost provisions managed by CPM's Finance Department are required to be externally audited annually in accordance with International Standard *IAS37 Provisions, Contingent Liabilities and Contingent Assets.* These cost estimates are calculated based on the status of the Project's implementation and do not cover the full life of the operation; e.g. only estimated for clearing and construction completed at the date of cost estimation. The assumptions and estimates are revised at least every three years in accordance with IAS37.

The 2015 estimates were derived from different methodologies;

- Demolition, deconstruction and disassembly for
 - Plant and Material
 - Building and Infrastructure
- Landform rehabilitation utilising DMP's Rehabilitation Liability Estimate (RLE) calculator; and
- Probabilistic approach to cost estimates with three confidence levels applied, 50%, 80% and 90%.

The original estimate was first made in 2011 (URS, 2011) and was revised in 2015 (AECOM, 2015) with changes to assumptions, rates and methodologies all documented.

10.1 Assumptions

- From 2015 activities such as re-profiling to re-instate drainage and microtopography; ripping compacted areas; placement of topsoil, seeding or spreading of vegetation are estimated under the DMP RLE calculator.
- The marine base and associated port assets will be relinquished (unless alternative opportunities become available) at the close of Project and obligations associated with this transfer are currently unknown. In this regard, the cost estimate excludes costs for demolition/deconstruction or disassembly beyond the access gates to the Port Facility.
- Removal of all infrastructure and excavation or burial of concrete footings are assumed to be deposited in the mine pit.
- An overarching allowance has been made under the RLE calculation for re-profiling and "making good" the land on which infrastructure is associated.
- CPM-published aerial images were utilised as input to calculate surface areas or change of volume materials.
- All foundations and substructures (e.g. basements and below ground chambers) are considered to remain in place and buried as part of the overall rehabilitation.



- The provision for removal of above ground concrete is considered adequate for the costs associated with internment of the substructures such as coring to allow free movement of water following burial.
- The rate for demolition of steel structures was increased to allow for the use of a 400 tonne crane.
- The Pilbara rate was determined by using the regional multiplier of 1.55 published in Rawlinsons Australian Construction Handbook (2015).
- In accordance with accounting standards, no credit has been allowed for any scrap or resale value.



11 Management of Information and Data

The information resources that were used in preparation of this Plan and that were relevant to closure of the Project are presented within Table **17** Document Register - Closure related reports, information and data. The rehabilitation management area and associated domain to which each document applies is also described within this Table.

		Landforms		Pastoral				Cape Preston	Shared infrastrue	cture	
Document Name	Document Summary	Mine Pit	TSF	Waste Rock Dumps and Stockpiles	Process and Power Station	Accommodation Village	Workshops, Laboratories, Materials Storage and Administration Buildings	Water Storage Ponds and Dams	Port Stockyard and Port Facilities	Haul Roads and Access Roads	Pipelines, Power lines and Service Corridor
Iron Ore Mine and Downstream Processing, Cape Preston, Western Australia - Public Environmental Review (Maunsell, 2000)	Provides baseline data, environment description, project description, processing type, environmental impacts and how they are to be managed, waste generation and environmental commitments that relate to closure.	_	_	_	_	_	_	_	_	_	_
Iron Ore Mine and Downstream Processing, Cape Preston, Western Australia - Supplementary Environmental Review (Maunsell, 2002)	Additional information pertinent to the operations and mining project, project description changes to the original PER submission in 2000 and data that instigated Project description changes.	-	-	-	_	-	-	-	_	-	_
Ministerial Statement 635	Provides design commitments and principles, proponent commitments regarding closure, elements required for the various management plans and requirements for completing a closure plan.	-	-	-	_	_	-	-	_	-	-
Sino Iron Project, Cape Preston	Mine and processing details, areas of disturbance,	-	-	-	-						

 Table 17
 Document Register - Closure related reports, information and data

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		Landforms			Pastor	al			Cape Preston	Shared infrastrue	cture
Document Name	Document Summary	Mine Pit	TSF	Waste Rock Dumps and Stockpiles	Process and Power Station	Accommodation Village	Workshops, Laboratories, Materials Storage and Administration Buildings	Water Storage Ponds and Dams	Port Stockyard and Port Facilities	Haul Roads and Access Roads	Pipelines, Power lines and Service Corridor
Section 45C Documentation (October 2008)	details changes to PER, rate of mining and infrastructure footprint.		•								
Section 45C - Mine and Processing Approval (July 2009)	Mine and processing details, areas of disturbance, details changes to PER, rate of mining and infrastructure footprint.	-	-	-	-						
Iron Ore Mine, Downstream Processing and Port Construction, Cape Preston, Pilbara Section 45C – Support Infrastructure	Mine support infrastructural details and infrastructural footprint.				-	-				-	_
Support Infrastructure and Layout Approval (February 2009)	Mine support infrastructural details and infrastructural footprint.				-	-				-	-
Relocation of Pellet Plant to Cape Preston Application (January 2009) and Approval (March 2009)	Location of pellet plant and associated infrastructure and effects on vegetation and surroundings and heritage issues.				-						
Section 45 C Sino Iron Cape Preston Mine Supporting Information , May 2016 (Strategen 2016)	Increase in the disturbance area to allow for expansion of infrastructure adjacent to the Tailings Storage Facility (TSF), and to allow discharge of surplus water from mine pit dewatering.	-	-								
Preliminary Decommissioning and Closure Plan (Maunsell	Contains a project outline, key environmental impacts, Mineralogy closure commitments and closure	-	-	-	-	—	-	-	-	-	-

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		Landforms			Pastor	al			Cape Preston	Shared infrastrue	cture
Document Name	Document Summary	Mine Pit	TSF	Waste Rock Dumps and Stockpiles	Process and Power Station	Accommodation Village	Workshops, Laboratories, Materials Storage and Administration Buildings	Water Storage Ponds and Dams	Port Stockyard and Port Facilities	Haul Roads and Access Roads	Pipelines, Power lines and Service Corridor
Aecom, 2006)	strategies.										
TSF Stage 1 Operating Manual	Describes TSF, TSF risks and management and closure criteria.		-								
TSF 1 Management Plan, 2010	Describes TSF, TSF risks and management and closure criteria.		-								
TSF Stage 2 Management Plan, 2013	Describes TSF, TSF risks and management and closure criteria.		-								
Rehabilitation Management Procedure	Outlines the minimum requirements for re-establishing disturbed areas, what materials characterisation tests will be undertaken and outlines rehabilitation criteria.	-	-	-	-	-	-	-	-	-	-
Waste Rock Management Plan	Contains waste rock characterisation, waste landform construction, ARD potential, controls in waste rock handling, topsoil management and how the landforms and waste rock will be monitored.			-							
Sino Iron Project Topsoil Management at Sino Iron Project - Draft Report (Outback Ecology, 2009)	Risks of topsoil storage to revegetation rehabilitation options and data used to derive assumptions.	-	-	-	-	-	-	-	-	-	-
Geotechnical Assessment Sino Iron Project (Golder Associates, April 2009)	Assessment for acid metalliferous drainage and key geotechnical issues associated with the mining Project.	-	-	-	-	_	-	-	-	_	-
Groundwater Dewatering -	Drawdown assessment and pit void water information.	-	-	-	-	-	-	-	-	-	-

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		Landforms			Pastor	al			Cape Preston	Shared infrastruc	cture
Document Name	Document Summary	Mine Pit	TSF	Waste Rock Dumps and Stockpiles	Process and Power Station	Accommodation Village	Workshops, Laboratories, Materials Storage and Administration Buildings	Water Storage Ponds and Dams	Port Stockyard and Port Facilities	Haul Roads and Access Roads	Pipelines, Power lines and Service Corridor
Aquaterra Memo Report: Predicted Impacts on Groundwater Levels of Revised Mining Plan (August 2008)						/					
Landform design recommendations for Sino Iron Project. I. Batter slope and dump top design (Landloch, December 2009)	Landform design preference and implications, waste characterisation details and completion criteria.			-							
Landform design recommendations for Sino Iron Project. IV. Assessment and completion criteria (Landloch December 2009)	Outlines assessment and completion criteria for rehabilitation of waste landforms.			-							
Landform design recommendations for Sino Iron Project. II. Landform evolution modelling (Landloch, December 2009)	Provides details and results from landform evolution modelling (e.g. use of topsoil mixed with competent rock).			-							
Landform design recommendations for Sino Iron Project III. Sediment control (Landloch, December 2009)	Outlines findings of study on runoff and soil detachment and an assessment of sediment size distribution data in relation to predicted design and slope of waste dumps, design and maintenance of sediment control structures.			-							

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		Landforms			Pastor	al			Cape Shared Preston infrastr		cture
Document Name	Document Summary	Mine Pit	TSF	Waste Rock Dumps and Stockpiles	Process and Power Station	Accommodation Village	Workshops, Laboratories, Materials Storage and Administration Buildings	Water Storage Ponds and Dams	Port Stockyard and Port Facilities	Haul Roads and Access Roads	Pipelines, Power lines and Service Corridor
DMP estimates on topsoil	Provides the estimated requirements for topsoil in cubic metres and details the amount of topsoil required for different infrastructural areas.	-	_	-	-	-	-	-	-	_	-
Fortescue Iron Ore Projects Assessment of Minesite Surface Water and Groundwater Issues (Aquaterra/ Halpern Glick Maunsell, June 2000)	Description of the existing hydrological and hydrogeological regimes, potential impact of the project on the Fortescue Floodplain, general dewatering requirements, likely scale of impact of pit dewatering on the local/regional hydrogeological system(s) during operations and development of impact management strategies; description (semi- qualitative) of the long term impacts of decommissioned pits (below water table) and tailings storages and required monitoring.	_	_	_	_	_	_	_	-	-	-
Tailings Storage Facility (Stage 1) Construction Sino Iron Ore. Cape Preston, WA [M08/ 264, 265 and 266] Tailings Storage Facility Management Plan (March 2010)	Proposed Stage 1 development of TSF includes commitments, overview of project, existing environment, environmental impacts and management, closure criteria, decommissioning and rehabilitation plans for TSF and TSF operating manual and emergency action plan.		_								
Technical Documentation in Support of the Management Plan for Sino Iron Project Tailings Storage Facility Stages 1 & 2 (Golder Associates,	Provides detailed information relevant to the tailings facility including project description, description of tailings process, operations and management, monitoring, decommissioning and rehabilitation. Also includes full tailings characterisation report and		-								

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		Landforms		Pastor	al			Cape Preston	Shared infrastrue	cture	
Document Name	Document Summary	Mine Pit	TSF	Waste Rock Dumps and Stockpiles	Process and Power Station	Accommodation Village	Workshops, Laboratories, Materials Storage and Administration Buildings	Water Storage Ponds and Dams	Port Stockyard and Port Facilities	Haul Roads and Access Roads	Pipelines, Power lines and Service Corridor
September 2009) (Appendix A of Tailings Storage Facility (Stage 1) Construction Sino Iron Ore Cape Preston, WA [M08/ 264, 265 and 266] Tailings Storage Facility Management Plan, March 2010)	geotechnical investigation, borehole and test pit logs, wind tunnel testing (potential of wind erosion of respirable fibres) and semi-quantitative dam break assessment.										
Review of Tailings Storage Management Plan for Sino Iron and Korean Steel Projects (Revised) (CPM letter to DMP 15 April 2010)	Addresses aspects of the management of asbestiform materials, surface water management, acid mine drainage and rehabilitation and closure in relation to the tailings storage facility.		_								
Sino Iron 6 Mtpa Iron Ore Pellet Production Facility Waste Rock Management Plan (April 2008)	Provides detailed objectives, targets and management actions, waste rock characterisation, site geology, waste rock strategy and rehabilitation plan, principles and criteria.			-							
Sino Iron Waste Rock (Mined) Management Procedure (June 2015)	Procedure includes waste rock characterisation, disposal and dump construction, methods of encapsulation for PAF material and monitoring.			-							
Austeel Biological Survey Phase I (Halpern Glick Maunsell, 2000)	The vegetation and flora survey was conducted between the 15th and 28th of April 2000. A total of 121 detailed flora sites were inspected. Sites were located to represent the major vegetation	-	-	-	_	-	-	-	_	-	-

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Document Name	Document Summary	Mine Pit	TSF	Waste Rock Dumps and Stockpiles	Process and Power Station	Accommodation Village	Workshops, Laboratories, Materials Storage and Administration Buildings	Water Storage Ponds and Dams	Port Stockyard and Port Facilities	Haul Roads and Access Roads	Pipelines, Power lines and Service Corridor
	communities occurring within the area, and were concentrated on areas which were known to be proposed for disturbance. The fauna survey of the project area was conducted between the 14th and 28th of April 2000. An additional day (8th May 2000) was spent investigating potential sightings of Black and White Fairy wrens on Cape Preston.										
Austeel Development, Cape Preston, WA. Assessment of source water quality and intake and outlet locations for desalination plant. Prepared for Occtech Engineering Pty Ltd. D.A. Lord & Associates (2000)	An assessment of water quality completed to support work being conducted for the desalination plant.								_		
Fortescue Iron Ore Projects. Assessment of Minesite Surface Water and Groundwater Issues (Aquaterra, 2000)	Baseline groundwater levels, electrical conductivity (EC) measurements, rising head tests on selected mineral exploration boreholes in the George Palmer Orebody to provide direct estimates of <i>in situ</i> permeability of the orebody and footwall/hanging wall rocks and potential pit dewatering inflows.	-	_	-	_	-	_	_	_	_	-
Water Resources of the Lower Fortescue River Area. Unpublished report to Raymond	Baseline information on regional hydrogeology.	-	-	-							

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Document Name	Document Summary	Mine Pit	TSF	Waste Rock Dumps and Stockpiles	Process and Power Station	Accommodation Village	Workshops, Laboratories, Materials Storage and Administration Buildings	Water Storage Ponds and Dams	Port Stockyard and Port Facilities	Haul Roads and Access Roads	Pipelines, Power lines and Service Corridor
International (Bradberry Associates, 1965)											
Hydrogeology of the Fortescue River Alluvium. Unpublished GSWA Hydrogeology Report No. 1993/14 (Commander, DP, 1993) and Fortescue River Coastal Plain Bore Completion Reports. Unpublished GSWA Hydrogeology Report No. 1989/13 (Commander, DP, 1989)	Baseline information on regional geology.	-	_	-							
Mineable Ore Reserves of the Central Block of the Balmoral Mining Lease. Unpublished report to Mineralogy Pty Ltd by YRS Offshore Research Services B.V. (Ypma, PJ, 1992)	Geology of the George Palmer Orebody.	_	_	-							
Interpreted Site Maps showing Geology of Central, Northern and Southern Blocks. Unpublished maps prepared for Mineralogy Pty Ltd. (Thiess	Maps of minesite geology.	-	-	_							

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		Landfo	Landforms Pastoral		Cape Preston	Shared infrastrue	cture				
Document Name	Document Summary	Mine Pit	TSF	Waste Rock Dumps and Stockpiles	Process and Power Station	Accommodation Village	Workshops, Laboratories, Materials Storage and Administration Buildings	Water Storage Ponds and Dams	Port Stockyard and Port Facilities	Haul Roads and Access Roads	Pipelines, Power lines and Service Corridor
Initial Mixing of Brine at Cape	Modelling undertaken of the near field mixing of brine										
Preston (D. A. Lord & Associates Pty Ltd., February 2002)	to be discharged from the proposed plant. The purpose of the modelling is to estimate the extent of the initial mixing zone for environmental impact assessment purposes.				-				-		
AQ Modelling Austeel (Sinclair Knight Merz, June 2002)	Re-modelling of the Austeel air emissions based on a second Pellet Plant with emissions identical to the first Plant; DRI emissions remaining the same; and two additional gas turbines at the power station.				-						
Air Quality Assessments for CITIC Pacific Mining Power Station at Cape Preston. Air Assessments 2008 and 2009	Modelling of the power station emissions against different assessment factors				-						
Cape Preston Stygofauna. Dr. Brenton Knott, March 2001 and subsequent survey October 2001. University of WA, Department of Zoology	A stygofauna survey was undertaken on the George Palmer Orebody, the proposed plant area and the alluvials on Mardie Station with the objective of identifying whether any stygofauna would be impacted upon by the dewatering process. A subsequent survey was undertaken in October 2001 to further investigate the significance of the Oniscid isopod discovered.	_	_	_	_	_	_	_	-	-	-
Marine Turtle Nesting Activity	CALM conducted an inspection of sea-turtle nesting								-		

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(Department of Conservation and Land Management [CALM], December 2000)	activity on the beaches of Cape Preston on the morning of 28 December 2000.										
Migratory Birds Survey (February 2001)	A four-day survey was carried out and 17 shorebirds listed under the international agreements JAMBA and CAMBA were recorded. Two species of migratory terns, which are also listed under both international agreements, were also recorded.	-	-	-	-	-	-	-	_	-	-
Aboriginal Heritage Studies: Ethnographic Survey by Rory O'Connor (May 2001) and archaeological survey by Gary Quartermaine (April 2001)	Seventy-two newly recorded sites and seventy-three sites previously recorded in files at the Aboriginal Affairs Department were found in the vicinity of the survey areas. Eleven of the previously recorded sites and seventy one of the newly recorded sites are within the Project boundaries. The ethnographic survey recorded twenty-eight sites of significance within the Project area.	_	_	_	_	_	_	_	-	_	_
Geotechnical investigation for the concept design of the Tailings Storage Facility (Reported in Supplementary PER 2002)	The study included a site investigation programme using test pits and percussion drilled boreholes, followed by laboratory testing of typical soil samples.		-								
Austeel Iron Ore Project, Prediction of Groundwater Level Drawdown (Aquaterra,	Groundwater modelling was undertaken to assess potential groundwater impacts resulting from the mining of the George Palmer Orebody.	-	-	-	-	_	-	-	-	-	-

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2001)											
Fortescue River Floodplain Modelling Aquaterra -	A level survey for eight cross sections across the Fortescue River floodplain was reported to have been commissioned in the Supplementary PER 2002.	-	-	-	-	-	-	-	-	_	-
Biological Survey – Commissioned in 2001 - Ongoing survey	Austeel commissioned a survey, additional to the survey conducted in April 2000 (Reported in the Supplementary PER 2002).	-	-	-	-	-	-	-	-	-	-
Reconnaissance and Targeted Northern Quoll survey Cape Preston (Ecoscape 2016a, b)	Reconnaissance and Targeted Northern Quoll Survey	_							-		
Report on Shorebird Numbers and Shorebird Values at Cape Preston (Bennelongia 2008)	Annual, shorebird field inventory 2008 -										
Kimseeds Rehabilitation Target Seed identification Manual 2011	List of seeds that could be collected form within Sino Iron tenements and used for potential seed mix	-	-	-	-	Ι	-	-	I	-	-
Outback Ecology Topsoil Management at Sino iron Project, March 2009		-	_		-						
Astron 2015 Rehabilitation							-]	-			-]
Astron 2016 Rehabilitation				-				-		-	

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Document Name	Document Summary	Mine Pit	TSF	Waste Rock Dumps and Stockpiles	Process and Power Station	Accommodation Village	Workshops, Laboratories, Materials Storage and Administration Buildings	Water Storage Ponds and Dams	Port Stockyard and Port Facilities	Haul Roads and Access Roads	Pipelines, Power lines and Service Corridor
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Appendix A – Figures

- Figure 1 Location Plan
- Figure 2 Conceptual Mine Continuation Development Footprint
- Figure 3 Rehabilitation Management Area Artificial Landforms
- Figure 4 Rehabilitation Management Area Share Infrastructure
- Figure 5 Rehabilitation Management Area Pastoral Land

Figure 6 – Rehabilitation Management Area – Cape Preston















Appendix B – Legal and Other Obligations

Table 1 Legislative Closure Requirements

Ministerial S	Statement 635	, 20 October 2003
Condition	Date	Closure Condition
16 -1	19.10.2006	Prior to construction, the proponent shall prepare and subsequently implement a Preliminary Decommissioning and Closure Plan, which provides the framework to ensure that the project area is left in an environmentally acceptable condition to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority. The preliminary Decommissioning and Closure Plan shall address: 1. Rational for the siting and desing of plant and infrastructure as relevant to environmental protection
		and conceptual plans for the removal or, if appropriate, retention of plant and infrastructure.
		 Long-term management of ground and surface water systems affected by the mine tailings storage facility and waste rock dumps;
		 A conceptual rehabilitation plan for all disturbed areas and a description of a process to agree on the end land use(s) with all stakeholders;
		4. A conceptual plan for a care and maintenance phase; and
		Management of noxious materials to avoid the creation of contamination areas.
16-2		At least five years prior to the anticipated date of closure, or at a time agreed with the Environmental Protection Authority, the proponent shall prepare a Final Decommissioning and Closure Plan designed to ensure that the site is left in an environmentally acceptable condition to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority. The final Decommissioning and Closure plan shall address:
		1. Removal of if appropriate, retention of plant and infrastructure in consultation with relevant stakeholders
		 Long term management of ground and surface water systems affected by the mine tailings storage facility and waste rock dumps;
		 Rehabilitation of all disturbed areas to a standard suitable for the agree new land use(s)
		 Identification of contaminated areas , including provision of evidence of notification and proposed management measure to relevant statutory authorities



16 -3	The proponent shall implement the Final Decommissioning and Closure Plan required by condition 16-2 until such time as the Minister for the Environment determines, on advice of the Environmental Protection Authority, that the proponent's closure responsibilities are fulfilled.
16-4	The proponent shall make the Final Decommissioning and Closure plan required by condition 16-2 publicly available, to the requirements of the Minister for the Environmental on advice of the Environmental Protection Authority.

Ministerial Statement 635, 20 October 2003					
Commitment	Action				
2-14	Prepare, implement and regularly revise and Environmental Management Programme (EMO). The EMP will contain plans, guidelines and procedures to manage environmental issues associated with construction and operation of the Project including: 14. closure and decommissioning				

Relevant DN	Relevant DMP Tenement Conditions							
Tenement	Condition	Closure Condition						
M08/123 M08/124	5.1	All waste materials, rubbish, plastic sample bags, abandoned equipment and temporary buildings being removed from the mining tenement prior to or at the termination of exploration programme						
	12.1	All topsoil being removed ahead of all mining operations from sites such as pit areas, waste disposal areas, ore stockpile areas, pipeline, haul roads and new access roads and being stockpiled for later respreading or immediately respread as rehabilitation progresses.						
	13.1	At the completion of operations, all buildings and structures being removed from site or demolished and buried to the satisfaction of the Director, Environment Division, DoIR						
	14.1	All rubbish and scrap is to be progressively disposed of in a suitable manner.						
	15.1	At the completion of operations, or progressively where possible, all access roads and other disturbed areas being covered with topsoil, deep ripped and revegetated with local native grasses, shrubs and trees to the satisfaction of the Director, Environment Division, DoIR						



M08/125	11.1	All topsoil being removed ahead of all mining operations from sites such as pit areas, waste disposal areas, ore stockpile areas, pipeline, haul roads and new access roads and being stockpiled for later respreading or immediately respread as rehabilitation progresses.
	12.1	At the completion of operations, all buildings and structures being removed from site or demolished and buried to the satisfaction of the Director, Environment Division, DoIR
	13.1	All rubbish and scrap is to be progressively disposed of in a suitable manner.
	14.1	At the completion of operations, or progressively where possible, all access roads and other disturbed areas being covered with topsoil, deep ripped and revegetated with local native grasses, shrubs and trees to the satisfaction of the Director, Environment Division, DoIR
M08/266	3-2	All costeans and other disturbances to the surface of the land made as a result of exploration, including drill pads, grid lines and access tracks, being backfilled and rehabilitated to the satisfaction of the Environmental Officer, Department of Industry and Resources (DoIR). Backfilling and rehabilitation being required no later than 6 months after excavation unless otherwise approved in writing by the Environmental Officer, DoIR
	4.1	All waste materials, rubbish, plastic sample bags, abandoned equipment and temporary buildings being removed from the mining tenement prior to or at the termination of exploration programme.
	5.2	Unless the written approval of the Environmental Officer, DoIR is first obtained, the use of scrapers, graders, bulldozers, backhoes or other mechanised equipment for surface disturbance or the excavation of costeans is prohibited. Following approval, all topsoil being removed ahead of mining operations and separately stockpiled for replacement after backfilling and/or completion of operations.
M08/266 M08/264 M08/265	12.1	All topsoil being removed ahead of all mining operations from sites such as pit areas, waste disposal areas, ore stockpile areas, pipeline, haul roads and new access roads and being stockpiled for later respreading or immediately respread as rehabilitation progresses.
M08/266 M08/264 M08/265	13.1	At the completion of operations, all buildings and structures being removed from site or demolished and buried to the satisfaction of the Director, Environment Division, DoIR
M08/266 M08/264	14.1	All rubbish and scrap is to be progressively disposed of in a suitable manner.

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M08/265		
M08/266 M08/264 M08/265	15.1	At the completion of operations, or progressively where possible, all access roads and other disturbed areas being covered with topsoil, deep ripped and revegetated with local native grasses, shrubs and trees to the satisfaction of the Director, Environment Division, DoIR
M08/264	23.1	At the time of decommissioning of the tailings storage facility and prior to rehabilitation, a further review report by a geotechnical or engineering specialist will be required by the Director, Environment, DMP. This report should review the status of the structure and its contained tailings, examine and address the implications of the physical and chemical characteristics of the materials, and present and review the results of all environmental monitoring. The rehabilitation stabilisation works proposed and any on-going remedial requirements should also be addressed.
M08/265	22.1	At the time of decommissioning of the tailings storage facility and prior to rehabilitation, a further review report by a geotechnical or engineering specialist will be required by the Director, Environment, DMP. This report should review the status of the structure and its contained tailings, examine and address the implications of the physical and chemical characteristics of the materials, and present and review the results of all environmental monitoring. The rehabilitation stabilisation works proposed and any on-going remedial requirements should also be addressed.
G08/54	8.1	All topsoil being removed ahead of all mining operations from sites such as pit areas, waste disposal areas, ore stockpile areas, pipeline, haul roads and new access roads and being stockpiled for later respreading or immediately respread as rehabilitation progresses.
	9.1	At the completion of operations, all buildings and structures being removed from site or demolished and buried to the satisfaction of the Director, Environment Division, DoIR.
	10.1	All rubbish and scrap is to be progressively disposed of in a suitable manner.
	11.1	At the completion of operations, or progressively where possible, all access roads and other disturbed areas being covered with topsoil, deep ripped and revegetated with local native grasses, shrubs and trees to the satisfaction of the Director, Environment Division, DoIR.
L08/20	5.1	All topsoil that may be removed ahead of pipelaying operations to be stockpiled for replacement in accordance with the directions of the Inspector.
	18.1	On the completion of the life of mining operations in connection with this licence the holder shall:•remove all installations constructed



	pursuant to this licence; and
	•on such areas cleared of natural growth by the holder or any of its agents, the holder shall plant trees and/or shrubs and/or any other plant as shall conform to the general pattern and type of growth in the area and as directed by the Inspector and properly maintain same until the Inspector advises regrowth is self supporting;
	unless the Mining Registrar orders or consents otherwise.
G08/74	None related to decommissioning or closure
G08/63	None related to decommissioning or closure
G08/53	None related to decommissioning or closure
G08/52	None related to decommissioning or closure

Environmental Protection Act Licence No: L8308			
Condition	date	Aspect related to closure	
1.2.2	24.11.2016	The licencee shall ensue that where waste produced on the Premises are not taken offsite for the lawful use or disposal, they are managed according to the requirements of table 1.2.1. Specifically the Landfill Facility and waste rock landforms	
1.2.3	24.11.2016	The licensee shall ensure that cover is applied and maintained on landfill waste in accordance with Table 1.2.2 and that sufficient stockpile covers are maintained on site at all times.	



Appendix C – Environmental Baseline Data

The environmental baseline data included in this appendix has been largely source from the PER (Maunsell, 2000) and Supplementary PER (Maunsell, 2002).

C1.1 Geology and Geochemistry

The ore resources are contained within the George Palmer ore deposit. The geology encountered within the George Palmer deposit consists mostly of Brockman Iron Formation with some minor expressions of the overlying Weeli Wolli Formation and underlying Mount McRae Shale. The Brockman Iron Formation consists of alternating sequences of Banded Iron Formation (BIF), shale and chert, subdivided into four Members, the iron-rich units being the Joffre and Dales Gorge Members.



Figure B-1 Minesite geology (after Maunsell, 2000) note that project components are no longer relevant

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A strong magnetic anomaly is coincident with the deposit, and it extends to both the north and south of the Project area (M08/123, M08/124 and M08/125) and correlates well with the extent of the Brockman Iron Formation.

The stratigraphy of the deposit is considered to be well understood in a regional and local context. Mineralisation within the Joffre and Dales Gorge Members are described as BIF with the main ore mineral being magnetite. The Joffre member is overlain by the Yandicoogina Shale and underlain by the Whaleback Shale and Dales Gorge BIF (Figure B-1). The average interpreted stratigraphic thickness of the Joffre member is approximately 300 m, strikes between 15 and 20 degrees east of north and dips consistently at around 45 degrees to the west-north-west. There is no significant folding within the formation. Fibrous materials may be present within the represented geological formations. This may present a risk to the health and safety of workers during closure, and public safety after closure, if fibrous materials within the pit walls and waste rock dump remain exposed after rehabilitation.

Geochemical testing carried out by Golder (2009) found that the majority of the materials sampled and tested were non-acid forming (NAF); however a number of samples, generally associated with the shale units (Mt McRae Shale, Whaleback Shale and Dales Gorge Shale), were found to be potentially acid-forming (PAF). The majority of the PAF material was also found to be associated with the waste rock units. This implies that the waste rock dumps and exposed pit wall may contain PAF material. An analysis of the geological block model indicated that the majority of the material is located such that it may be managed by careful materials placement within the waste rock dumps during operations.

It is found that leaching of acid and metals may occur, if PAF materials become oxidised. The presence of PAF materials may present a risk to achieving closure outcomes particularly concerning the maintenance of pit void quality, and surface and groundwater quality around the waste rock dumps and TSF.

C1.2 Topsoil Stockpiles and Soil Quality

Some of the key topsoil and subsoil characteristics identified in the Waste Rock Management Plan (CPM, 2008) and in the draft Topsoil Management Report (Outback Ecology, 2009) are:

- Topsoil layers are thin (2 to 10 cm) and contain a gravel content typically more than 50%.
- Upper subsoils (5 to 30 cm) and lower subsoil (30 to 100 cm) are dominated by gravel and increase in thickness from about 50 cm on crests and slopes to 100 cm on lower areas and lower to flat slope positions.
- Roots are abundant in the upper part of the soil profile. Roots extended into subsoil materials and underlying fractured rock.
- Soils have a low nutrient content, are neutral to slightly alkaline and generally have low salinity levels and are highly dispersive.

In order to achieve successful rehabilitation outcomes, topsoil management needs to incorporate strategies for planning, stripping, stockpiling and respreading. Issues found in topsoil management procedures included:

• Topsoil from contrasting landscapes and/or vegetation associations were combined in the same stockpile. This results in there being less capacity for targeted placement of soils during



rehabilitation activities and may lead to increased erosion risk or the potential to not promote establishment of plant communities in inappropriate landscape zones.

- Skeletal soils and/or outcropping rock in some areas has resulted in there being insufficient topsoil volumes compared to the total area to be rehabilitated. This presents a risk to achieving expected rehabilitation outcomes for vegetation re-establishment.
- Loss of soil structure due to mechanical disruption of the soil during stripping may mead to poorly structured, hard-setting surface soils on rehabilitated areas. This may increase the risk of erosion of soil and poor plant establishment after rehabilitation.
- Formation of anaerobic environments in stockpiles may lead to seed death and reduced numbers of seed available for plant establishment during rehabilitation.
- The presence of dispersive soil types may result in increases erosion and poor plant establishment in the areas where non-ameliorated topsoil is used in rehabilitation, particularly where dispersive soils are replaced on sloping surfaces (e.g. on the edges of waste rock dumps).

C1.3 Geotechnical Assessments (TSF)

Geotechnical investigations were carried out for the concept design of the TSF, and are summarised in the Supplementary PER (Maunsell, 2002). The ground conditions encountered can be generalised according to the following two subsurface sequences:

- · Calcretes and weathered sediments overlying basalts on the western side of the TSF site; and
- Outcropping shallow basalts located throughout the remainder of the TSF site.

A sediment profile of the TSF site is described in order of youngest to oldest as:

- Gravelly to sandy red/brown clay extending to depths of 0.4 m to 2 m;
- Light brown to creamy white calcrete (calcium carbonate rich) to depths of 4 m to 6 m;
- interbedded layers of mottled purple/red/brown chert/shale/tuff extending to depths varying from 5.7 m to 30 m; and
- Light grey green basalt extending for the remainder of the investigation sequence up to 30 m.

Permeability testing indicates that within the calcrete sand and gravel soils the permeability is in the ranges from 10 to 7 m/s through to 10 to 8 m/s. Within the basalts the permeability is greater than 10 to 8 m/s.

The majority of the soils located on the TSF site are sandy clays and gravelly clays of medium to high plasticity, high natural moisture content (>11.1%), standard maximum dry density of between 1.67 and 1.92 t/m³ and standard optimum moisture content of greater than 17%. The calcrete materials within the soil profiles are gravely clayey sands of low to medium plasticity, low natural moisture content (<11%), standard maximum dry density of between 1.96 and 2.08 t/m³ and standard optimum moisture content of greater than 13.5%.

The near surface soils of the TSF site comprise a thin veneer of intermediate to high plasticity sandy clays (gilgai), ironstone clayey sands and clayey gravels, overlying low permeability cemented calcrete sands and gravels. The soils overly weathered shales and tuffs or fresh basalt. The presence of these materials would tend to indicate the seepage losses could be in the order of 10 to 7 m/s beneath the TSF and the falling head testing indicating the majority of seepage loss is within the calcrete sands and gravels.

The potential for the underlying soils to receive seepage from the TSF indicates that seepage of tailings pore water (which may be acidic and/or metalliferous) has the potential to impact groundwater

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quality beneath the TSF during operations. This may present a risk to achieving closure objectives relating groundwater quality and the health of groundwater dependant vegetation and fauna.

C1.4 Groundwater

The major aquifers in the project area are the gravels of the Fortescue River alluvium and to a lesser extent the Yaraloola Conglomerate. The aquifer properties are described in Table B-1. Previous investigations (Commander, 1993; and Bradberry Associates, 1965) indicate that the alluvium is potentially a major source of fresh water and could support substantial pumping for water supply. Aquifer permeabilities in excess of 50 m/d and bore yields of up to 900 kL/d each have been demonstrated. Sustainable abstraction of around 10,000 ML per year has been estimated. Numerous station wells and bores in the area tap this aquifer.

Age	Unit	Description
Quaternary	Fortescue River Alluvium	Gravels form major aquifer with high permeability. Aquifer covers extensive area beneath floodplain. Groundwater is fresh in most of floodplain area. Groundwater is marginal to brackish on edge of floodplain. Groundwater is brackish to saline at depth near coast.
	Eluvium-Residual Soils	Mostly above the water table. Forms local aquifer where saturated, connected to alluvium.
Tertiary	Trealla Limestone	Aquitard. Forms confining layer to Yarraloola Conglomerate. Forms base of overlying alluvial aquifer.
Cretaceous	Yarraloola Conglomerate	Confined aquifer with moderate to low permeability. Forms narrow channel aquifer in old river course. Intersected in three GSWA bores. Groundwater is fresh in these bores.
Proterozoic	Weeli Wolli Formation Brockman Iron Formation Mt McRae-Mt Sylvia Formation Maddina Volcanics	Indurated rocks with no primary porosity or permeability. Some minor fracture induced secondary aquifer properties. Not aquifers in project area. Groundwater is marginal to brackish in mine area.

Table B-1 Summary of Hydrogeological Properties (after Maunsell, 2000)

The Yarraloola Conglomerate is much less extensive than the shallower alluvium in the project area and appears to be limited to a narrow channel. Permeability of less than 2 m/d has been indicated, although the water quality, where tested, appears to be as good, if not better than in the alluvium.

The Proterozoic basement rock aquifers are recharged by the infiltration of rainfall and local runoff in areas of outcrop and via leakage from overlying residual soils and sediments in areas of subcrop. These aquifers discharge by baseflow to local drainages and by throughflow to the Fortescue River alluvium and coastal sediments. As such groundwater flow in the basement rock aquifers is generally from topographic highs towards the Fortescue River and the coast, with some local convergence about creeks during non-flood periods. Based on hydraulic gradients indicated by groundwater level contours, and the transmissivity indicated by rising head testing, the groundwater throughflow in the basement rock aquifers in the minesite area is around 5 kL/d per km.


The Fortescue River Alluvium aquifer, and deeper sediments on the main floodplain, is mostly recharged by the infiltration of river flow, although there is some minor direct infiltration of rainfall and some throughflow from flanking basement rock aquifers. These aquifers discharge by baseflow to the Fortescue River during periods when the water table is above the riverbed and above river water levels, and by evapotranspiration. The latter occurs via vegetation established on the floodplain and also as direct evaporation from the near shore tidal flats where the fresh groundwater flows up to the surface above a saline water interface. As such, groundwater level contours tend to be parallel to the coast with flow in a north-westerly direction, although there is local divergence of groundwater flow away from the main river channels at times of river flow and local convergence of groundwater flow about the river channels in periods of little to no flow. The groundwater throughflow in the main aquifer (gravels) in the alluvium has been estimated (Commander, 1993) at up to 9.2 Mm3/yr (an average of around 25 ML/d).

Groundwater flow in the region is generally from southeast to northwest towards the ocean, with local groundwater flows being influenced by topography, recharge and discharge zones. Groundwater levels will vary with the seasons and there is potential for development of perched groundwater tables following periods of rainfall.

The management of groundwater during operations has the potential to affect closure outcomes in relation to:

- The final pit void water level;
- Contaminant transport through groundwater flow paths from the pit void, and other potentially contaminated areas resulting in impact to receiving environments; and
- The availability of groundwater to sustain groundwater dependant ecosystems (e.g. vegetation and subterranean fauna).

C1.5 Groundwater Quality

The distribution of groundwater quality is described in the PER (Maunsell, 2000) and is best illustrated by salinity. Figure B-2 shows groundwater salinity contours based on groundwater samples taken during the April 2000 field survey results and earlier (pre-1993) results from groundwater sampled from the Fortescue River alluvium bores.

The groundwater quality types in the region are summarised into three main types:

- Fresh groundwater (<1,000 mg/L TDS) in the central part of the Fortescue River alluvium. This fresh water forms a "lobe" elongated along the main channels of the River as a result of recharge;
- Marginal to brackish groundwater (1,000 to around 2,000 mg/L TDS) in the basement rock aquifers and on the flanks of the Fortescue River alluvium where throughflow from the basement rocks mixes with the fresh water in the alluvium; and
- Brackish to saline groundwater (greater than 5,000 mg/L TDS) adjacent to the coast, where there is
 a saline water interface between the fresh groundwater flowing northwards and seawater. This
 interface dips to the south (i.e. inland) forming a "salt water wedge" and groundwater salinity would
 increase with depth in the near coastal and tidal flats areas.

Groundwater quality data from the Basement Rock aquifers (from 1993 and 2000) indicate the groundwater to be predominantly sodium chloride type water which has evolved by simple dissolution or mixing since recharge of rainfall. Comparison of the reported laboratory data with the Western Australian Water Quality Guidelines for Fresh and Marine Waters (OEPA, 1993) in relation to drinking water and livestock water guidelines indicates that the Fortescue River Alluvium groundwater quality



conforms to the drinking water guidelines apart from at the flanks of the floodplain and in the near coastal zone.



Figure B-2 Regional Groundwater Salinity Contours (after Maunsell, 2000) (after Maunsell, 2000) note that project components are no longer relevant

Apart from one drill-hole in the George Palmer Orebody (A11), the groundwater sampled from the basement rock bores and wells exceeds drinking water guidelines, mostly in relation to salinity (TDS) and chloride. However, some of the earlier samples collected also reported elevated values for sulphate, manganese, barium, nickel, boron and cadmium compared to the guidelines.

Most of the groundwater sampled is within the guidelines for stock water usage; however, there were several exceptions. The exceptions are some of the GSWA monitor bores located on, or adjacent to, the tidal flats, and basement rock bore M7.

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Changes to groundwater quality as a result of the Project, may present a risk to the achievement of closure outcomes relating to final land use and protection of beneficial uses of groundwater in the region following closure.

C1.6 Surface Hydrological Regime

Background surface water information for the project area comprises streamflow gauging data for the Fortescue River, aerial photography and published 1:50,000 topographical mapping. To supplement this data, a site visit was conducted by Aquaterra in February 2000. From the topographical mapping and the observations obtained, sufficient information was obtained to describe the general surface water conditions in the project area (Aquaterra, 2000).

The Department of Water provide flood flow estimates for the lower Fortescue River of 3080 m³/s and 5320 m³/s for the 10 year and 100 year annual recurrence interval (ARI) flood events respectively, based on data from this gauging station.

The project area is located adjacent to the lower Fortescue River, which has an effective catchment area of approximately 20,000 km². The total Fortescue River Basin has a catchment area of around 50,000 km²; however, the upper portion of this basin drains only as far as the Fortescue Marsh Area, approximately 350 km from the coast, and does not drain into the lower Fortescue River (Maunsell, 2000 after WRC, 2000).

Upstream from the North West Coastal Highway, the Fortescue River is generally contained between high ridges. However, downstream from the highway, the topography becomes less pronounced and the river flow path less constrained. During large flood events, river flows will break away from the main flow channel and extend over the adjacent floodplains. Through the floodplains, numerous smaller flow channels have developed discharging in the same general direction as the main channel. The Fortescue River adjacent to the project area has a well-defined main flow channel, typically 4 to 6 m deep and around 100 m wide with a gravelly bed.

The Edward and Du Boulay Creeks flow in a north westerly direction through the general project area and discharge into the Fortescue River. These creeks, which drain ridges located to the east and southeast of the project area, have catchment areas of approximately 30 km^2 and 210 km^2 respectively. Near the project areas, both creeks typically have main flow channels with 5 to 10 m wide gravel beds.

Rainfall runoff from the steep ridges located within the general project area would tend to be rapid and short lived. These steep and incised drainage lines typically link into lower energy flow channels located around the perimeter of the ridges and then drain to the main Fortescue, Du Boulay or Edward systems, or directly to the coast. Tidal levels at the Fortescue River mouth vary between a mean high water spring of approximately 1.8 m AHD and a mean low water spring of approximately -1.9 m AHD with fluctuations resulting in inundation of the coastal tidal marshes.

Due to the potential for flood waters to extend across the floodplains and the mine area, final landform design should consider potential impact from flood waters, including potential for erosion and saturation of raised landform edges, and flooding of flat profiled features and low lying areas.

C1.7 Flora and Vegetation

A vegetation and flora survey of the project area was conducted in April 2000 (Maunsell, 2000). Sixty four (64) vegetation types were identified within the survey area (refer to Appendix 2 of PER



(Maunsell, 2000)). There were no firm conclusions made regarding the significance or otherwise of the vegetation types identified within the survey area, given the paucity of other data with which to make local and regional comparisons. The perceived conservation significance of vegetation identified in the Project area is summarised in Table B-2.

Vegetation type(s) defined in the survey of the project area	Perceived conservation significance based on field experience	Comments
Lb & Ld1	Low	Beaches are widespread along the coast. Flora common and widespread.
Lm	Refer to PER	See Section 8.3.3 of the PER (Maunsell, 2000).
Ls1/2	Moderate	Saline flats are abundant along the coast. Communities likely to be relatively similar in floristic composition. Samphire susceptible to physical disturbance.
Ld2/3	High	Coastal dune habitat relatively widespread but has a limited representation (area). Similar habitat and vegetation occurs to the east at Cape Lambert (M. Maier, pers. obs.) and Karratha (Dames & Moore, 1995). Dunes susceptible to invasion by Buffel grass and erosion following physical disturbance.
Ld4	High	High species richness. Habitat likely to be poorly distributed along coast.
Ld5	Moderate	Flora quite widespread and common. Habitat restricted to sandy swales. Similar vegetation likely to occur in equivalent habitat elsewhere along coast.
Lp1	Moderate	Flora quite widespread and common. Sandy plain habitat likely to be poorly distributed along coast.
Hpg1/2/3, Hps1 & Hc1	Moderate to High	Red cracking clay habitat quite widespread on the Abydos Plain, and typical flora also relatively widespread and common. Vegetation in good condition within the study area, and supports some Priority flora (<i>Hibiscus brachysiphonius</i>). Cracking clays susceptible to weed invasion and erosion following physical disturbance.
Nh12/3/4/5	Moderate	Flora widespread and common. Hummock grasslands dominate the three orebodies, however, these vegetation types are possibly restricted in the region, given their occurrence on the most coastal extension of the Newman Land System (LS).
Nc1/2/3/4	Moderate to High	Minor creek lines relatively species rich and have a small representation in the landscape. Where influenced by underlying geology, vegetation types of these creek lines are possibly restricted in the region, given their occurrence on the most coastal extension of the Newman LS.
Nr12/3/4	Moderate to High	Rocky outcrops relatively species rich and support habitat restricted species (e.g. lianes and rock figs). Very variable in composition. Outcrops make up a very small proportion of the landscape. Outcrop vegetation types possibly restricted in the region, given their occurrence on the most coastal extension of the Newman LS.
ROh1a-b & ROh2a-b	Low to Moderate	Flora largely common and widespread. Hummock grasslands likely to be broadly distributed in the coastal areas, given the extensive occurrence of the Rocklea LS in the region.
ROp1	Low to Moderate	Vegetation type associated with calcretisation caused by seepage; occurs elsewhere along the coast in similar habitat (i.e. where rocky slopes abut beaches on the Burrup; M. Trudgen, pers. com.). Some areas support restricted species.
ROx1	Low to Moderate	Flora relatively common and widespread. Limited distribution within the general Rocklea LS, and may therefore have a minor representation in the

Table B-2 Summary of Perceived Conservation Significance of the Vegetation Units in the Project Area (after Maunsell, 2000)

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Vegetation type(s) defined in the survey of the project area	Perceived conservation significance based on field experience	Comments
		region. Subject to weed invasion by Buffel grass.
ROc1/2/3/4/5	Moderate	Minor creek lines relatively species rich and have a small representation in the landscape. Vegetation types unlikely to be restricted in the region, given the broad distribution of the Rocklea LS. Some areas support Priority flora (<i>Abutilon trudgenii</i> ms.).
ROr1/2/3	Moderate	Rocky outcrops very variable in composition, relatively species rich and support restricted species (e.g. lianes and rock figs). Make up a very small proportion of the landscape. Vegetation types unlikely to be restricted in the region, given the extensive occurrence of the Rocklea LS.
Px1/2/3 & Bx1	Moderate	Snakewood shrublands variable in composition, but typical flora are common and widespread, and suitable habitat is broadly distributed in the region within the Paraburdoo and Boolgeeda LS. Vegetation types therefore unlikely to be restricted. Habitat susceptible to weed invasion (Buffel grass; also potentially Mesquite near Fortescue River). Some areas support Priority flora (<i>Hibiscus brachysiphonius</i>).
Pp1/2	Moderate	Flora generally common and widespread. Suitable habitat likely to exist elsewhere along coast within Paraburdoo LS, thus vegetation types unlikely to be restricted in the region. Vegetation typically in very good condition with little weed invasion.
Pc1/2/3/4 & Pf1	Moderate to High	Creek lines have high species richness and support various habitat-specific flora, including Priority flora in some areas (<i>Eriachne tenuiculmis, Phyllanthus aridus</i>). Make up small proportion of landscape. Vegetation very variable, but unlikely to be restricted in region given extensive occurrence of Paraburdoo LS. Susceptible to weed invasion (Buffel grass and Mesquite).
Mp1	Moderate	Flora relatively common and widespread. Macroy LS relatively widely distributed in region, therefore vegetation type unlikely to be restricted. Vegetation in very good to excellent condition with little weed invasion.
Mr1/2	Moderate to High	Rocky outcrops very variable in composition, relatively species rich and support very different flora from surrounding hummock grasslands. Outcrops make up a very small proportion of the landscape in the Macroy LS, and some vegetation types may be restricted in the region.
Rc1/2/3/4	High	Riverine vegetation has a high species richness and supports a range of habitat-specific flora. Flora relatively widespread and typical of such habitats. River LS widely distributed in region and vegetation types are therefore unlikely to be restricted. However river systems make up a small proportion of the land surface, and riverine forest with Cadjeputs is likely to have a particularly limited distribution in the region. Vegetation susceptible to weed invasion and changes in water levels. Occurs in the Fortescue River and its tributaries, which represent the major drainage system for the area. Disturbance to vegetation or habitat may therefore affect areas dependent on this system (both upstream and downstream).
Rf1	Moderate	Flora largely common and widespread. Vegetation would occur elsewhere in region on floodplains of the River LS. Floodplains are an important component of drainage systems. Susceptible to weed invasion.
Rf2	None	Degraded; infested with Mesquite.
Yp1 & Yc1	Moderate	Very limited assessment of these areas indicated extremely variable vegetation, reflecting minor differences in water relationships and depositional changes on a very fine scale. Yamerina LS broadly distributed to west, and broad vegetation types therefore unlikely to be restricted, however some plant assemblages likely to be uncommon.

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Since vegetation types are relatively closely linked to land system classifications, broad comparisons can be made based on the distribution of the land systems which comprise the survey area. Of the nine land systems occurring within survey area (Boolgeeda, Horseflats, Littoral, Macroy, Newman, Paraburdoo, River, Rocklea and Yamerina), the Littoral, Horseflats, Rocklea, Boolgeeda, and to a lesser extent Paraburdoo and Macroy land systems are well represented. The Newman land system is more typical of areas inland, where it is broadly distributed. The River land system has a relatively minor representation in the region, while the Yamerina land system occurs as a single broad swathe associated with the Fortescue River delta. The distribution of land systems and vegetation types is shown on Figure B-3 to Figure B-5.

A total of 427 taxa of vascular flora were recorded from the survey area. These taxa belong to 191 genera from 64 families. Six of the species were mangroves (Section A.9). Nonvascular flora (e.g. algae, mosses and liverworts) and fungi were not specifically sampled. One green alga, *Chara* sp., was recorded from riverine pools, while blue-green algal crusts were noted on tidal mudflats. Two fungi were recorded; the gasteromycete *Podaxis pistillaris* and an undetermined black fungi.

Families and genera represented by the greatest number of taxa are typical of the dominant plant groups of the western Pilbara. Twenty six (26) families and 117 genera were represented by only one taxon. The most frequently recorded species were Buffel grass **Cenchrus ciliaris* (91 records), *Triumfetta clementii* (82 records), *Triodia wiseana* (78 records), *Rhynchosia* cf. *minima* (75 records), *Trichodesma zeylanicum* (72 records), *Evolvulus alsinoides* var. *villosicalyx* (66 records), *Acacia bivenosa* (65 records) and *Solanum lasiophyllum* (62 records). Seventy six species were recorded from only a single collection.

A search of CALM's *Threatened (Declared Rare) Flora* database and the Western Australian Herbarium Specimen database did not find any records of conservation significant species. The *Priority Species List* described eight priority flora as occurring in the area:

- Priority 1-Gunniopsis sp. Fortescue (M Trudgen 11019);
- Priority 2-Ischaemum albovillosum; and
- Priority 3-Abutilon trudgenii ms., Acacia glaucocaesia, Hibiscus brachysiphonius, Sida sp.
 Wittenoom (WR Barker 1962), *Tephrosia* sp. Cathedral Gorge (FH Mollemans 2420) and *Themeda* sp. Hamersley Station (ME Trudgen 11431).





Figure B-3 Land system and Vegetation Distribution - Mine Area (after Maunsell, 2000) note that project components are no longer relevant

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Figure B-4 Land system and Vegetation Distribution - TSF Area (after Maunsell, 2000) note that project components are no longer relevant

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Figure B-5 Land system and Vegetation Distribution – Cape Preston Area (after Maunsell, 2000) note that project components are no longer relevant

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No Declared Rare Flora (DRF) were located during the field survey and none are expected to occur within the habitats encompassed by the project (Section 8.1.2 of the PER; Maunsell, 2000). Of the

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Priority species highlighted by the search of the Priority Species List, *Abutilon trudgenii* ms., *Hibiscus brachysiphonius* and *Sida* sp. Wittenoom were recorded during the field survey conducted by Halpern Glick Maunsell. Two additional Priority 3 species, *Eriachne tenuiculmis* and *Phyllanthus aridus*, were also collected. In addition, some "Flora of Interest" (flora species that are not listed as DRF or Priority but which are poorly known and/or could not be identified to species level) were also identified:

- Apparently newly discovered species *Tephrosia* aff. *clementii* (type 1) (M1/M2), *Tephrosia* aff. *clementii* (type 2) (M35-14), *Hibiscus* aff. *platychlamys* (M9-15), *Hibiscus* aff. *platychlamys* (M35-11) and other Mulvaceae (several taxa with affinities to *Sida fibulifera* were collected from the project area, while a number of Abutilon taxa also appear to represent undescribed taxa. The genus *Sida* is under revision).
- Range extensions Senna sp. Karajini (ME Trudgen 10,392).
- Species previously poorly collected and thought likely to be uncommon *Tephrosia* aff. Supina (M.E. Trudgen 12,357) and *Urochioa* sp. "glabrous apices".
- Other poorly collected species *Boerhavia paludosa, Mukia* sp. D (Flora of Australia) and *Sclerolaena beaugleholei.*

Thirteen species of introduced flora (*Prosopis pallida* hybrid, *Aerva javanica, Argemone ochroleuca, Bidens bipinnata, Cenchrus ciliaris, Cenchrus setigerus, Citrullus lanatus, Cucumis melo subsp. Agrestis, Datura leichhardtii, Malvastrum americanum, Melochia pyramidata, Passiflora foetida, Setaria verticillata*) were recorded in the Project area. Mesquite (*Prosopis pallida* hybrid), is listed as a Declared Plant (Noxious Weed) under the *Agriculture and Related Resources Protection Act 1999.*

The vegetation mapping completed as part of the PER (Maunsell, 2000) may be used to identify target landforms and vegetation extent and distribution in relation to closure criteria, and to identify vegetation communities that may be impacted by the Project and not able to be re-established at closure.

C1.8 Fauna

A fauna survey of the project area conducted in April 2000 recorded a total of 179 vertebrate species. A summary of the number of species recorded from each major vertebrate group is provided in Table B-3 below. A full list of recorded fauna species is provided in Appendix 3 of the PER (Maunsell, 2000).

Fauna	Total
Native Mammals	17*
Introduced Mammals	5
Avifauna	96
Reptiles	58**
Amphibians	3
Total	179

Table B-3	Vertebrate	fauna	species	recorded	during	the	April	2000	surve	y
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*Includes two species of bats, *Scotorepens greyii* and *Vespadelus findlaysoni,* that were recorded from the Fortescue River Bridge adjacent to the project area.

**Note that the species of marine turtle nesting on Cape Preston could not be identified. There may be up to four different species, although Green Turtles and Hawsbills are considered the most likely.

The fauna survey completed as part of the PER (Maunsell, 2000) and Supplementary PER (Maunsell, 2002) may be used to identify fauna habitat, species diversity and population numbers to enable more



defined closure criteria to be developed, and to identify fauna communities that may be impacted by the Project and not able to be re-established at closure.

Birds

A total of 96 species of birds was recorded during the survey which represented 40 families and included 59 non-passerines and 37 passerines. The most abundant group of birds were granivores. The 13 granivorous species comprised just 14% of the total number of species, but represented 60% of all records. The granivores included the Little Button-quail, Brown Quail, Crested Pigeon, Spinifex Pigeon, Diamond Dove, Peaceful Dove, Bar-shouldered Dove, Galah, Little Corella, Australian Ringneck, Cockatiel, Zebra Finch and Painted Finch. The majority of these records were of the Little Corella. The most abundant of the non-granivores were the small insectivorous species including the Yellow Whiteeye, Variegated Fairy-wren and Willie Wagtail. The Singing Bushlark, which feeds on small grasses, seeds and insects, was also relatively common. Breeding records were obtained for just three species, the Emu, Red-capped Plover and the Diamond Dove.

Parts of the project area are utilised by migratory shorebirds for feeding and/or roosting. A survey undertaken in February 2001 recorded 17 shorebirds listed under the China-Australia Migratory Bird Agreement (CAMBA) and Japan-Australia Migratory Bird Agreement (JAMBA). In addition, two species of migratory terns that are also listed under both international agreements were also recorded. The number of migratory shorebirds present at Cape Preston during the survey period was not considered to be internationally or nationally important.

The area of highest bird use was at the mouth of the mangrove creek separating Cape Preston from the mainland. There will be no direct project impact in this area.

Given the low numbers and species recorded within the Cape Preston region and the limited habitat disturbance proposed, the project is unlikely to have a significant impact on migratory shorebirds.

Mammals

The survey recorded 22 species of mammals comprising the echidna, four dasyurids, two macropods, two molossid bats, three vespertilionid bats, five native and one introduced murid rodent, two canids, one felid and one bovid. None of the mammal species were recorded in large numbers, with the exception of the Euro which was particularly abundant.

The most commonly trapped species was the bat *Mormopterus Ioriae cobourgiana* (20 records) followed by *Sminthopsis macroura* (16 records). The next most commonly recorded species was *Ningaui timealeyi* (13 records).

Of the 73 total mammal records, the Dasyuridae accounted for the greatest proportion (49%), followed by the three species of molossid bats (29%). The murid rodents comprised 14% of all records. Bats comprise a significant component of the mammal assemblage in the Pilbara region. Approximately 18 chiropteran species have been recorded from the region, including two megachiropterans (flying foxes) and 16 microchiropterans (insect-eating bats). They utilise a range of habitats, some of which are found within the project area. None of the bats are Schedule or Priority species; however, two have a reported strong preference for mangal habitats.

In the mangal, the bats *Nyctophilus arnhemensis* and *Mormopterus Ioriae cobourgiana* were captured and recorded. The genus Mormopterus is currently undergoing revision. The Mormopterus captured in this survey correspond with 'Population U' of Adams et al. (1988), which is currently known as *M*.



loriae cobourgensis although the nomenclature used here follows CALM (2000) (i.e. *M. loriae cobourgiana*). Only one individual of *N. arnhemensis* was captured. *M. loriae cobourgensis* is recorded as being almost exclusively a mangrove species, although it does move to adjacent areas.

Three other bat species (*Chaerephon jobensis, Scotorepens greyi* and *Vespadelus findlaysoni*) were identified from calls, although positive identification could not be made without a capture.

Herpetofauna

The survey recorded 58 species of reptiles comprising one sea-turtle, eight agamids (dragon lizards), two varanids (monitors), eight geckos, four pygopodids (legless lizards), 22 skinks, three pythons, six elapids (front-fanged snakes), three blind snakes and one seasnake.

One additional skink *Cryptoblepharus carnabyi* was tentatively identified from a rock pile within the project area. The most commonly captured species were the gecko *Gehyra punctata* and the smaller skinks *Carlia munda* (21 records), *Menetia greyii* (19 records) and *Lerista bipes. Ctenophorus isolepis* were also very abundant but not readily sampled.

Numerous recruits were captured or observed during the course of the survey, particularly of *Ctenotus pantherinus, C. serventyi* and *Ctenophorus isolepis.* Many females also appeared to be gravid, particularly *Carlia munda*.

Only two species of frogs *Litoria rubella* and *Cyclorana maini* were recorded from the survey area. However calls of a third species, tentatively identified as *Uperoleia russelli*, were recorded from Edward Creek. The habitat comprised clumps of reeds in a gravel river bed. Evidence of nesting by sea-turtles was observed on one beach; however, the species could not be clearly identified.

The project area is known to, or may, support, a number of Pilbara endemics or geographically restricted taxa. These include *Diplodactylus mitchelli, D. savagei, Nephrurus wheeleri cinctus, Ctenotus angusticeps, C. duricola, C. grandis titan, Egernia pilbarensis, Lerista quadrivincula, Morethia ruficauda exquisita, Notoscincus butleri, Rhamphotyphlops diversus ammodytes, Demansia rufescens and Acanthophis wellsi.* The distribution of the as yet undescribed species *Ctenotus* aff. *robustus* is not understood, however it has been recorded from areas of cracking clay in the west Pilbara. The new species of *Ctenotus* recorded during this survey is only known from the single record at this locality. However, it may represent the northern form of the *Ctenotus uber* species complex.

Rare or Threatened Fauna

The field survey did not record any Schedule listed fauna species. However, seven Priority listed fauna taxa were recorded (Little Western Freetail Bat Mormopterus Ioriae cobourgensis, Western Pebble-mound Mouse Pseudomys chapmani, Short-tailed Mouse Leggadina lakedownensis, Bush Stonecurlew Burhinus grallarius, Beach Stonecurlew Esacus neglectus, Eastern Curlew Numenius madagascariensis; and the Green Turtle Chelonia mydas). The Green Turtle is also included on the Threatened Species list of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Cth).

In addition, one undescribed species of rodent (*Pseudomys* sp. "hamersley") and two undescribed skinks (*Ctenotus aff. robustus* and *Ctenotus* sp. nov.) of possible conservation significance were recorded.

A search of CALM's database of threatened fauna species recorded from, or potentially occurring in, the area one Schedule 4 species (Peregrine Falcon *Falco peregrinus)*, one priority three species



(Asian Dowitcher *Limnodromus semipalmatus*) and seven Priority 4 species [Water Rat *Hydromys chrysogaster*, Grey Falcon *Falco hypoleucos*, Square-tailed Kite *Lophoictinia isura*, Bush Stonecurlew *Burhinus grallarius*, Beach Stonecurlew *Esacus neglectus*, Eastern Curlew *Numenius madagascariensis*, White-shafted Tern (Little Tern) *Sterna (albifrons) sinensis*].

Stygofauna

A stygofauna survey was undertaken on the George Palmer Orebody, the proposed plant area and the alluvials on Mardie Station in March 2001 (Maunsell, 2002). The stygofauna found were dominated, both in terms of numbers of specimens and in diversity by crustaceans [amphipods, a thermosbaenacean, isopods, copepods (cyclopoid and harpacticoid) and ostracods]. The other aquatic fauna comprised turbellarian and oligochaete worms, and an acarine.

The two remaining non-stygofaunal specimens were a beetle and a Diplura (insect relative).

Overall, the stygofauna specimens collected comprised:

- Amphipoda (4 species, 39 individuals);
- Isopoda (1 species, 19 individuals);
- Thermosbaenacea (1 species, 78 individuals);
- Copepoda (2 species, >400 individuals);
- Ostracoda (2 species, 13 individuals);
- Acarina (1 species, 2 individuals);
- Oligochaeta (3 species, 9 specimens); and
- Turbellaria (2 specimens).

Amphipoda

Four species of Amphipods were identified. One species, genus Nedsia, is known to be common and abundant in groundwaters of Cape Range peninsula, Barrow Island and in bore samples from the Fortescue catchment (T Finston, pers. comm. 17 August 2001). The Nedsia specimens are larger than the other amphipod specimens whose affinities have been difficult to determine and have not been resolved.

Thermosbaenacea

The specimens collected were found to belong to the order Thermosbaenacea due to the position of the brood pouch. The finding of this specimen is described as very significant since the main distribution of the Thermosbaenacea is in subterranean habitats of the Mediterranean coast and in the Caribbean (i.e. a Tethyan distribution). Recently they have been recorded in the Pilbara.

Ostracoda

Two species of ostracoda were collected during the survey. Although ostracods have been found throughout the project area and on nearby pastoral leases, none were recorded from the George Palmer Orebody bores.

Copepoda

The dominant copepod present in the collected samples was the cyclopoid copepod. Based on leg morphology, only one species was identified, although there was considerable size range and sexual dimorphism in the samples. Cyclopoid copepods were recorded from most bores within the project area.



Only a single Harpacticoid copepod species was recorded from the project area. A review of the subterranean copepods collected from the Pilbara area is currently being undertaken, hence it is too soon to comment on any affinity with Cape Preston specimens.

Acarina

The two specimens of acarine collected appear to be of the same species.

Isopoda

The specimens collected suggest a new genus of isopod. Unfortunately, the specimens were very delicate and not in perfect condition. A total of 19 individuals of the isopod species were recorded from a George Palmer Orebody bore. This species was not recorded elsewhere within the project area.

Oligochaeta

The oligochaete specimens were identified by Dr. Adrian Pinder. Three families were represented (Enchytraeidae, Phreodrilidae and mature Turbificidae respectively).

Turbellaria

Microturbellarians are difficult to work with unless studied live. The specimens collected were solidly opaque and consequently it was not possible to observe any morphological detail.

A further investigation of the key species of interest (the Isopod from the orebody) identified in the March 2001 sampling was undertaken in October 2001. The objective of this survey was to gather more information on the distribution of the isopod species. During the October 2001 stygofauna survey, all bores previously sampled in March 2001 were resurveyed using the same methodology. Peter Serov (Invertebrate Identification) has identified the isopod as an Oniscid (related to slaters). It is believed to be the first subterranean Oniscid ever recorded.

As at February 2002 the Isopod has only been identified in bores located within the orebody. Based on the hydraulic connectivity of the orebody and the alluvials it is expected that isopods are present throughout the region. In support of this, it has been documented that less mobile stygofauna (such as the large amphipod species and the small ostracods collected during this survey) are well represented throughout the sampling area.

The lower numbers of isopods collected is likely to be a result of low isopod densities and undersampling and as a consequence it is highly unlikely that the project will result in the loss of this species. In addition it should be noted that the George Palmer Orebody is only one of a number of surface expressions of an orebody that extends to a depth of 100's of metres and for 100's of kilometres to the south. On the basis of the information collected to date, it was concluded that it is highly unlikely that the project will result in the loss of any species (Maunsell, 2002).

C1.9 Mangrove Communities

The mangrove community assemblages mapped in the area are extensive and generally in very good to excellent condition (Maunsell, 2000). Of seven species of mangroves known to occur in coastal environments in the Pilbara region, six were recorded in the Cape Preston study area during a field survey in April 2000. The species present in the Cape Preston area were the White Mangrove (Avicennia marina), Yellow-leaved Spurred Mangrove (Ceriops tagal), Stilt-rooted Mangrove (Rhizophora stylosa), Horned Mangrove (Aegiceras corniculatum), Club Mangrove (Aegialitis annulata) and Rib-fruited Orange Mangrove (Bruguiera exaristata).



The most abundant and widespread species in the study area were *Avicennia marina* (dominant or codominant in most assemblages in the study area) and *Rhizophora stylosa* (which formed dense monospecific assemblages). Other species recorded typically occurred as subdominant members of assemblages, as small monospecific stands or as scattered understorey species.

Total mangrove cover for the area mapped as part of the study is estimated at approximately 35.49 ha of dense to open mangrove associations and a further 7.25 ha of very open *Avicennia marina* shrubland. The mangrove assemblages mapped in the study area are summarised in Table B-4.

Code	Assemblage	Area (ha)
Ac	Aegiceras corniculatum low, dense cover on recently deposited banks	0.11
Rs	Tall, closed canopy Rhizophora stylosa pure stands	3.68
As	Tall, closed canopy Avicennia marina pure stands	3.21
AmRs	Tall mixed Avicennia marina and Rhizophora stylosa	4.44
AmCt	Low open cover of Avicennia marina and Ceriops tagal	0.11
Am1	Pure open Avicennia marina shrubland on rocky shores	1.24
Am2	Low, open Avicennia marina with scattered Rhizophora stylosa and Aegiceras corniculatum	5.85
Am3	Low to moderate Avicennia marina pure stands	15.28
Am4	Stunted, very open and scattered Avicennia marina on samphire flats	7.25
Ct	Low shrubland dominated by Ceriops tagal with occasional Avicennia marina	0.66
M1	Mixed assemblage of Avicennia marina, Rhizophora stylosa and Aegiceras corniculatum on depositional islands	0.05
M2	Mixed assemblage of Avicennia marina, Rhizophora stylosa, Ceriops tagal and Aegialitis annulata on sandy substrates	0.86

Table B-4 Mangrove Assemblages of the Cape Preston Area and Their Extent of Local Occurrence

The mangal of the study area also supported a range of other species typically associated with mangrove habitat in the Pilbara. Fauna species routinely sighted included the mudskipper (gobid species including *Periophthalmus* spp.), occasional mud crabs (*Scylla serrata*), numerous red fiddler crabs *Uca flammula*, various species of grapsid crabs, and large epifaunal molluscs (*Littorina* spp). Reptiles recorded from mangal habitats at Cape Preston included *Amphibolurus gilbertii*, which was relatively common, and a single sighting of the Banded Mangrove Mud Snake (*Hydrelaps darwiniensis*). A relatively diverse and abundant bird fauna utilised the mangroves at the site, including several species which are regarded as effectively restricted to mangrove habitat.

In his regional review of the conservation significance of mangroves in the Pilbara, Semeniuk (1997) identifies Cape Preston (including the creek) as being a Type 'A' area. The study considered the area to contain mangroves significant on international, regional and local scale. The site was also identified as the most southern occurrence of true ria shore mangrove formation in the Pilbara (Semeniuk, 1997).

Mangrove communities may be susceptible to changes in surface water drainage regimes, in particular, changes to sedimentation rates and water quality. Closure activities and outcomes should



ensure that mangrove communities are not impacted in the design of final landforms and re-profiling and re-vegetating disturbed areas.

C1.10 Marine and Nearshore Environment

A marine survey of the Cape Preston area (from Preston Island to Preston Spit) was undertaken to provide baseline biological data (Maunsell, 2000). The study found six general community assemblages which roughly correspond to the physical conditions (habitat types) at each site (Figure B-6). Each of these communities is representative of similar habitats found along the Pilbara coastline.

Detailed description of the physical characteristics and biological community assemblages of these communities are provided in the PER (Maunsell, 2000).

Overall, the six community assemblages identified within the survey area are characteristic of nearshore regions along the Pilbara coast. Members of the genus *Sargassum* were the dominant algae.

Algal species were similar to those found by Borowitzka and Huisman (unpublished) in the Dampier Archipelago. There was little coral cover in the majority of the survey area, but it was common to find patches of coral often with large established colonies. A zone of coral reef exists along the northern part of Cape Preston and around Preston Island.

These reefs have medium to high coral cover and although only a few species make up the majority of the cover, there are numerous species present at low density from three dominant coral families. These reefs are similar to nearshore reefs observed south-west to Onslow and north-east to Dampier, with the exception of the one site north of Preston Island whose community was more representative of mid-reef assemblages such as those observed around the outer Islands of the Dampier Archipelago.





Figure B-6 Marine Habitat Map (after Maunsell, 2000) note that project components are no longer relevant

The nearshore communities of the Cape Preston area can be separated into the following habitat types:

- Sandy beach dominating the western side of Cape Preston; •
- Rock/pebble beach surrounding Preston Island;
- Mud flat at the southern end of Cape Preston and surrounded by mangroves; and •
- Rocky headland predominantly at the tip of Cape Preston but also on Preston Island. •



Although all four of these habitats have the potential to be impacted by the Project, it is the sandy beach (used by nesting turtles) and mud flat habitats (due to the presence of mangroves) which have the greatest significance from a biological perspective.

Species Requiring Special Protection

Three fauna species of conservation significance, and which are protected under the *Wildlife Conservation Act 1950* may occur in the project area. These are the Loggerhead Turtle *Caretta caretta* (Schedule 1), Green Turtle *Chelonia mydas* (Priority 4), and the Hawksbill Turtle *Eretmochelys imbricate* (Priority 4).

The Department of Conservation and Land Management (CALM) conducted an inspection of seaturtle nesting activity on the beaches of Cape Preston on the morning of 28 December 2000 between 0630 and 0845 hours, just after a low tide of 0.65 m which occurred at 0625 hours. No live sea turtles were observed. A dead mature male Green Turtle was discovered on the beach east of Cape Preston.

Low densities of nesting activities were encountered (12 old nests) over 7.5 km of suitable beach. Two forms of turtle tracks, 'alternate' and 'opposite' (two distinct types) were discovered indicating that at least three species of turtles were nesting on Cape Preston. The two distinct types of 'opposite' tracks suggest that both Green and Flatback Turtles were nesting, whilst the 'alternate' tracks indicate that either Hawksbill and/or Loggerhead Turtles are also nesting on the beaches.

The Dugong *(Dugong dugong)* is listed by CALM as a Priority 4 species but is unlikely to occur in the area due to the absence of seagrass beds.

A number of species of whale are also protected by the *Wildlife Conservation Act 1950* and the EPBC Act 1999 (Cth) but are unlikely to be affected by the project.

Marine and nearshore ecosystems may be susceptible to changes in surface water drainage regimes, in particular, changes to sedimentation rates and water quality. Closure activities and outcomes should ensure that the marine and nearshore environment are not impacted in the design of final landforms and re-profiling and re-vegetating disturbed areas.

C1.11 European Heritage

There are no European Heritage sites listed on the Register of the National Estate (or the Interim List of the Register).

C1.12 Aboriginal Heritage

In February 2000 Austeel commissioned an ethnographic study of the project area (O'Connor, 2000). The study considered a zone bounded on the west by the Fortescue River, on the northwest by the coastline from the Fortescue River mouth to Cape Preston, on the southeast by the North West Coastal Highway and on the east by a roughly southeast tending line from Cape Preston to the Highway.

Although this overstates the area that will ultimately be used for the project it has the advantages of including lands that surround the project.

The study dealt with:

- Aboriginal sites as listed in the Aboriginal Affairs Department records;
- Previous relevant ethnographic reports;



- The contents of relevant sections of the Native Title Register;
- History of local Aboriginal politics relevant to the project; and
- Preliminary discussions with selected relevant Aboriginal people.

Austeel has held ongoing discussions with major Aboriginal groups in the area. The major claimant groups (and their legal representatives) consists of the Wong-Goo-Tt-Oo (WGTO) claimant group, the Yaburara and Coastal Mardudhunera people (YM), and the Kuruma Marthudunera people (KM). Discussions were held with Patricia Cooper, Wilfred Hicks and Cane Hicks who were some of the claimants for Native Title applications in the area.

On 30 October 1996 meetings were held between the Chairman of Austeel and Mineralogy with the KM group in Roebourne to provide the group with an understanding of the Company's plans and to negotiate an agreement. Subsequent discussions led to a draft Indigenous Land Use Agreements (ILUAs) agreement being drawn up with the three Traditional Owner Groups.

Since these ILUAs were agreed, the status today in 2017 is that:

- the native title claim made by WGTO was dismissed by the Federal Court of Australia and removed from the National Native Title Tribunal's register of Native Title Claims; and
- KM amended the boundaries of its native title claim so that its claim no longer overlaps with the area the subject of the Approved Proposals or this Proposal.

Pursuant to the current YM ILUA, YM recognises, acknowledges and agrees that the existing and any future mining tenements and titles granted for the purposes of this Proposal are valid, effective and enforceable under the Native Title Act, the IOPA and otherwise at law.

C1.13 Aboriginal Sites

Information from the Aboriginal Sites Register in the Aboriginal Affairs Department (AAD) identified 34 sites which had been previously recorded from the general study area. None of these sites occur in areas that will be impacted by the Project. Most of the sites appear to have been discovered in the course of the archaeological survey for the Perth to Dampier Gas Pipeline.

Austeel commissioned an ethnographic survey and an archaeological survey on the existence of aboriginal heritage sites within Austeel's mining tenements in the Fortescue River/Cape Preston area (Maunsell, 2002). Seventy-two newly recorded sites and seventy-three sites previously recorded in files at the AAD were found in the vicinity of the survey areas. Eleven of the previously recorded sites and seventy one of the newly recorded sites are within the Project boundaries. The ethnographic survey was carried out in the company of members from all native title claimant groups and other relevant interested people. The survey recorded twenty-eight sites of significance within the project area. The report provides recommendations for the management of these sites. A number of sites were requested by the Aboriginal people to be kept confidential and these have not been listed in the report. Austeel has advised (Maunsell, 2002) that the Project will not impact on these sites.

Since 2007 CPM have submitted 24 Section 18's to the now Department of Aboriginal Affairs (DAA) including ethnographic and salvage surveys with all three groups. Quarterly relationship meetings have been held since 2009 with six working group meetings also having been held.



C1.14 Recreational Access

Current recreational use of the area comprises vehicle access to the mouth of the Fortescue River via an unsealed road from the North West Coastal Highway and to Cape Preston via a dirt track heading generally north from the unsealed road. Boat launching facilities are available at the mouth of the Fortescue River. Access to Cape Preston is via vehicle across the mud flats at low tide or by boat. A disused fishing shack occurs at Cape Preston.

C1.15 Current and Proposed Public Use of the Area

Members of the public obtain access to the mouth of the Fortescue River via an unsealed road which traverses the plant and mine site. No figures are available for the level of public usage; however, during a number of site visits the maximum number of vehicles seen would have averaged 3 to 4 per day.

Large numbers of vehicles may visit the site on occasion and some overnight camping may occur at the river mouth (8 km from the plant site). Once construction commences a section of the access road will need to be diverted to ensure that construction and operations vehicles are separated from public vehicles.

There are no residences in proximity to the Project.

These factors should be considered in the consultation process around final land use for the Project site, and closure outcomes.



Appendix D – Risk Assessment

This risk assessment table has been sourced from a historical review undertaken in 2011 (URS, 2011). This table has been updated to take into account more recent actions by CPM that relate to closure and rehabilitation.

Domain	Hazard / Activity	Risk / Impact	Existing Controls	Control Effectiveness	Proposed Actions & Owner
General	Ownership of Rehabilitation	Accountability for undertaking progressive rehabilitation is not known or assigned to the appropriate asset owners within the company.	 The Mine Manager is responsible for implementing and resourcing the Waste Rock Dump Management Plan and rehabilitation within the Mining area. The Processing Manager is responsible for implementing the TSF Management Plan. The Environment Department will assist to identify further research opportunities. Routine audits to be undertaken to confirm that the WRDMP is being successfully implemented. Responsibility for Decommissioning and clocure available. 	Effective	ACTION: Continue to support the implementation WRD and TSF Management Plans following const and adapt these plans as improvements are identi through life of operations.
		Funding for research not approved	 Closure activities will be determined closer to this time. Environment Department to identify trials or research opportunities prior to annual budget reviews The Processing Manager, Mine Manager and Environment Manager to ensure that appropriate funding is assigned within 	Ongoing review	ACTION: Review the assignment of positions and accountabilities of asset owners across the Projec ensure rehabilitation and associated research requirements are adequately captured.
	Unplanned Closure	No strategy for managing unplanned closure to cover care and maintenance phase could result in abandoned site.	 annual budget reviews Section 9.2 of this Conceptual Closure Plan, outlines the minimum actions. Annual rehabilitation costs estimated in accordance with accounting standard IAS37. These estimated costs relate to disturbance/damage caused to date and are updated every three years. Topsoil recovered prior to commencement of mining operations is stored in designated areas. Records of volumes and location of material collected are maintained within a GIS database. 	Effective	ACTION: continue to collect topsoil ahead of construction activities onsite and store materials in designated areas. Maintain information within regi and GIS system. ACTION: Further develop the strategy for Care an Maintenance and Unplanned Closure and incorpor into future iterations of this Conceptual Closure pla
	Relinquishment at Closure	Relinquishment process is undefined	 Government require evidence that progressive rehab has taken place in accordance with the closure plans. External consultant contracted annually to assist with tracking the success of progressive rehabilitation Periodic review of this Conceptual (Life of Mine) Closure Plan. 	Ongoing review	ACTION: Continue to track disturbance versus progressive rehabilitation ACTION: Continue to assess the success of rehabilitation (both internally and externally) and ic any learnings changes to the process ACTION: Within 5 years of closure of operations c strategy that will clarify the relinquishment process the Project .





Domain	Hazard / Activity	Risk / Impact	Existing Controls	Control Effectiveness	Proposed Actions & Owner
Mine Pit Void	Poorly timed rehabilitation	Greater financial burden arising from potential law suits, or reworking previous rehabilitation due to poor rehab implementation.	 environment education awareness module includes rehabilitation topic Topsoil records maintained and reported regularly Annual audit of success of rehabilitation undertaken and reported Waste rock dump management plan identifies the batter slope angles and rehabilitation requirements to optimise success Analogue sites have been selected for collecting data that can be used for developing suitable criteria for measuring rehabilitation and closure success Conceptual Closure Plan identifies Rehabilitation Management Areas and specific Domains 	Ongoing review	ACTION: Continue to review the assignment of positions and accountabilities ACTION: continue to develop and refine appropriat closure criteria to assess the success of rehabilitati ACTION: in-line with development of closure criteria continue to develop and improve the existing report on rehabilitation progress to senior management. ACTION: Environmental Works continue to refine a requiring environmental works including topsoil placement, ripping and seeding. ACTION: Environmental Works – continue to assess availability of topsoil sources and volumes on a reg basis.
	Surface Water	Altered hydrology regime is not maintained resulting in flooding and erosion to the local environment	 Surface water modelling and management is periodically reviewed Field audits to assess success of altered hydrogeology regime Surface water erosion controls design and constructed for WRD, TSF and the main transport corridor 	Ongoing review	ACTION: continue to implement surface water eros controls and assess their effectiveness
		Fibrous materials exposure from walls of pit above the final pit lake water level	 Potential fibre in the mine pit geology is mapped Continue ongoing review of requirement of controls for any exposed Dales Gorge formation within the mine pit walls. 	Effective	ACTION: Further studies into pit lake development time and whether geology exposed contains fibrous materials. ACTION: Confirm requirement for controls to ensur appropriate management of fibrous materials post closure.
	Materials characterisation	Potentially Acidic Forming (PAF) material	 DR019999: Ore Mark Out and Waste Identification Procedure. This procedure identifies PAF exposed in the mine pit during LOM operations DR018299: Waste Rock (Mined) Management Procedure identifies how PAF will be encapsulated within a WRD 	Effective	ACTION : Continue to review these internal proced in-line with mine planning processes.





Domain	Hazard / Activity	Risk / Impact	Existing Controls	Control Effectiveness	Proposed Actions & Owner
	Final Void	Water quality of pit lake	• CloudGMS (2017) model developed and implemented which has incorporated knowledge from existing mining operations (geological and hydrological) to develop a more accurate conceptual model for the Project including post closure.	Effective	 ACTION: Environmental Works – Verification of fir void strategy and confirmation of the assessment potential impact related to the final void water. ACTION: Environmental Works - Determine post-ormonitoring requirements for in-pit surface water arr revegetation monitoring.
	Safety	Pit wall stability	 Management of the Sino Iron Pit is in accordance with the <i>Guidelines for Open Pit Slope</i> <i>Design and Guidelines for</i> <i>Evaluation Water in Pit Slope</i> <i>Stability</i> (CSIRO 2010) Sino Iron Pit Geotechnical Management Plan and related work procedures Pit wall stability is monitored 	Effective	ACTION : Engineering Works – continue to monito stability and review mine planning to define expec angles to minimise erosion on sloping walls and b in the mine pit.
		Preventing public and animal access as pit depth is significant	DMP 1997 Guideline: Safety Bund Walls Around Abandoned Open Pit Mines.	Ongoing review	ACTION: Engineering Works - Source suitable ma for construction of abandonment bund.
Waste Dumps	Stage 2 Landform Construction not achieved	Long term stability cannot be achieved if the walls and batters are constructed incorrectly.	 Landloch Design Criteria identified during field trials Landloch I- IV Waste Rock Management Plan (April 2009) 	Ongoing review	 ACTION: Engineering Works - Confirm availability waste rock for construction of required features. ACTION: Engineering Works - Refine dimensions measurements for engineering and rehabilitation v ACTION: Engineering Works - Confirm closure str for waste dumps. ACTION: Engineering Works - Refine use of waste materials in rehabilitation activities (materials bala)
	PAF	Unplanned closure could expose PAF material if WRD are not finalised properly	 DR018299: Waste Rock (Mined) Management Procedure identifies how PAF will be encapsulated within a WRD during construction of dumps and operation of mine 	Effective	ACTION: Comply with DR018299: Waste Rock (Management Procedure
		Is not identified and managed during operations	 DR0199999: Ore Mark Out and Waste Identification Procedure. This procedure assists in the identification of PAF exposed in the mine pit during LOM operations Waste Rock Management Plan (April 2009) 	Effective	ACTION: Comply with DR019999: Ore Mark Out Waste Identification Procedure. This procedure as the identification of PAF exposed in the mine pit d LOM operations ACTION: Environmental Works - Develop conting if contamination of surface water and/or groundwa exceeds acceptable levels
	Instability Erosion of slopes	Dispersive soil	DR022032 – Landloch Landform Design Recommendations – III. Sediment Control	Ongoing review	ACTION: Environmental Works – Inspect toe drain sediment basins to be routinely inspected to ensur recommendations are being implemented





Domain	Hazard / Activity	Risk / Impact	Existing Controls	Control Effectiveness	Proposed Actions & Owner
		Runoff from high intensity rainfall events results in gullying and erosion.	 DR015225: Other - Landloch, Landform Design Recommendations - I. Batter Slope and Dump Top Design Routine inspection of toe drains and sediment basins and overall assessment of rehabilitation success 	Ongoing review	ACTION: Continue to audit the success of progress rehabilitation batters on the WRD ACTION: amend designs as required.
	Potentially Fibrous materials	Dust generation of potential mineral fibres resulting in exposure to human health post closure.	 DR022031: Other Landloch Landform Design Recommendations - II Landform Evolution Monitoring DR015225: Other - Landloch, Landform Design Recommendations - I. Batter Slope and Dump Top Design DR030318 Sino Iron Fibrous Minerals Management Plan 	Effective	ACTION : Comply with DR030318 Sino Iron Fibron Minerals Management Plan. ACTION : Continue to map the potential risk from the rehabilitated waste rock dumps
	Lack of topsoil	Unable to re-create the appropriate capping mixture in accordance with design criteria resulting in erosion and slope instability within 100 years.	• Topsoil removed from waste dumps are stockpiled, added to the topsoil register estimated annually via GIS flyover	Ongoing review	ACTION : Environmental Works – continue to conf availability of topsoil and determine if soil ameliora topsoil stores is necessary.
		Revegetation criteria is not achieved resulting in non self -sustaining vegetation	 Implemented analogue monitoring to develop criteria around native vegetation and its usefulness on these landforms with these slopes Annual rehabilitation assessment undertaken internally and by external consultant. 	Ongoing review	 ACTION: Engineering Works - Define specific closs strategies and actions for borrow pits and landfill. ACTION: Environmental Works- continue to under studies and trials that will identify appropriate and and determine revegetation methods and targets for rehabilitation works and other landform areas with domain. ACTION: Environmental Works Develop continge if contamination of surface water and/or groundware exceeds acceptable levels.
	Rehabilitation	Incorrect concave Slope design	 DR015225: Other - Landloch, Landform Design Recommendations - I. Batter Slope and Dump Top Design Implemented analogue monitoring to develop criteria around native vegetation and its usefulness on these landforms with these slopes Annual rehabilitation assessment undertaken internally and by external consultant. 	Effective	ACTION: Continue to monitor, report and review success of progressive rehabilitation. ACTION: Once final height and batters are complea waste dump, expand the auditing to confirm if coslops is appropriate
		Operational timeframe affecting ability to progressively rehabilitate	 Waste Rock Dump Management Plan TSF Management Plan 	Ongoing review	ACTION: Processing and Mining to annually revie schedules and confirm availability of landscapes t available for rehabilitation. ACTION: Determine post-closure monitoring requirements for groundwater, surface water and revegetation monitoring, based on operational monitoring.

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Domain	Hazard / Activity	Risk / Impact	Existing Controls	Control Effectiveness	Proposed Actions & Owner
	Weeds in Topsoil	Greater than 20% weed infestation establishing within the regeneration	DR017480 Vegetation Clearing Procedure	Ongoing review	ACTION: comply with DR017480 Vegetation Clearing Procedure ACTION: comply with DR017497 Rehabilitation Soil Management Procedure.
		Contaminated with WONS (mesquite and parkinsonia)	 DR017497 Rehabilitation Soil Management Procedure. Topsoil Management identification of mesquite on site 	Effective	ACTION: monitoring of existing rehabilitated sites to determined likely weed species and potential percentac of infestation post rehabilitation. This will help identify potential control methods to treat weeds that may establish post rehabilitation / closure
TSF	Dust Generation between final deposition and capping	Potential mineral fibres (non-asbestos) exposed from dried tailings surfaces resulting in noncompliance with licence conditions.	 TSF Management Plan - Waste rock material to be placed as a cover on top of final tailings as it dries 	Ongoing review	 ACTION: Implement trials utilising a polymer to the finatailings too be undertaken when appropriate. ACTION: Comply with TSF Management Plan. ACTION: Environmental Works - Verify ability of TSF cover to mitigate risks associated with the exposure of fibrous.
	Downstream construction using waste rock material	Liquefaction of tailings not retained by dam wall	 TSF Management Plan Construction Design: very large gravity downstream embankment construction will retain the liquefied tailings until they become self- supporting again, external peer review confirmed this 	Effective	ACTION: Comply with TSF Management Plan.
	Surface Water Drainage	High rainfall intensity resulting in erosion of TSF walls and surrounding areas creating instability	 TSF Management Plan Surface water controls designed Annual geotechnical audits of TSF 	Ongoing Review	ACTION: Comply with TSF Management Plan. ACTION: continue to undertake routine audits of erosic ACTION: continue to undertake routine geotechnical audits
	Long time frame to commence Progressive Rehabilitation	It will be 15 -18 years before rehabilitation of the first TSF batter can commence and before any real success or failure can be measured in the field.	 DR015225: Other - Landloch, Landform Design Recommendations - I. Batter Slope and Dump Top Design Waste Rock dump batters will be completed in this timeframe and provide field trial results to compare with the TSF 	Ongoing review	ACTION: Environmental Works -Undertake studies and trials to identify appropriate analogues and determine revegetation methods and targets for rehabilitation work and other landform areas within this domain. ACTION: Engineering Works - Determine detailed engineering works associated with decommissioning structures, pipework and any other infrastructure that required decommissioning or removal; ACTION: Engineering Works - Refine dimensions and measurements for engineering and rehabilitation works
		Sufficient availability of rock for cover.	 Throughout life of operations mine planning to monitor and confirm availability of cover material in lead up to closure. 	Ongoing review	ACTION: Engineering Works - Confirm availability of waste rock and competent rock for engineering works.
		Viability of cover design to ensure is water shedding & non erosion (To be determined)	 TSF Management Plan DR015225: Other - Landloch, Landform Design Recommendations - I. Batter Slope and Dump Top Design 	Ongoing review	ACTION: Comply with TSF Management Plan. ACTION: Environmental Works - Modelling of the TSF walls once final design is known ACTION: Environmental Works - Verify ability of TSF cover to mitigate risks associated with the exposure of fibrous. ACTION: Engineering Works - Verify TSF cover design

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Domain	Hazard / Activity	Risk / Impact	Existing Controls	Control Effectiveness	Proposed Actions & Owner
					to be consistent with closure objectives.
		Insufficient availability of topsoil for cover and slope batters	 Topsoil removed from waste dumps and TSF areas are stockpiled, added to the topsoil register estimated annually via GIS flyover 	Ongoing review	ACTION: Environmental Works - Continue to confirm availability of topsoil and detern if soil amelioration of topsoil stores is necessary.
		Geotechnical complications	 Annual geotechnical audit during life of mine 	Effective	ACTION: Continue to undertake annual geotech at and review design as required.
	Flooding	drainage channel diversion for flood water management	Engineering design	Needs Work	ACTION: Detailed engineering design to be review
	Seepage	Groundwater contamination , arising from horizontal seepage to the surface aquifer and vegetation	 Groundwater monitoring system. Regular audits and inspections. 	Ongoing review	ACTION: Compliance with TSF Management Plan. ACTION: Environmental Works - determine post-cl monitoring requirements for groundwater, surface w and revegetation monitoring, based on operational monitoring. ACTION: Environmental Works - Develop continge if seepage and contamination exceed acceptable le
Water Slurry Pends 8	Liners	Inappropriate disposal	 Disposal options: send to an industrial landfill or pierce and bury within structure. 	Ongoing review	ACTION: review options within future iterations of closure plan and as ponds and dams are decommissioned.
Dams	Contamination from seepage	soil beneath liner contaminated with elevated metals or nutrients	 Water stored is fresh, neutral ph liners are HDPE testing post closure for potential soil contamination 	Effective	ACTION : continue to monitor soils below water sto pond liners prior to rehabilitation. Undertake decontamination activities as required.
Port Stockyard	Surface Water Drainage	Surface waters containing potential contaminants drain to the marine environment	 Magnetite is inert and is not known to bio-accumulate Water in surface water ponds assessed in accordance with Part V licence L8578 Water levels in surface water ponds monitored prior to cyclone season and emptied if required 	Ongoing review	ACTION : Continue to implement routine inspection licence monitoring.
	Contamination to soil	Desalination plant sulphuric acid	 Concrete Bunding to DG requirements Regular audits during operations Contaminated site investigation guidelines 	Effective	ACTION: Continue to implement routine inspection ACTION: continue to undertake tank integrity testin accordance with DF requirements during life of min operations
	Concrete Footings & Foundations	prevents re-establishment of native vegetation	DR017485 Rehabilitation Management Procedure	Ongoing review	ACTION: comply with DR017485 Rehabilitation Management Procedure. ACTION: Trials to determine the depth of ripping an application of topsoil
	Infrastructure	General contamination to soil	 Regular audits / inspections to identify contamination potentialContaminated Sites Investigation Guidelines 	Effective	ACTION : Continue to implement routine inspection Undertake decontamination as required.

01





Domain	Hazard / Activity	Risk / Impact	Existing Controls	Control Effectiveness	Proposed Actions & Owner
Services corridor	Compaction	Prevents re-establishment of native vegetation	 DR017485 Rehabilitation Management Procedure Annual Rehabilitation Assessments in areas where compaction occurred 	Ongoing review	ACTION: comply with DR017485 Rehabilitation Management Procedure comply with DR017485 Rehabilitation Management Procedure ACTION: Continue with annual assessment of rehabilitated areas.
	Interruption to surface drainage and tidal flow	Salt flat and mangrove vegetation decrease in area due to permanently altered drainage patterns	 Modelling completed to ensure final design of infrastructure avoids impacts to downstream and upstream vegetation. 	Ongoing review	 ACTION: Further research into understanding sur drainage along the services corridor. ACTION: comply with DR017485 Rehabilitation Management Procedure comply with DR017485 Rehabilitation Management Procedure. ACTION: monitor vegetation in areas considered
	Contamination	Tailings, return water and slurry pipelines loss to surrounding soils	 Regular audits / inspections to identify contamination potential Contaminated Sites Investigation Guidelines 	Effective	ACTION: Continue to undertake regular audits / inspections to identify contamination potential ACTION: Comply with contaminated Sites Invest Guidelines.
Process Plant and Power station	Compaction	prevents re-establishment of native vegetation	 DR017485 Rehabilitation Management Procedure Annual Rehabilitation Assessments 	Effective	ACTION: Trials to determine the depth of ripping a application of topsoil ACTION: comply with DR017485 Rehabilitation Management Procedure
	Contamination	spills and leaks beneath process area	 Contaminated Sites Act Development of a contaminated register during life of mine. 	Effective	ACTION: Continue to undertake regular audits / inspections to identify contamination potential ACTION: Comply with contaminated Sites Investig Guidelines.
	Concrete Footings & Foundations	prevents re-establishment of native vegetation	 DR017485 Rehabilitation Management Procedure 	Needs Work	ACTION: Trials to determine the depth of ripping a application of topsoil ACTION: comply with DR017485 Rehabilitation Management Procedure







Appendix E– Progressive Rehabilitation Update



Progressive Rehabilitation Update January 2017

Sino Iron Project



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1 Introduction

This document provides an update to the progressive rehabilitation and closure activities which have taken place since CPM developed the internal Sino Iron Project Conceptual Mine Closure Plan (DR024040). This update will form part of the routine review of progressive rehabilitation, knowledge gaps and closure actions identified throughout the life of the project.

2 Closure Approvals

Ministerial Statement 635 was issued by the Minister for Environment in 2003 for the Sino Iron Project. The statement contains four conditions (16-1 to 16-4) and one commitment (18) specific to closure. Mineralogy Pty Ltd were previously the proponent of the original MS635 and MS822 and had submitted a Preliminary Closure Plan (Maunsell 2006), in order to meet the requirements of Condition 16.

In September 2016 the Office of the Environmental Protection Authority (EPA) transferred MS635 and MS822 to CITIC Pacific Mining, on behalf of Sino Iron (Pty Ltd) and Korean Steel (Pty Ltd). As the new proponent it is anticipated that an updated Preliminary Closure Plan will be required to accurately reflect the Sino Iron Project as it exists and to align with the joint EPA / DMP Guidelines for Preparing Mine Closure Plans 2015. As part of the Part IV assessment process for the Sino Iron Mine Continuation Proposal operations a Conceptual Closure Plan has been prepared.

3

Conceptual Mine Closure Plan – Action Plan

The joint EPA / DMP guidelines were revised in 2011 and updated in 2015. Prior to the transfer of proponency to Korean Steel and Sino Iron there was no legal mechanism that updates original Preliminary Closure Plan (Maunsell 2006), to align with industry standards and project requirements.

This was identified as a risk and CPM's Environment Department developed an independent internal Conceptual Mine Closure Plan to align as best as possible with the joint guidelines.

As CPM is seeking to gain mine approval under Part IV of the *Environment Protection Act 1986* it is appropriate to submit a Conceptual Closure Plan to current standards for the Mine Continuation Proposal.



4 Purpose

The purpose of this document is to provide an overview of rehabilitation activities completed to date.

An update is provided for the following activities:

- Waste rock dumps
- Rehabilitated overburden:
 - o Road corridor
 - o Waste dumps
- Closure criteria
- Pit void/lake.

5 Wasterock Dump Landform Designs

Landloch Pty Ltd were engaged by CPM in 2009 to provide recommendations on landform design that are likely to result in improved rehabilitation and closure outcomes. This included a site specific review, waste characterisation, cover and landform design, assessment criteria and the development and review of management procedures.

Rainfall and overland flow simulation was conducted (Figure) and the results were interpreted using the Water Erosion Prediction Program, a computer simulation program.

A SIBERIA model was also run for various periods up to 1,000 years to determine erosion rates (Figure 2, Figure 3). The modelling provided good confidence that waste dump design criteria identified from the site trials will minimise erosion.





Figure1: Rainfall simulation being conducted on South East Waste Dump.

Some recommendations from the modelling were:

- Concave batter profile consisting of 30% and 20% (Figure 4).
- A specific topsoil/rock mixture to sheet the waste dump, lightly ripped.
- Retain dump top water runoff to minimise erosion.
- Acid forming soils will be encapsulated.




Figure 2: SIBERIA output for waste dump without recommended topsoil/rock mulch layer: 1,000 year simulation.



Figure 3: SIBERIA output for waste dump with recommended topsoil/rock mulch layer: 1,000 year simulation.





Figure 4: Final landform batter profile, showing crest bunding and profiles.

6 Rehabilitation Overview

During construction activities CPM has implemented a progressive rehabilitation strategy, where possible. Recovery of topsoil is required when land is disturbed and is stockpiled either for immediate rehabilitation or for post land-use rehabilitation.

Topsoil stockpiles have been established in several locations across the Project. The Mining department survey topsoil stockpiles on a monthly basis, the remaining stockpiles are captured using aerial imagery and monitored by the Environment department for change. As of September 2016 the topsoil quantities across the major areas of the project were:

- Mining area: 1,259,000m³
- Tailings storage facility area: 833,978m³
- Cape Preston area: 38,125m³



6.1 Road Corridors

There are two main arterial roads for the Project, these are the East West Road which is the site access road and the North South road which is the Cape Preston access road. Rehabilitation of the corridor surrounding these roads was implemented as a part of the scope of work for the civil earthwork companies.

Topsoil redistribution combined with narrow corridors of clearing has resulted in rapid recolonisation from topsoil seedbanks and nearby vegetation.



Figure 5: Road corridor prior to rehabilitation efforts.





Figure 6: Road corridor rehabilitated in June 2011.



Figure 7: Road corridor rehabilitated in June 2011.

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Figure 8: Road construction laydown area rehabilitated in November 2011.



Figure 9: Small dump of unsuitable road construction material, rehab commenced in 2011.

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6.2 Waste Dumps

Rehabilitation of waste dumps has commenced with several areas in various stages of earthworks. Rehabilitation activities are currently on hold while CPM focuses on the construction of TSF Stage 2 using waste rock being hauled directly from the pit.

Total Waste dump rehabilitation, in its various stages, is approximately 64.62ha. Rehabilitation has only commenced on the first lift of each waste dump due to the majority of waste being consumed by TSF construction. Of the possible areas available for rehabilitation, an estimated 69% has rehabilitation commenced.

SE waste dump: 26.47ha. (80% of available area)

NE waste dump: 31.34ha. (58% of available area)

Other areas: 6.81ha.



Figure 1: Section of South East waste dump which was rehabilitated in June 2010.





Figure 11: Profiled waste dump (20%) awaiting clean material cover before topsoil and rock mulch can be applied.



Figure 12: Topsoil (bottom left), rock mulch (top right) and clean push (in distance).

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7 Closure Criteria

Analogue monitoring sites were initially setup in 2015 and with 35 quadrats covering seven vegetation communities. In 2016 an additional five quadrats were established with an eighth vegetation community. At the same time thirty quadrats were established and monitored at six rehabilitation sites to provide an understanding of current rehabilitation performance and to assist in the development of closure criteria. The outcomes from this monitoring will contribute to closure criteria for the project.

CPM aims to develop closure criteria which results in safe, stable landscapes. These closure criteria will be realistic and achievable whilst also meeting the EPA objectives of being ecologically sustainable.

Once closure criteria have been developed CPM will engage with the EPA to agree a process for determining completion of rehabilitation and subsequent close out of monitoring requirements.

7.1 Pit Void / Lake

To date, approvals have been obtained and operations have progressed with a focus on developing the eastern portion of the mine pit (**East Pit**). As part of the Proposal the mine pit will be extended to the west (**West Pit**) remaining wholly within Mining Leases M08/123, M08/124 and M08/125.

The final pit is planned to be formed by benches with ultimate pit wall angles of 45 to 50 degrees. The base of the West Pit will be the deepest, reaching up to 455 m below relative level (**RL**).

It is assumed that the final void will be formed from the East Pit and West Pit and that these will remain as open voids at closure that will gradually fill with water to a level defined by the long term balance between inflows and outflows. On the cessation of mining operations, the west pit is expected to fill relatively quickly in comparison with the East Pit. This is expected to be related to groundwater inflows from the weathered material along the western margin of the pit, which is in connection with the adjacent superficial alluvial aquifer. After approximately 30 years, water levels in the West Pit will reach -100m AHD, at this time, water will begin to flow in the East Pit. Based on historic modelling a final water level of -90 to -100m AHD will form in both the west and east pits approximately 60-80 years after the cessation of mining operations (CloudsGMS 2016).

The original PER (Maunsell 2002) identified that it is expected that the pit lake will become saline over time; however, it is not expected that this will have any long-term impacts on groundwater other than that situated in the immediate vicinity of the pit. Once surface water and groundwater modelling studies are completed any variations to pit lake from the Proposal will be better known.

1 Proposal Implementation

1-1 When implementing the Proposal [being the Sino Iron Project as amended by this Proposal], the proponents shall not exceed the authorised extent of the Proposal as defined in Table 2 in Schedule 1, unless amendments to the Proposal and the authorised extent of the Proposal have been approved under the EP Act.

2 Contact Details

2-1 The proponents shall notify the CEO of any change of name, physical address or postal address for the serving of notices or other correspondence within twenty eight (28) days of such change. Where the proponents are a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State.

3 Compliance Reporting

3-1 The proponents shall prepare, submit and maintain a Compliance Assessment Plan to the CEO at least six (6) months prior to the first Compliance Assessment Report required by condition 3-6, or prior to implementation, whichever is sooner.

3-2 The Compliance Assessment Plan shall indicate:

- 1. the frequency of compliance reporting;
- 2. the approach and timing of compliance assessments;
- 3. the retention of compliance assessments;
- 4. the method of reporting of potential non-compliances and corrective actions taken;
- 5. the table of contents of Compliance Assessment Reports; and
- 6. public availability of Compliance Assessment Reports.

3-3 After receiving notice in writing from the CEO that the Compliance Assessment Plan satisfies the requirements of condition 3-2 the proponents shall assess compliance with conditions in accordance with the Compliance Assessment Plan required by condition 3-1.

3-4 The proponents shall retain reports of all compliance assessments described in the Compliance Assessment Plan required by condition 3-1 and shall make those reports available when requested by the CEO.

3-5 The proponents shall advise the CEO of any potential non-compliance within seven (7) days of that non-compliance being known.

3-6 The proponents shall submit to the CEO a Compliance Assessment Report by 30 April each year addressing compliance in the previous calendar year, or as agreed in writing by the CEO. The first Compliance Assessment Report shall be submitted by the proponents addressing the compliance for the period from the date of issue of this Statement, notwithstanding that the first reporting period may be less than 12 months.

•The Compliance Assessment Report shall:

- 1. be endorsed by the proponents' CEO or a person delegated to sign on the CEO's behalf;
- 2. include a statement as to whether the proponent has complied with the conditions;
- 3. identify all potential non-compliances and describe corrective and preventative actions taken;
- 4. be made publicly available in accordance with the approved Compliance Assessment Plan; and
- 5. indicate any proposed changes to the Compliance Assessment Plan required by condition 3-1.

4 Public Availability of Data

4-1 Subject to condition 4-2, within a reasonable time period approved by the CEO of the issue of this Statement and for the remainder of the life of the proposal the proponent shall make publicly available, in a manner approved by the CEO, all validated environmental data (including sampling design, sampling methodologies, empirical data and derived information products (e.g. maps)) relevant to the assessment of this proposal and implementation of this Statement.

4-2 If any data referred to in condition 4-1 contains particulars of:

(1) a secret formula or process; or

(2) confidential commercially sensitive information;

the proponent may submit a request for approval from the CEO to not make these data publicly available. In making such a request the proponent shall provide the CEO with an explanation and reasons why the data should not be made publicly available.

5 Operational Environmental Management Plan

5-1 Prepare and implement an Operational Environmental Management Plan.

5-2 The proponent:

(1) may review and revise the Operational Environmental Management Plan, or

(2) shall review and revise the Operational Environmental Management Plan as and when directed by the CEO.

6 Mine Closure Plan

6-1 Prepare and implement a Mine Closure Plan consistent with the *Guidelines for Preparing Mine Closure Plans.*

6 -2 The proponent shall review and revise the Mine Closure Plan required by condition 6-1 at intervals not exceeding three to five years, or as otherwise specified by the CEO, and submit the plan to the CEO at the agreed interval.

6-1 The proponent shall implement the latest revision of the Mine Closure Plan, which the CEO has confirmed by notice in writing, satisfies the requirements of condition 6-3.

7 Marine wastewater outfall [condition not proposed to be amended]

The proponent must locate the waste water outfall in the port area within a Moderate Ecological Protection Area which is confined to 250 metres from all points of the port structures.

8-2 The proponent shall ensure that the Moderate Ecological Protection Area is maintained in the port area, except for a Low Ecological Protection Area at the wastewater outfall. The boundary of the Low Ecological Protection Area must not exceed 70 metres from all points of the diffuser structure. At the outer boundary of the Moderate Ecological Protection Area a high level of ecological protection shall be maintained.

8-3 The proponent shall ensure that within the Low Ecological Protection Area the 95th percentile of bioaccumulating toxicant concentrations meets ANZECC and ARMCANZ 2000 National Water Quality Management Strategy 80% species protection guideline levels, and within the Moderate Ecological Protection Area the 95th percentile of toxicants meets ANZECC and ARMCANZ 2000 National Water Quality Management Strategy90% species protection levels.

8-4 The proponent shall ensure that the following conditions are met at the boundary between the Low Ecological Protection Area and the Moderate Ecological Protection Area:

- The median salinity resulting from discharge at the wastewater diffuser either, (1) does not exceed the 95th percentile of the natural salinity range over the same period; or, (2) does not exceed the median salinity at a suitable reference site by more than 1.2 parts per thousand.
- 2. The 95th percentile of toxicant concentrations meets the 90% species protection levels specified in ANZECC and ARMCANZ 2000 National Water Quality Management Strategy.
- 3. The results of Whole Effluent Toxicity testing undertaken using a minimum of five species as per ANZECC and ARMCANZ (2000) protocols demonstrate that sufficient dilution is occurring such that a moderate level of ecological protection (90% species protection) is met for at least 95% of wastewater flow and oceanographic conditions.
- 4. The ambient dissolved oxygen in bottom water samples is not below 80% saturation for more than six weeks and never below 60% saturation.
- 5. The median temperature in any season does not exceed the 95th percentile of the natural temperature range over the same period.

8-5 The proponent shall verify diffuser performance in terms of achieving the required number of dilutions to meet the requirements of 8-2 to 8-4, under a range of flow rates, meteorological and sea state conditions for a period of at least 12 months immediately following commissioning, by use of continuous loggers or at least weekly sampling.

8-6 The proponent shall use procedures contained in EPA 2005 Manual of Operating Procedures for Environmental Monitoring Against the Cockburn Sound Environmental Quality Criteria EPA Report 21 for monitoring carried out to meet the requirements of 8-2 to 8-5.

8-7 Within 18 months of commissioning the proponent shall submit a report containing the results of the monitoring required by 8-2 to 8-5 and a discussion of the operating limitations necessary to ensure ongoing compliance with 8-2 to 8-4 to the Chief Executive Officer of the Department of Environment and Conservation.

8-8 In the event that the monitoring required by 8-5 indicates that the requirements of 8-2 to 8-4 are not being met or are not likely to be met, the proponent shall immediately report such findings to the Chief Executive Officer of the Department of Environment and Conservation along with a description of the management actions to be taken to meet the requirements of 8-2 to 8-4.

Review of previous statement							
Audit Code	Subject	Action	2016 Annual Compliance Audit Report	CORE Compliance Processes	Rationalisation		
635:M1.1	Proposal implementation	Implement the proposal as documented in Schedule 1 of Statement 635, subject to the conditions of this statement.	The proposal was implemented in accordance with Schedule 1 and associated approved changes.	GDP Procedure (DR001867) Change of Management Procedure (DR001875) CPM Steering Committee.	Exclude – Administrative condition and replicates statutory requirements of EP Act.		
635:M1.2	Change to proposal (substantial)	Refer any change to the proposal, as documented in Schedule 1, to the EPA if the Min for Env determines it is substantial.	A scoping and referral document was submitted to the EPA in June 2009 for the Mineralogy Expansion Proposal (MEP). The MEP, for which Mineralogy is the proponent, applies for an expansion of the Sino Iron project (additional 17.4 Mtpa ore concentrate production). It also requests an increase in the project footprint from 2,546ha to 5,371ha.		Propose replacing with 'modern generic conditions' (Condition 1).		
			On 6 July 2009 the EPA advertised its decision to assess the MEP at the level of PER with a six week public review period. The PER document has been approved by the EPA for public review, which commenced on 5 October 2009. Following this public review period (closing date 16 November 2009) submissions were provided by the EPA to the proponent. A detailed response on the submissions was submitted to the EPA in December 2009.				
			Consultation between the proponent, the EPA and other decision making authorities has taken place.				
635:M1.3	Change to proposal (non substantial)	Changes to the proposal, as documented in Schedule 1, may be effected where the Min for Env determines that those changes are not substantial.	The proponent did not seek any changes to the proposal in the reporting period.				
635:M2.1	Proponent Commitments	Implement the environmental management commitments documented in Schedule 2 of Statement 635.	This table summarises the compliance status of all commitments outlined in Schedule 2, as well as correspondence received from the OEPA in September and December 2010 (respectively, ref DER4388-03 and A351774, File DER2010/000621). All commitments are discussed within the relevant sections.	Refer to Audit Code 635: P1-18.	Exclude – Administrative condition.		

Audit Code	Subject	Action	2016 Annual Compliance Audit Report	CORE Compliance Processes	Rationalisation
635:M2.2	Proponent Commitments	Implement subsequent environmental management commitments which the proponent makes as part of the fulfilment of conditions in Statement 635.	A Compliance Obligation Register for Environment has been developed, which provides information on specific compliance requirements for existing activities. This register ensures obligations with government conditions, obligations from approved management plans, other approvals (e.g. licences, permits, works approvals, tenement conditions) and commitments are captured and recorded. CPM's environment department undertakes audits and inspections to ensure activities are completed in accordance with stipulated requirements, as well as good environmental practice. Non-compliances identified are recorded within the electronic incident management system Cintellate. An assessment of the implementation of EMP's required under Statement 635 and 822 are presented where relevant within this document.		
635:M3.1	Nominated proponent	The proponent nominated by the Min for Env, is responsible for the implementation of the proposal until the Minister has revoked this nomination and nominated another person in respect of the proposal under Section 38(7) of the Act.	Not applicable.	EPA Administrative Conditions - No action Required.	Exclude – Administrative condition and replicates statutory requirements of EP Act. Propose replacing with 'modern generic conditions' (Condition 2).
635:M3.2	Change in proponent	Any request for a change in proponent ship shall be accompanied by a copy of the Minister's statement endorsed with an undertaking by the proposed replacement proponent to carry out the proposal in accordance with Statement 635. Contact details and appropriate documentation on the capability of the proposed replacement proponent to carry out the proposal shall also be provided.	Not applicable. NOTE: CPM has requested a transfer of proponent be made from Mineralogy to CPM.	EPA Administrative Conditions - No action Required.	Exclude – Administrative condition and replicates statutory requirements of EP Act.
635:M3.3	Proponent	Notify the OEPA of any change of proponent contact name and address.	Not applicable.	EPA Administrative Conditions - No action Required.	Exclude – covered by modern condition.
635:M4.1	Commencement	Provide evidence to the Min for Env within five years of the date of Statement 635 that the proposal has been substantially commenced.	Completed. A response letter was received from the Min. for Env. on 9 December 2008.	Refer to DEC Correspondence (DR042044).	Exclude – Completed.

Audit Code	Subject	Action	2016 Annual Compliance Audit Report	CORE Compliance Processes	Rationalisation
635:M4.2	Commencement	Make an application to the Min for Env for any extension of approval for the substantial commencement of the proposal beyond five years from the date of Statement 635.	Not applicable.		
635:M5.1	Surface waters	The proponent shall demonstrate that the mine village is positioned so as to minimise encroachment into the 100-year average recurrence interval flood levels.	Completed. DEC approval of the Early Works Investigation Village was received on 20/9/07.	Refer to DEC Correspondence (DR042045).	Exclude – Completed.
635:M5.2	Surface waters	Demonstrate that the mine waste dump is positioned so as to minimise encroachment into the 100-year average recurrence interval flood levels.	Completed. DEC approval of the initial project waste dumps has been received and is documented in a letter dated 20/9/07.		
635:M5.3	Surface Waters	interval flood levels. Employ best practice measures in the design and construction of the waste rock dump and mine tailings storage facility.	Completed. A Waste Rock Management Plan and a Tailings Storage Facility Management Plan were respectively submitted to DMP in September 2008 and November 2009. The waste rock dump and tailings storage facility are constructed in accordance with these plans and any other relevant government approval(s). Soil characterisation field trial reports prepared by Landloch Pty Ltd for the waste rock dumps were submitted to the DMP as part of the 2011 Annual Environmental Report. Following completion of construction activities a construction report for the Tailings Storage Facility – Stage 1 was submitted to the DMP (letter dated 13/06/11) in accordance with tenement conditions. A Tailings Storage Facility Operating Manual was submitted to the DMP (letter dated 29 June 2012). TSF Stage 1b Construction Management Plan was submitted to DMP (20 April 2015) who granted approval in accordance with the tenement conditions (letter dated 29 June 2015). TSF Stage 2 Construction Management Plan was submitted to DMP (16 December 2015) who granted approval in accordance with the tenement conditions (letter dated 29	GDP Procedure (DR001867) Waste Rock MP (14/12/2015, Mine Planning Portal). TSF Management Plan (29/6/2012).	Exclude - DMP is the lead regulator re TSF and WRD construction and management.

Audit Code	Subject	Action	2016 Annual Compliance Audit Report	CORE Compliance Processes	Rationalisation	
635:M6.1	Pit Dewatering and Vegetation Monitoring Plan	Prepare a Pit Dewatering and Vegetation Monitoring Plan for the pit and its surrounding groundwater depletion zone.	Completed. DEC approval of the Pit Dewatering and Vegetation Management Plan (PDVMP) has been received and is documented in a letter dated 10/10/06. Management actions contained within the PDVMP which remain relevant to the nature and scale of activities undertaken during the project's operational phase are contained within the OEMP, superseding the PDVMP in the operations phase. The OEMP was approved by the OEPA in a letter dated 13 August 2014 (EPA Ref 20130000027585, CPM Ref DR034642).	OEMP S6.1, S10.2.4.	OEMP S6.1, S10.2.4. Managed via OEMP condition.	Managed via OEMP condition.
635:M6.2:1	Pit Dewatering and Vegetation Monitoring Plan	Implement the Pit Dewatering and Vegetation Monitoring Plan.	See section 3.2.1 of this report for implementation status.			
635:M6.3	Pit Dewatering and Vegetation Monitoring Plan	Make the Pit Dewatering and Vegetation Monitoring Plan publicly available.	Completed. The Operations Phase Environmental Management Plan and superseded Pit Dewatering and Vegetation Monitoring Plan is publicly available on the CPM website and will remain so throughout the life of the project.			
635:M7.1	Marine Management Plan	Prepare a Marine Management Plan.	Completed. DEC approval of the Marine Management Plan (MMP) has been received and is documented in a letter dated 27/03/09. Condition 7-1 (5) has been deleted from Statement 635 when Statement 822 was published on 23 December 2009. Updates to the MMP were submitted to the EPA for the following minor amendments: • construction of a service wharf; • development of Preston Island; and • relocation of tug pens. These updates were respectively issued to the EPA on 11 August 2009, 12 May 2010 and 22 June 2011. Management actions contained within the MMP which remain relevant to the nature and scale of activities undertaken during the project's operational phase are contained within the OEMP, superseding the MMP in the operations phase. The OEMP was approved by the OEPA in a letter dated 13 August 2014 (EPA Ref 20130000027585, CPM Ref DR034642).	Refer to DEC Correspondence (DR042046). OEMP S8, S10.2.4.	Operational Elements – Managed via OEMP Condition. NOTE: The trestle jetty & dredge channel has not yet been implemented. Propose condition stating a separate construction plan to be reviewed prior to commencement of these activities (or something to similar effect).	
635:M7.2:1	Marine Management Plan	Implement the Marine Management Plan	See section 3.2.2 of this report for implementation status.			

Audit Code	Subject	Action	2016 Annual Compliance Audit Report	CORE Compliance Processes	Rationalisation
635:M7.3	Marine Management Plan	Make the Marine Management Plan publicly available.	Completed. The Operations Phase Environmental Management Plan and superseded Marine Management Plan is publicly available on the CPM website and will remain so throughout the life of the project.		
635:M8.1	Marine Wastewater Outfall	Characterise seawater quality at the proposed intake, discharge points of the outfall, and at a suitable reference station.	Not applicable. Condition was deleted from Statement 635 in December 2009 when Statement 822 was published.	Superseded by MS822.	Exclude – regulated via MS822. Include MS822 conditions in new Statement for this Proposal. Consultation is required for residual conditions related to operations. Exclude - Overlap with MARPOL & Marine Orders (Australian Legislation). Relevant Operational Elements – Managed via OEMP condition. NOTE: The trestle jetty & dredge channel has not yet been implemented. Propose condition stating a separate construction plan to be reviewed prior to commencement of these activities (or something to similar effect).
635:M8.2	Wastewater Outfall Management Plan	Prepare a Wastewater Outfall Management Plan.	Not applicable. Condition was deleted from Statement 635 in December 2009 when Statement 822 was published.		
635:M8.3	Wastewater Outfall Management Plan	Implement the Wastewater Outfall Management Plan.	Not applicable. Condition was deleted from Statement 635 in December 2009 when Statement 822 was published.		
635:M8.4	Wastewater Outfall Management Plan	Make the Wastewater Outfall Management Plan publicly available.	Not applicable. Condition was deleted from Statement 635 in December 2009 when Statement 822 was published.		
635:M9.1	Port Environmental Management Plan	Prepare a Port Environmental Management Plan to address emissions from the port berthing facility, product-handling facilities, desalination plant, and associated structures.	Completed. Approval of the Port Environmental Management Plan (PEMP - version 14) has been received from the OEPA and is documented in a letter dated 07/11/11. Note that the above-mentioned letter of the OEPA required some minor amendments, which resulted in CPM developing version 15 of the PEMP. This version is utilised for port operational activities. The approved Port Environmental Management Plan was developed for the port operations phase. As such, this plan was not superseded by the OEMP and is included as an Appendix in the OEMP document	OEMP Appendix C, S10.2.4.	
635:M9.2	Port Environmental Management Plan	Implement the Port Environnemental Management Plan.	See section 3.2.3 of this report for implementation status.		
635:M9.3	Port Environmental Management Plan	Make the Port Environmental Management Plan publicly available.	Completed. The Port Environmental Management Plan as Appendix C of the Operational Environmental Management Plan is publicly available on the CPM website and will remain so throughout the life of the project.		

Audit Code	Subject	Action	2016 Annual Compliance Audit Report	CORE Compliance Processes	Rationalisation
635:M10.1	Air Emissions	Establish a meteorological station.	Completed. Two meteorological stations were established at the project in August 2006. The cape weather station was destroyed on 30 December 2013 during an extreme weather event and has not been replaced.	Completed.	Exclude – Completed.
635:M10.2	Air Emissions	Revise air emission modelling.	Completed. Air emission modelling was conducted as part of the original proposal. Additional modelling by Air Assessments occurred in 2008 and 2009 to assess the air quality impact of the pellet plant and power station.		
635:M10.3	Air Emissions	Investigate and implement best practice NOx control and measures.	Not required in this reporting period. Construction of the DRI plant has not commenced.	To be completed prior to commencement of construction of DRI Plant.	Propose condition stating OEMP to be reviewed prior to commencement of construction of DRI or Pellet Plant (or something to similar effect).
635:M10.4	Dust Management Plan	Prepare a Dust Management Plan.	Not required in this reporting period. Construction of the DRI plant has not commenced.		
635:M10.5	Dust Management Plan	Implement the Dust Management Plan.	Not required in this reporting period. Construction of the DRI plant has not commenced.		
635:M11.1	Greenhouse Gas Emissions	Prepare a Greenhouse Gas Emissions Management Plan.	Completed. DEC approval of the Greenhouse Gas Management Plan (GGMP) has been received and is documented in a letter dated 15/12/06. Management actions contained within the GGMP which remain relevant to the nature and scale of activities undertaken during the project's operational phase are contained within the OEMP, superseding the GGMP in the operations phase. The OEMP was approved by the OEPA in a letter dated 13 August 2014 (EPA Ref 20130000027585, CPM Ref DR034642).	NGER Energy and Emissions Estimation Procedure (DR029705) CER Safeguard Mechanism (DR041338). OEMP S6.8, S10.2.4.	Exclude - Regulated by Clean Energy Regulator.
635:M11.2	Greenhouse Gas Emissions Management Plan	Implement the Greenhouse Gas Emissions Management Plan.	See section 3.2.4 of this report for implementation status.		
635:M11.3	Greenhouse Gas Emissions Management Plan	Make the Greenhouse Gas Emissions Management Plan publicly available.	Completed. The Operations Phase Environmental Management Plan and superseded Greenhouse Gas Management Plan is publicly available on the CPM website and will remain so throughout the life of the project.		

Audit Code	Subject	Action	2016 Annual Compliance Audit Report	CORE Compliance Processes	Rationalisation
635:M12.1	Noise Management Plan	Prepare a Noise Management Plan	Completed. DEC approval of the Noise Management Plan has been received and is documented in a letter dated 13/10/06.	OEMP S6.12, Appendix B, S10.2.4.	Exclude - CPM has adopted a complaints based management approach and is regulated by DER under Part V.
635:M12.2	Noise Management Plan	Implement the Noise Management Plan.	Completed. Letter sent to EPA 11/12/2012 (DR029450) advising that NMP superseded by operations phase NMP. Management actions contained within the Operations Phase NMP which remain relevant to the nature and scale of activities undertaken during the project's operational phase are contained within the OEMP. The Operational Noise Management plan is also an Appendix in the OEMP and supersedes the construction NMP. The OEMP was approved by the OEPA in a letter dated 13 August 2014 (EPA Ref 20130000027585, CPM Ref DR034642).		
635:M12.3	Noise Management Plan	Make the Noise Management Plan publicly available.	Completed. The Operations Phase Environmental Management Plan and superseded Noise Management Plan is publicly available on the CPM website and will remain so throughout the life of the project.		
635:M13.1	Recreational Use Management Plan	Prepare a Recreational Use Management Plan.	Completed. DEC approval of the Recreational Use Management Plan (RUMP) has been received and is documented in a letter dated 1/11/06. Management actions contained within the RUMP which remain relevant to the nature and scale of activities undertaken during the project's operational phase are contained within the OEMP, superseding the RUMP in the operations phase. The OEMP was approved by the OEPA in a letter dated 13 August 2014 (EPA Ref 20130000027585, CPM Ref DR034642).	OEMP S6.12, S10.	Managed via OEMP condition.
635:M13.2	Recreational Use Management Plan	Implement the Recreational Use Management Plan.	No change in implementation status this reporting period.		
635:M13.3	Recreational Use Management Plan	Make the Recreational Use Management Plan publicly available.	Completed. The Operations Phase Environmental Management Plan and superseded Recreational Use Management Plan is publicly available on the CPM website and will remain so throughout the life of the project.		

Audit Code	Subject	Action	2016 Annual Compliance Audit Report	CORE Compliance Processes	Rationalisation
635:M14.1	Compliance Auditing	Prepare an audit programme and submit compliance reports.	Completed. DEC approval of audit program has been received and is documented in a letter dated 27/11/09. This document represents the eight compliance report and covers the reporting period 1 July 2015 to 30 June 2016. CPM will seek to engage with the EPA to reduce the frequency of the compliance reports to an interval of either every two or three years.	OEMP S10.2. Annual Compliance Reports.	DEMP S10.2. Annual Compliance Reports. Propose annual compliance reporting condition (or something to similar effect). Propose replacing with 'modern generic conditions' (Condition 3).
635:M14.2	Performance Review	Submit a Performance Review report.	Not required in this reporting period. The operations phase of the project commenced 2 December 2013 when the first ship was loaded with iron ore concentrate. The first performance Review report is required early in 2020.		
635:M15.1	Conservation Estate Management Plan	Determine and report on appropriate mitigatory measures.	Completed. DEC approval of the Conservation Estate Management Plan has been received and is documented in a letter dated 19/03/09.	OEMP S9, S10.2.4.	This Plan is a standalone document that was previously approved by the EPA in accordance with MS635. It includes greenhouse gas emissions tree planting commitment, conservation tree planting commitment, mesquite management and conservation estate commitments. Its ongoing requirement to be discussed with EPA.
635:M15.2	Conservation Estate Management Plan	Prepare a Conservation Estate Management Plan and incorporate mitigatory measures referred to in condition 15-1 into the plan.	Completed. DEC approval of the Conservation Estate Management Plan (CEMP) has been received and is documented in a letter dated 19/03/09. Management actions contained within the CEMP which remain relevant to the nature and scale of activities undertaken during the project's operational phase are contained within the OEMP, superseding the CEMP in the operations phase. The OEMP was approved by the OEPA in a letter dated 13 August 2014 (EPA Ref 20130000027585, CPM Ref DR034642).		
635:M15.3	Conservation Estate Management Plan	Implement the Conservation Estate Management Plan.	See section 3.2.5 of this report for implementation status.		
635:M15.4	Conservation Estate Management Plan	Make the Conservation Estate Management Plan publicly available.	Completed. The Operations Phase Environmental Management Plan and superseded Conservation Estate Management Plan is publicly available on the CPM website and will remain so throughout the life of the project.		
635:M16.1	Preliminary Decommissioning and Closure Plan	Prepare a Preliminary Decommissioning and Closure Plan.	Completed. DEC approval of the Preliminary Decommissioning and Closure Plan has been received and is documented in a letter dated 19/10/06.	OEMP S6.1, S6.2, S6.4, S6.5, S6.6 & S6.7.	Propose closure and rehabilitation condition (or something to similar effect).

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635:M16.2	Final Decommissioning and Closure Plan	Prepare a Final Decommissioning and Closure Plan designed to ensure that the site is left in an environmentally acceptable condition.	Not required in this reporting period. Closure of the project is not anticipated within 5 years.		
635:M16.3	Final Decommissioning and Closure Plan	Implement the Final Decommissioning and Closure Plan until such time that the proponent's closure responsibilities are fulfilled.	Not required in this reporting period.		
635:M16.4	Final Decommissioning and Closure Plan	Make the Final Decommissioning and Closure Plan publicly available.	Not required in this reporting period.		
635:P1.1	Construction Phase Environmental Management System	Prepare a construction phase Environmental Management System (EMS) for the project.	Completed. DEC approval of the Environmental Management System (EMS) has been received and is documented in a letter dated 20/11/06.	Refer to DEC correspondence (DR030596).	Managed via OEMP condition.
635:P1.2	Construction and Operation Phase Environmental Management System	Prepare and implement the construction and operation phase EMS.	Completed. OEPA approval of the Operational Environmental Management System (EMS) has been received and is documented in a letter dated 19/04/13.		
635:P1.4	Operation Phase Environmental Management System	Implement the operation phase EMS.	Completed. EPA approval of the Operations Phase Environmental Management System (EMS) has been received and is documented in a letter dated 19/04/13. See section 3.1 of this report for implementation status.		
635:P2.1 C	Construction Phase Environnemental Management Programme	Prepare, implement and regularly revise an Environmental Management Programme (EMPgm).	Completed. The Phase 1 Construction EMPgm for Terrestrial Activities was prepared in September 2007. The Phase 2 Construction EMPgm for Cape Preston was prepared in December 2008.	Refer to OEPA correspondence (DR034642).	Managed via OEMP condition.
			The Phase 3 Construction EMPgm for Marine Activities was prepared in January 2009. DEC approval of these plans has been received and is documented respectively in letters dated 28/9/07, 24/03/09 and 30/03/09.		

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635:P2.2	Operation Phase Environmental Management Programme	Prepare, implement and regularly revise an EMPgm.	Completed. CPM submitted an Operations Phase Environmental Management Plan (OEMP) to Mineralogy (the proponent of MS 635) on 5 March 2013, which was subsequently provided by Mineralogy to the OEPA on 2 April 2013. The OEMP was approved by the OEPA in a letter dated 13 August 2014 (EPA Ref 20130000027585, CPM Ref DR034642). See section 3.2 and 3.2.6 of this report for implementation status.		
635:P3	Flora survey	Undertake a flora survey – in particular in the cracking clay environment. If any specimens of the Priority 1 species Goodenia pallida are identified, a management strategy will be developed with DPAW.	Completed. As reported in the MEP (Section 6.2.1) a total of eight floristic surveys were completed within the Cape Preston area since 2000.	Refer to reference documents: Austeel Biological Survey Phase 1 (HGM 2001). Cape Preston Iron Ore Development (Maunsell/AECOM2003). Balmoral South EIA (Maunsell/AECOM 2006). Cape Preston Potential Campsites and Airstrips (Mattiske 2007). G08/52 & G08/53 Additional Vegetation Surveys (Astron 2007). Balmoral North (AECOM 2009, Sino Iron Project (AECOM 2009). Mineralogy Expansion Proposal (Astron 2009).	Exclude – Completed.
635:P4.1	Vegetation Monitoring Plan	Prepare a Vegetation Monitoring Plan to determine the extent of creekline vegetation loss.	Completed. DEC approval of the Vegetation Monitoring Plan has been received and is documented in a letter dated 10/10/06. Management actions contained within this plan which remain relevant to the nature and scale of activities undertaken during the project's operational phase are contained within the OEMP, superseding this plan in the operations phase. The OEMP was approved by the OEPA in a letter dated 13 August 2014 (EPA Ref 20130000027585, CPM Ref DR034642).	OEMP S6.1 & S7.2.	Managed via OEMP condition.

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635:P4.2	Vegetation Monitoring Plan	Implement the Vegetation Monitoring Plan to determine the extent of creekline vegetation loss.	See section 3.2.1 of this report for implementation status.		
635:P5	Mesquite (Prosopis pallida hybrid) Control Plan	Undertake Mesquite control as an active member of the Mesquite Control Committee.	CPM continued its involvement with the Pilbara Mesquite Management Committee (PMMC), through executive member representation.	OEMP S6.3.	Managed via OEMP condition.
635:P6.1	Fauna Management Plan	Prepare a Fauna Management Plan.	Completed. DEC approval of the Fauna Management Plan has been received and is documented in a letter dated 30/03/09.	OEMP S7.1.	Managed via OEMP condition.
635:P6.2.1	Fauna Management Plan	Implement the Fauna Management Plan (construction).	Complete. Letters submitted to the OEPA 14 February 2011 (Ref. 08-MIN-E-L-TS-00048) and 29 November 2010 (DR021622).		
635:P6.2.2	Fauna Management Plan	Implement the Fauna Management Plan (operation).	See above. Significance of wading bird and turtle habitat addressed during construction phase. CPM developed an OEMP which includes Fauna management actions. The OEMP was approved by the OEPA in a letter dated 13 August 2014 (EPA Ref 20130000027585, CPM Ref		
			DR034642). See section 7.1 of the OEMP. See section 3.2.6 of this report for implementation status.		
635:P7.1	Ballast Water Management Plan	Prepare a Ballast Water Management Plan.	Completed. The Ballast Water Management Plan is included in the Port EMP, which was approved in November 2011 by the OEPA. The Port EMP is Appendix C of the OEMP.	OEMP – Appendix C.	Exclude - Ballast water is regulated by the Biosecurity Act 2015. There is also International Convention for the Control and Management of Ships' Ballast Water and Sediments. International convention of the control of harmful anti-fouling systems on ships.
635:P7.2	Ballast Water Management Plan	Implement the Ballast Water Management Plan.	See section 3.2.3 of this report for implementation status.		
635:P8.1	Surface Water Management Plan	Prepare a Surface Water Management Plan.	Completed. DEC approval of the Surface Water Management Plan has been received and is documented in a letter dated16/03/09.	OEMP S6.6.	Managed via OEMP condition.
635:P8.2:1	Surface Water Management Plan	Implement the Surface Water Management Plan (construction)	Complete- the construction phase plans were superseded by the OEMP.		

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635:P8.2:2	Surface Water Management Plan	Implement the Surface Water Management Plan (operation).	CPM developed an OEMP which includes surface water management actions. The OEMP was approved by the OEPA in a letter dated 13 August 2014 (EPA Ref 20130000027585, CPM Ref		
			DR034642). No change in implementation status this reporting period.		
635:P9.1	Groundwater Management Plan	Prepare a Groundwater Management Plan.	Completed. DEC approval of the Groundwater Management Plan has been received and is documented in a letter dated 12/6/07.	OEMP S6.7.	Exclude - Groundwater MP required to be read in conjunction with DoW operating strategy.
635:P9.2:1	Groundwater Management Plan	Implement the Groundwater Management Plan (construction).	Complete- the construction phase plans were superseded by the OEMP.		
635:P9.2:2	Groundwater Management Plan	Implement the Groundwater Management Plan (operation).	CPM developed an OEMP which includes ground water management actions. The OEMP was approved by the OEPA in a letter dated 13 August 2014 (EPA Ref 20130000027585, CPM Ref DR034642). See section 6.7 of the OEMP.		
			See section 3.2.6 of this report for implementation status.		
635:P10.1	Spill Contingency Plan	Prepare a Spill Contingency Plan.	Completed. The Spill Contingency Plan is part of the Port EMP, which was approved in November 2011 by the OEPA. An updated copy of the Spill Contingency Plan has been submitted to the Department of Transport for review.	OEMP – Appendix C.	 Exclude - Regulated by DoT DOT is the Hazard Management Agency for marine oil pollution incidents in Western Australian waters. The State Emergency Management Plan for Marine Oil Pollution (WestPlan MOP), outlines the procedures for managing oil pollution in the State, including spill response.
635:P10.2	Spill Contingency Plan	Implement the Spill Contingency Plan.	No change in implementation status this reporting period.		
635:P11	Final project layout	Liaise with DoW on the siting of project components and equipment.	Completed. EPA determined that DMP were the lead agency in assessment of the waste rock dumps and TSF. See 635:M5.3.		Exclude - DMP is the lead regulator re TSF and waste rock landform construction and management.

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635:P12.1	Aboriginal Sites Management Plan	Prepare an Aboriginal Sites Management Plan.	Completed. DEC approval of the Aboriginal Heritage Management Plan has been received and is documented in a letter dated 13/10/06.	OEMP S6.11.	Exclude - Regulated by DAA.
635:P12.2:1	Aboriginal Sites Management Plan	Implement the Aboriginal Sites Management Plan (construction).	Complete- the construction phase plans were superseded by the OEMP.		
635:P12.2:2	Aboriginal Sites Management Plan	Implement the Aboriginal Sites Management Plan (operation).	CPM developed an OEMP which includes aboriginal sites management actions.		
			The OEMP was approved by the OEPA in a letter dated 13 August 2014 (EPA Ref 20130000027585, CPM Ref DR034642).		
			See section 6.11 of the OEMP.		
			No change in implementation status this reporting period.		
635:P13	Public Access to sites for recreational purposes	Maintain public access to the mouth of the Fortescue River and to other sites required for recreational purposes.	Completed. An agreement between Sino Iron Pty Ltd (co-proponent) and the Shire of Roebourne (now the City of Karratha) has been reached to maintain, upgrade and realign the Fortescue River Road. Public access to the Fortescue River mouth remains via the Extension River road	SoR/CPM Fortescue River Road Maintenance Agreement (DR008633).	Exclude - Regulated by CoK.
635:P14	Carbon Sequestration	Establish a plantation crop(s) of trees at the rate of in the order of 100,000 trees per annum for 10 years.	Not required in this reporting period. Construction of the DRI plant has not commenced.	OEMP S4.4.	This Plan is a standalone document that was previously approved by the EPA in accordance with MS635. It includes greenhouse gas emissions tree planting commitment, conservation tree planting commitment, mesquite management and conservation estate commitments. Its ongoing requirement to be discussed with EPA.

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635:P15	Conservation Estate	Establish a plantation crop(s) of trees at the rate of in the order of 50,000 trees per annum for 10 years.	Not required in this reporting period. Construction of the DRI plant has not commenced.	OEMP S4.4.	This Plan is a standalone document that was previously approved by the EPA in accordance with MS635. It includes greenhouse gas emissions tree planting commitment, conservation tree planting commitment, mesquite management and conservation estate commitments. Its ongoing requirement to be discussed with EPA.
635:P16.1	Subterranean Fauna	Design a stygofauna assessment program in consultation with an Australian University.	Completed. Following the proponent's request to cease subterranean stygofauna monitoring a letter was received from the OEPA (3 December 2009) outlining its acceptance that Commitment 16 has been met.	Completed refer to DEC correspondence (DR017145).	Exclude – Completed.
635:P16.2	Subterranean Fauna	Implement the stygofauna assessment program (construction).	Completed. Following the proponent's request to cease subterranean stygofauna monitoring a letter was received from the OEPA (3 December 2009) outlining its acceptance that Commitment 16 has been met.		
635:P16.3	Subterranean Fauna	Implement the stygofauna assessment program (operation).	Completed. Following the proponent's request to cease subterranean stygofauna monitoring a letter was received from the OEPA (3 December 2009) outlining its acceptance that Commitment 16 has been met.		
635:P17	Personnel induction	Protect sensitive fishery nursery habitats from overfishing.	The mandatory site induction covers off prohibited fishing on the project. In addition, the off-site recreation management program provides further information on fishing.	Community: offsite recreation procedure (DR025524).	Managed via OEMP condition.
635:P18	Best practice	Implement best practice environmental management and decommissioning and rehabilitation management plans within the project.	Preparation of EMS, EMPgm, EMPs, including monitoring programs and procedures, ensures best practice environmental management strategies are developed and implemented. This ACR details CPM's progress against commitments detailed in government approved EMPs.	Annual Compliance Reports.	Propose annual compliance reporting condition (or something to similar effect).
822:M8.1	Marine Wastewater Outfall	Locate the wastewater outfall in the port area within a Moderate Ecological Protection Area which is confined to 250 metres from all points of the port structures.	Completed. The wastewater outfall is installed within 250m of the port structure.		Exclude – Completed.

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822:M8.2	Marine Wastewater Outfall	Ensure that the Moderate Ecological Protection Area is maintained in the port area, except for a Low Ecological Protection Area at the wastewater outfall. The boundary of the Low Ecological Protection Area must not exceed 70 metres from all points of the diffuser structure. At the outer boundary of the Moderate Ecological Protection Area a high level of ecological protection shall be maintained.	Outfall water quality monitoring commenced 7 March 2012 (baseline period). Desalination plant commissioning commenced 22 September 2012. Outfall water quality monitoring continued throughout the reporting period. See section 3.2.8 of this report for implementation status.	OEMP S8.3 (DR029968).	Include MS822 conditions in new Statement for this Proposal. Consultation is required for residual conditions related to operations.
822:M8.3	Marine Wastewater Outfall	Ensure that within the Low Ecological Protection Area the 95th percentile of bioaccumulating toxicant concentrations meets ANZECC and ARMCANZ 2000 National Water Quality Management Strategy 80% species protection guideline levels, and within the Moderate Ecological Protection Area the 95th percentile of toxicants meets ANZECC and ARMCANZ 2000 National Water Quality Management Strategy 90% species protection levels.	See section 3.2.8 of this report for implementation status. S3.2.8) Marine water quality monitoring of the desalination plant wastewater discharge has been undertaken in accordance with Ministerial Statement 822. This has involved continuous logging of physico-chemical parameters (including temperature, salinity and dissolved oxygen), Whole Effluent Toxicity testing and water quality chemistry testing. Four monitoring stations consisting of continuous monitoring instruments, data loggers and telemetry buoys were deployed in March 2012. Two stations are located at the Low Ecological Protection Area (LEPA), one at the Moderate Ecological Protection Area (MEPA) and one as a reference site.	OEMP S8.3 (DR029968).	
822:M8.4	Marine Wastewater Outfall	 Ensure that the following conditions are met at the boundary between the Low Ecological Protection Area and the Moderate Ecological Protection Area: The median salinity resulting from discharge at the wastewater diffuser either, (1) does not exceed the 95th percentile of the natural salinity range over the same period; or, (2) does not exceed the median salinity at a suitable reference site by more than 1.2 parts per thousand. 	The plant is approved to produce 44 Mm3 of desalinated water and discharge 57.8 Mm3 of brine per annum. Brine discharge from the desalination plant commenced on 22 September 2012. The desalination plant has continued to be run at low production levels during the reporting period. Discharged water through the outfall consists of a variable mixture of brine and seawater depending on site water requirements at the time. The total volume of product water produced from the desalination plant for the reporting period was approximately 14.8 Mm3 with approximately 19.5 Mm3 of outfall brine water discharged from the diffuser. This figure excludes the overflow seawater from the pre-treatment area when the reverse osmosis modules are not running. Monitoring of the marine environment undertaken during the reporting period did not detect any breaches of the conditions specified within MS822. Wastewater outfall monitoring will continue to be undertaken until it is demonstrated the requirements of MS822 have been met.	OEMP S8.3 (DR029968)	

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		 The 95th percentile of toxicant concentrations meets the 90% species protection levels specified in ANZECC and ARMCANZ 2000 National Water Quality Management Strategy. The results of Whole Effluent Toxicity testing undertaken using a minimum of five species as per ANZECC and ARMCANZ (2000) protocols demonstrate that sufficient dilution is occurring such that a moderate level of ecological protection (90% species protection) is met for at least 95% of wastewater flow and oceanographic conditions. The ambient dissolved oxygen in bottom water samples is not below 80% saturation for more than six weeks and never below 60% saturation. The median temperature in any season does not exceed the 95th percentile of the natural temperature range over the same period. 			
822:M8.5	Marine Wastewater Outfall	Verify diffuser performance in terms of achieving the required number of dilutions to meet the requirements of 8-2 to 8-4, under a range of flow rates, meteorological and sea state conditions for a period of at least 12 months immediately following commissioning, by use of continuous loggers or at least weekly sampling.	The plant remains in a commissioning phase and has not met production capacity to allow performance to be verified.	OEMP S8.3 (DR029968).	

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822:M8.6	Marine Wastewater Outfall	Utilise procedures contained in EPA 2005 Manual of Operating Procedures for Environmental Monitoring Against the Cockburn Sound Environmental Quality Criteria EPA Report 21 for monitoring carried out to meet the requirements of 8-2 to 8-5.	A quality assurance plan (QAP) (DR038862) has been prepared and maintained in accordance with the procedures.	OEMP S8.3 (DR029968).	
822:M8.7	Marine Wastewater Outfall	Within 18 months of commissioning submit a report containing the results of the monitoring required by 8-2 to 8-5 and a discussion of the operating limitations necessary to ensure ongoing compliance with 8-2 to 8- 4 to the Chief Executive Officer of the Department of Environment and Conservation.	A report (DR033209) was prepared and submitted to the OEPA on 19 March 2014 (DR033211). Two further wastewater outfall water quality monitoring reports for 2014 and 2015 were submitted to the OEPA 1/4/2016 (DR040503) in accordance with OEPA correspondence dated 18/11/14 (OEPA Ref 2014-0000761897).	OEMP S10.2.3 (DR029968).	
822:M8.8	Marine Wastewater Outfall	In the event that the monitoring required by 8-5 indicates that the requirements of 8-2 to 8-4 are not being met or are not likely to be met, immediately report such findings to the Chief Executive Officer of the Department of Environment and Conservation along with a description of the management actions to be taken to meet the requirements of 8-2 to 8-4.	The OEMP outlines the marine wastewater outfall contingency plan. The OEMP was approved by the OEPA in a letter dated 13 August 2014 (EPA Ref 20130000027585, CPM Ref DR034642). Monitoring conditions were met throughout the reporting period. See section 3.2.8 of this report for status.	OEMP S8.3 (DR029968).	