Environmental Scoping Document

Turee Syncline Iron Ore Project

Prepared for
Hamersley Iron Ore Pty Ltd

February 2012

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ACKNOWLEDGEMENTS

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Abbreviations

ABBREVIATION	DESCRIPTION
AMD	Acid and metalliferous drainage
BoM	Bureau of Meteorology
CEMP	Construction Environmental Management Plan
DEC	Department of Environment and Conservation (WA)
DIA	Department of Indigenous Affairs (WA)
DMP	Department of Mines and Petroleum (WA)
DRF	Declared Rare Flora
EMP	Environmental Management Plan (operational)
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
ESD	Environmental Scoping Document
FIFO	Fly-in fly-out
GL	Gigalitres
HSEQ Policy	Health, Safety, Environment and Quality Policy
IBRA	Interim Biogeographic Regionalisation for Australia
IEMS	Iron Environmental Management System
IUCN	International Union for Conservation of Nature
km	Kilometres
ML	Megalitres
Mtpa	Million tonnes per annum
P	Priority (flora)
PEC	Priority Ecological Community
PER	Public Environmental Review
Pilbara Iron	Pilbara Iron Pty Ltd
RL	Reduced level
ROM	Run of mine
RTIO	Rio Tinto Iron Ore
SEWPaC	Department of Sustainability, Environment, Water, Populations and Communities (Cth)
SRE	Short range endemic (species)

ABBREVIATION	DESCRIPTION
TEC	Threatened Ecological Community
WA	Western Australia
WC Act	*Wildlife Conservation Act 1950* (WA)

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1 Introduction

1.1 BACKGROUND

Hamersley Iron Pty Ltd (the Proponent), a wholly owned subsidiary of Rio Tinto Iron Ore (RTIO), is seeking to develop a new iron ore mine at the Turee Syncline deposit in the Pilbara region of Western Australia (WA). The proposed Turee Syncline Iron Ore Project (the Proposal) will involve the construction and operation of a greenfield mine site approximately 15 kilometres (km) north-east of Paraburdoo. The mine will produce up to 10 million tonnes per annum (Mtpa) dry ore from the Turee deposit. The expected operational mine life is approximately 16 years.

Mining will consist of a series of above water table open pits along the ore strike zone (strike length). Additional disturbance activities will be involved to allow construction of supporting infrastructure. The key components of the Proposal include:

- Mine pits (all above water table).
- Product stockpiles and waste dumps.
- Ore handling and processing facilities (depending on option pursued).
- Mine support facilities, including offices, workshops, explosives storage, waste water treatment plant and residential camp.
- Rail line extension or conveyor (depending on ore handling and processing facilities option pursued).
- Power line extension (from Paraburdoo).
- Road infrastructure (mine access and internal road network).
- Water supply infrastructure.

Options are under consideration for both ore handling and processing and water supply. Ore handling and processing will be undertaken either by transport of ore by road or conveyor for processing at Paraburdoo; or through on site processing using a plant to be constructed at Turee Syncline. Water supply will be sourced either from the Proponent's existing system at Paraburdoo via a new pipeline to be constructed to Turee Syncline; or from a proposed new borefield close to Turee Syncline. These options will be refined at the completion of feasibility studies.

1.2 PURPOSE OF ENVIRONMENTAL SCOPING DOCUMENT (ESD)

The Proposal was referred to the Environmental Protection Authority (EPA) under Section 38 of the *Environmental Protection Act 1986* (WA) on 10 June 2010. The level of assessment for the Proposal was advertised on 12 July 2010 as Public Environmental Review (PER) with a four week public review period.

Assessment at the level of PER requires the Proponent to prepare an Environmental Scoping Document (ESD). The purpose of this document is to provide a basis of understanding with the EPA regarding the assessment of the Proposal as well as providing an indicative timeline for the

assessment. This ESD provides a summary of the potential environmental impacts, their significance and possible management responses; proposed scope of studies for incorporation into the PER; stakeholder consultation program; proposal and assessment schedule; and the study team.

1.3 IDENTIFICATION OF PROPONENT

The proponent for the Proposal is Hamersley Iron Pty Ltd (the Proponent). Pilbara assets of the Proponent includes iron ore mines, as well as railway and port and infrastructure located at Dampier and Cape Lambert.

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1.4 PROPOSAL JUSTIFICATION AND ALTERNATIVES CONSIDERED

Pilbara Iron Pty Ltd (Pilbara Iron) operates the Proponent's iron ore mine and joint venture assets in the Pilbara region. Pilbara Iron is currently overseeing expansion activities to meet future demand for iron ore, primarily from China. This includes an increase in port throughput capacity, serviced through a combination of expansions to existing mining operations and the development of new iron ore deposits.

The Turee Syncline deposits subject to this Proposal will contribute to increased iron ore exports over the next decade and beyond. The Proposal is expected to produce up to 10 Mtpa of dry ore to be incorporated into the Proponent's product offering. Turee Syncline is also strategically located near the Proponent's Greater Paraburdoo operations and lies immediately south of the Paraburdoo branch of the company's existing rail network.

The township of Paraburdoo was established by the Proponent in 1970 to house employees working at the Paraburdoo mine, 5 km away. The town is one of the largest urban settlements in the Shire of Ashburton. The continuing activities of various RTIO subsidiaries in the area contribute significantly to the economy and employment in the town. The 'do nothing' alternative would result in the loss of opportunity to add value to Australia's raw materials, loss of economic, social and employment opportunities particularly within local towns and loss of potential for future developments in downstream processing of raw materials. The world's increasing demand for iron ore would then be met through the development of new deposits and processing facilities or the development of other overseas projects with the loss of associated benefits to Paraburdoo, the Pilbara, WA and Australia.

1.5 APPLICABLE LEGISLATION

Key WA legislation relevant to the Proposal includes the following (alphabetical order):

- *Aboriginal Heritage Act 1972*
- *Agriculture and Related Resources Protection Act 1976*

- *Bush Fires Act 1954*
- *Conservation and Land Management Act 1984*
- *Contaminated Sites Act 2003*
- *Country Areas Water Supply Act 1947*
- *Dangerous Goods Safety Act 2004*
- *Electricity Act 1945*
- *Environmental Protection Act 1986*
- *Health Act 1911*
- *Iron Ore (Mount Bruce) Agreement Act 1972*: the Proposal area includes land held under Statement Agreement ML252 (Sections 12 to 15) which were granted in 1974 under this Act.
- *Land Administration Act 1997*
- *Local Government Act 1995*
- *Main Roads Act 1930*
- *Mining Act 1978*
- *Native Title (State Provisions) Act 1999*
- *Occupational Safety and Health Act 1984*
- *Rail Safety Act 1998*
- *Rights in Water and Irrigation Act 1914*
- *Soil and Land Conservation Act 1945*
- *Waterways Conservation Act 1976*
- *Wildlife Conservation Act 1950*

Key Commonwealth legislation relevant to the Proposal includes the following (alphabetical order):

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

2 Summary description of the proposal

2.1 LOCATION

The Turee Syncline Proposal area (the site) is located approximately 15 km north-east of the town of Paraburdoo (Shire of Ashburton) in the Pilbara region, WA (Figure 1). The site lies immediately south of the Paraburdoo branch of the Proponent's rail network and the Tom Price to Paraburdoo Road (public). Karijini National Park is located to the immediate east of the site.

2.2 PRELIMINARY KEY PROPOSAL CHARACTERISTICS

Table 1 identifies the preliminary key Proposal characteristics. The exact locations of the individual elements of the Proposal (e.g. pits, dumps, processing plant, internal haul roads, pipelines, rail loop and other infrastructure) are still to be finalised as part of detailed mine planning and engineering studies. However, all such elements of the Proposal are proposed to be contained within the Proposal component polygons indicated in Figure 2.

Table 1: Preliminary environmental footprint of the Proposal (key characteristics)

ENVIRONMENTAL IMPACT/ASPECT	PROPOSAL COMPONENT	RELEVANT PROPOSAL ACTIVITIES	EXTENT OF IMPACT
Proposal implementation	All operations	Life of Proposal	Approximately 16 years*
		Production rate	Approximately 10 Mtpa
	Water supply	Option 1: Source from existing borefield at Paraburdoo	Approximately 2 GL/annum
		Option 2: Establishment of new local borefield	Approximately 2 GL/annum
	Ore processing	Option 1: Ore transported to Paraburdoo Mine	Use of haul trucks/road trains on existing public road system or on new haul road, or Use of new overland conveyor
		Option 2: On site processing	Establishment of crushing facilities, overland conveyor, ore stockpiles and rail loop
Vegetation/fauna habitat disturbance/ changes	Mining area	Clearing and earthworks to facilitate development of mine pits, product stockpiles, overburden dumps, potential processing facilities (depending	Approximately 1,600 ha of ground disturbance

ENVIRONMENTAL IMPACT/ASPECT	PROPOSAL COMPONENT	RELEVANT PROPOSAL ACTIVITIES	EXTENT OF IMPACT
		on ore handling/processing option pursued), haul roads, all weather access road and administration buildings	
	Infrastructure corridor	Clearing and earthworks to facilitate development of power line, communication infrastructure, and potentially a rail loop (depending on ore handling/processing option pursued) and water pipeline connection to Paraburdoo (depending on water supply option pursued)	Approximately 505 ha of ground disturbance (dependent on option pursued)
	Accommodation area	Clearing and earthworks to facilitate the construction of accommodation facilities and associated facilities	Approximately 95 ha of ground disturbance
	Borefield (option)	Clearing and earthworks to facilitate the development of water supply borefield (depending on water supply option pursued)	Approximately 45 ha of ground disturbance (dependent on option pursued)

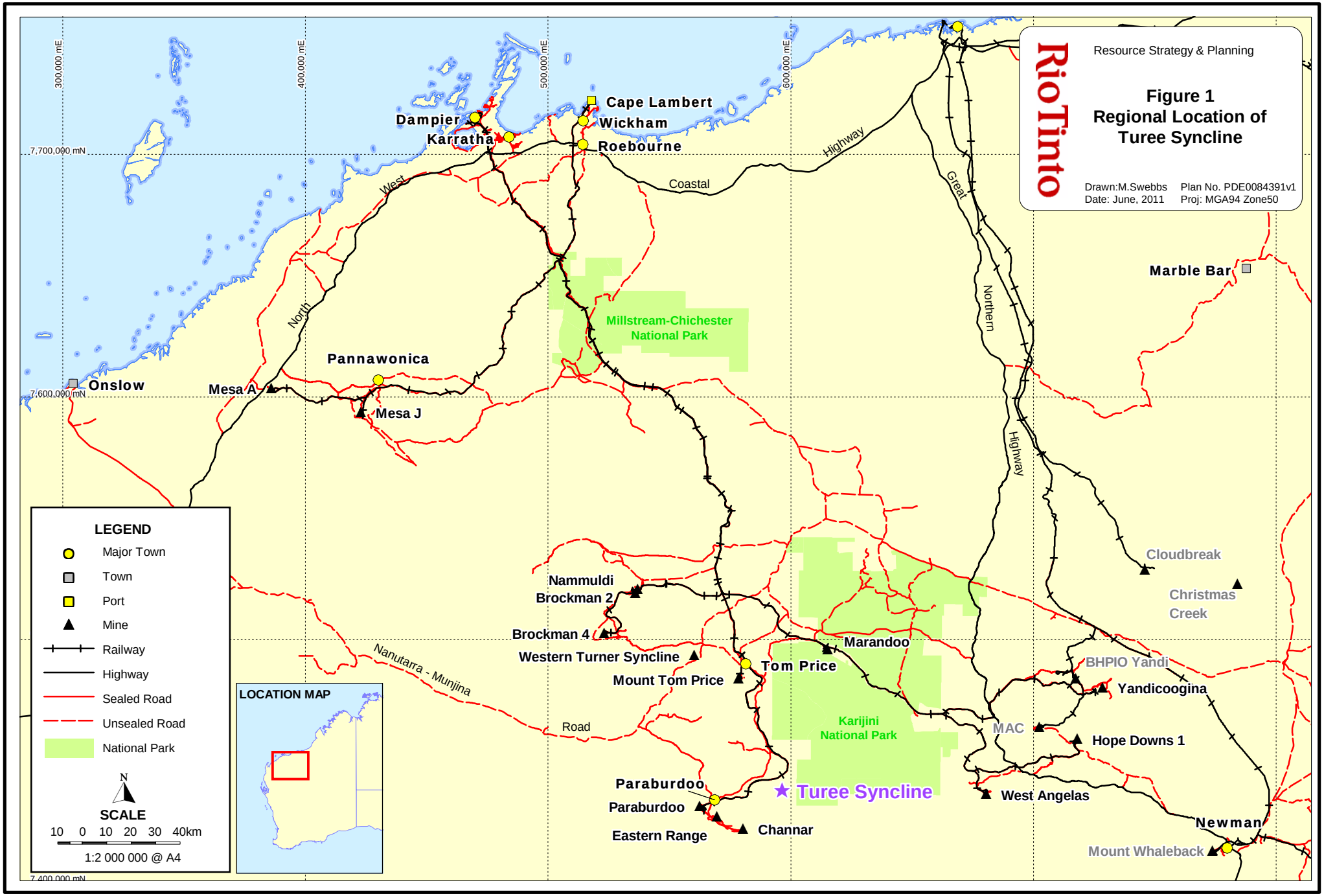
*Life of Proposal is based on the indicative mine plan at the time of submission – actual life of mine and duration of the Proposal will be dependent on a number of factors including market conditions.

The Proposal will require clearing of native vegetation to facilitate the development of the Proposal elements. Approximate areas to be cleared for specific aspects of the proposal are outlined in Table 2. Based on the current indicative mine plan, the Proposal will result in new ground disturbance of up to approximately 2,245 ha. This disturbance estimate may change as a result of modifications to the detailed design plan.

Table 2: Indicative extent of vegetation clearing

PROPOSAL COMPONENT	APPROXIMATE EXTENT OF VEGETATION DISTURBANCE WITHIN PROPOSAL COMPONENT POLYGON (ha)
Mining area	1,600
Infrastructure corridor	505
Accommodation area	95
Borefield (water source option)	45
Total	**2,245**

Note: These disturbance figures are conservative estimates based on conceptual plans and include a buffer – these figures will be refined during further studies.


Resource Strategy & Planning
Figure 1
Regional Location of
Turee Syncline
Drawn:M.Swebbs
Date: June, 2011
Plan No. PDE0084391v1
Proj: MGA94 Zone50
300,000 mE
400,000 mE
500,000 mE
600,000 mE
7,700,000 mN
7,600,000 mN
7,400,000 mN
Dampier
Karratha
Cape Lambert
Wickham
Roebourne
West Coastal Highway
Great Northern Highway
North West Coastal Highway
Marble Bar
Millstream-Chichester National Park
Pannawonica
Onslow
Mesa A
Mesa J
Nammuldi
Brockman 2
Brockman 4
Western Turner Syncline
Mount Tom Price
Marandoo
Tom Price
Karijini National Park
Nanutarra - Munjina Road
Cloudbreak
Christmas Creek
BHPIO Yandi
Yandicoogina
MAC
Hope Downs 1
West Angelas
Newman
Mount Whaleback
Paraburdoo
Paraburdoo
Eastern Range
Channar
Turee Syncline
LEGEND
Major Town
Town
Port
Mine
Railway
Highway
Sealed Road
Unsealed Road
National Park
N
SCALE
10 0 10 20 30 40km
1:2 000 000 @ A4
LOCATION MAP

2.3 MINING

An indicative mine layout is shown in Figure 2. The final form of the mine plan is subject to the completion of additional resource and engineering studies.

The proposed area to be mined lies along an approximate 8 km strike length. A conventional drill, blast, and load and haul operation will be implemented. In response to topography and access constraints, mine pits are proposed to be developed in a gradual linear progression along the strike length. Accordingly, mining activities will be concentrated in localised areas over the life of the Proposal.

The Proponent has identified the area of resource, where it continues westwards from the mining area defined by this Proposal, as possibly being subject to future mining. However, this area does not form part of the scope of this Proposal and will only be developed once the appropriate approvals are in place.

Groundwater dewatering will not be required as the target resource lies entirely above the watertable. Periodic in-pit dewatering of accumulated surface water may be required following heavy rainfall events.

2.4 ORE PROCESSING

Two options are currently under consideration for ore processing therefore the Proponent will be undertaking an environmental impact assessment of both options.

2.4.1 Processing option 1: Ore transported to Paraburdoo Mine

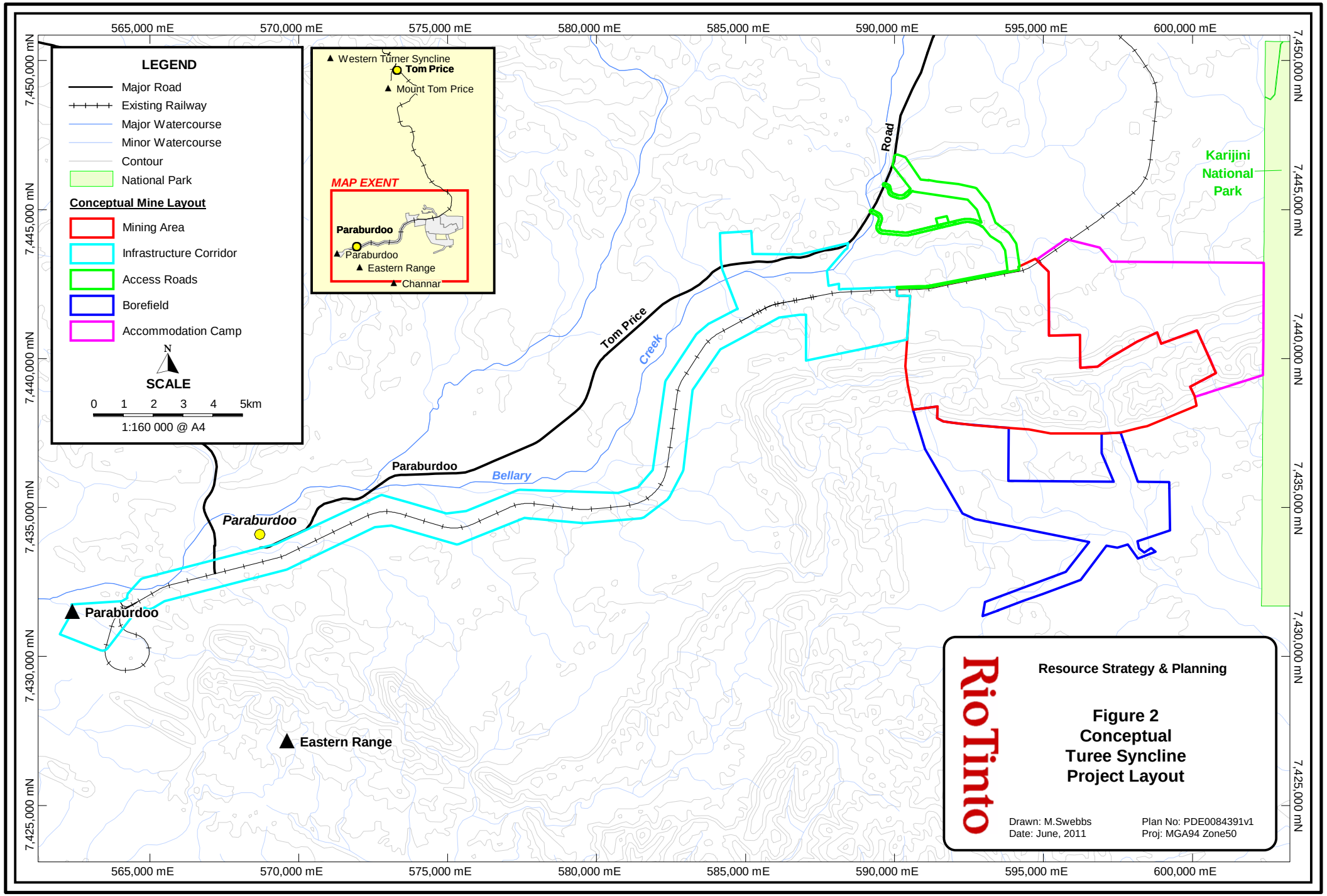
This option would involve ore being loaded and transported to the processing facilities at the Paraburdoo Mine (operated by Pilbara Iron).

The ore would be transported using road trains or via an overland conveyor system. The former option may require the construction of a new haul road and stockpiling area. If the conveyor system was pursued, a new overland conveyor would need to be constructed, and prior to transport, the ore will require crushing at Turee Syncline.

2.4.2 Processing option 2: On site processing and rail loading

This option would involve the comprehensive processing of ore at Turee Syncline prior to loading onto the existing rail network for transportation. Under this option, the following key elements would need to be established at Turee Syncline:

- Primary, secondary and tertiary crushing facilities and associated ore stockpile locations.
- Overland conveyors to transfer ore between crushing and processing facilities, and from there to screening and associated ore stockpile locations.
- A new rail loop or siding and loading facility enabling connection to the existing Paraburdoo to Tom Price railway line. See Section 2.8 for more information relating to the rail infrastructure.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7,435,000 mN
7,430,000 mN
7,425,000 mN
LEGEND
Major Road
Existing Railway
Major Watercourse
Minor Watercourse
Contour
National Park
Conceptual Mine Layout
Mining Area
Infrastructure Corridor
Access Roads
Borefield
Accommodation Camp
N
SCALE
0 1 2 3 4 5km
1:160 000 @ A4
Western Turner Syncline
Tom Price
Mount Tom Price
MAP EXENT
Paraburdoo
Paraburdoo
Eastern Range
Channar
Road
Karijini National Park
Tom Price
Creek
Paraburdoo
Bellary
Paraburdoo
Paraburdoo
Eastern Range
Resource Strategy & Planning
Figure 2
Conceptual
Turee Syncline
Project Layout
Drawn: M.Swebbs
Date: June, 2011
Plan No: PDE0084391v1
Proj: MGA94 Zone50

2.5 MINERAL WASTE ROCK DUMPS

The mine stripping ratio of ore to waste is estimated to be approximately 1:2. Waste may be used to construct haul roads and land bridges between pits and in the establishment of the run of mine (ROM) pad. Topographical constraints may limit the opportunity for backfilling. The feasibility of backfilling voids will be continually assessed during operation and the ongoing mine closure planning process. The balance of waste may be placed in out-of pit dumps. Waste dump areas will be designed to take into consideration surface drainage requirements and mine closure principles.

2.6 WATER REQUIREMENTS AND SUPPLY

Operational water requirements are estimated to be approximately 2 gigalitres (GL)/annum, or an estimated 5.2 megalitres (ML)/day. The water requirements for construction are still being determined but are expected to be substantially less than that required for operation.

The major use of water will be for dust control of active mining and processing areas and addition to the product to ensure there is a sufficient moisture level to prevent dust generation during transport.

It is proposed to transfer water to tanks to be located near the ROM pad or plant. Raw water, fire water and localised potable water will then be reticulated throughout the mine operations, plant and village. As standard practice, water sprays will be located at ore transfer points for dust management purposes.

Two water supply options are currently under investigation for the Proposal; these are described below.

2.6.1 Water supply option 1: Source from Paraburdoo

This option would involve connection with existing water supply infrastructure in the Greater Paraburdoo area (which is linked to the existing Turee Creek borefield source area). Water would be transferred from Greater Paraburdoo along a new 37 km pipeline to a receiving tank at Turee Syncline. The pipeline would be positioned in the proposed infrastructure corridor, alongside the existing railway line between Paraburdoo and Turee Syncline. In-line pump stations would also be required to facilitate water transfer.

2.6.2 Water supply option 2: Establishment of local borefield

This option proposes sourcing water locally by establishing a new borefield near the site in the Boolgeeda Iron Formation (south of the Brockman Hills). The borefield would include a series of abstraction bores, associated pumping equipment and a network of intra-borefield pipelines and access tracks. The borefield may either be serviced by reticulated power (powerlines) or by dedicated diesel generators. Abstracted water would be piped to the site for onsite tank storage.

2.7 SURFACE WATER MANAGEMENT

There are no major waterways or drainage systems that would require modification as a result of developing the Proposal. However, localised modification of surface water flow paths will be necessary to protect mine infrastructure from flood risks. It may also be necessary to install culverts, crossings and bridges along the infrastructure corridor and the mine access road.

It is anticipated that control of interactions between natural surface water drainage, mining operations and waste dumps will be managed through standard management practices which typically include a series of diversion bunds, drains, silt traps and in-pit sumps.

2.8 RAIL INFRASTRUCTURE

If the option to process ore at Turee Syncline is pursued, a rail loop (or siding) and loading facility enabling connection to the existing railway line will be required. The proposed rail loop location is shown in Figure 2. The rail loop would branch to the south of the existing railway line that passes Turee Syncline. The length of the proposed loop would be approximately 6 km and a spur would be required at approximately mid length of the loop, to allow for the shunting train cars without encroaching onto the main line.

A new transmission network would be established to support signaling and voice communication operations. An access track would be provided along the length of the loop.

2.9 OTHER INFRASTRUCTURE

2.9.1 Accommodation and transport

The Proposal will have a combination of a residential and a fly-in fly-out (FIFO) workforce with flights for the operation utilizing the Paraburdoo airport. A construction camp and accommodation village is proposed to be established to the east of the mining area with the indicative location indicated in Figure 2. It is proposed to combine the buildings and facilities required for the construction camp and permanent village. The Proponent is also investigating establishing accommodation in the town of Paraburdoo.

2.9.2 Power

It is anticipated that power will be sourced from Paraburdoo via a new transmission line constructed to the site. The new line would be approximately 30 km in length and is proposed to be located in the existing cleared easement adjacent to the Paraburdoo to Tom Price railway line (Figure 2).

An on site diesel power plant would also be utilised to meet interim power requirements and provide ongoing emergency back-up power supplies.

2.9.3 Wastewater treatment

A combination of methods is proposed for the treatment of septic waste at the site. For areas with small populations, <20 persons (i.e. the ROM service area), a septic/leach system is proposed. For areas with a larger population, >20 persons (i.e. the permanent village), a Biomax type treatment system is proposed.

2.9.4 Fuel

Fuel will be transported to the site via road. The proposed fuel storage facility at the site would be constructed near to the heavy vehicle workshop as part of the mobile plant area. The facility would house a series of tanks to provide the site with the required fuel storage capacity.

2.9.5 Road access

An all weather access road connecting the Paraburdoo to Tom Price Road to the site is proposed. Additional roads branching off the main access road will provide connections to specific areas of the site. Car parking areas and associated small arterial access roads would also be established.

Modification to the Paraburdoo to Tom Price Road will be necessary to provide acceleration and deceleration slip lanes for entering and exiting traffic.

2.9.6 Communications

It is proposed that general communications infrastructure for the site would consist of a fibre optic link and site distribution system from the existing service on the Paraburdoo to Tom Price Road. A mobile tower and radio base station tower is anticipated to be required for the site.

2.9.7 Port operations

Ore from the site is proposed to be transported via rail to the port operations at Dampier and/or Cape Lambert which is provided for under the current approved rail and port capacities.

2.10 WORKFORCE

It is estimated that approximately 500 personnel will be required during the construction phase and a regular complement of approximately 300 personnel during ongoing operations.

2.11 TIMING

Provided all relevant internal and external approvals are obtained for the Proposal, construction at the site is scheduled to commence in 2013 with production commencing in 2014. The operational life of the mine is dependent on a number of factors, including expected production rates being achieved and market conditions.

3 Environmental setting

3.1 PHYSICAL ENVIRONMENT

3.1.1 Climate

The climate of the Pilbara region is described as arid tropical with two distinct seasons: a hot summer from October to April and a mild winter from May to September (Gentilli 1972). The regional climate is characterised by very low rainfall, high evaporation and high daytime temperatures.

Average annual rainfall for the region shows a typical sub-tropical wet dry pattern. High rainfall occurs in summer, resulting from sporadic and intense thunderstorms and/or tropical cyclones which emanate from the north. Little or no rainfall is experienced during winter.

The closest official Bureau of Meteorology (BoM) weather recording station is at Paraburdoo Airport (Station No. 007185), where climate data has been collected since 1974 (BoM 2011). Key climatic indicators from this location are summarized below:

- Mean daily maximum temperature: 41.1°C (Jan) – 24.8°C (July)
- Mean daily minimum temperature: 26°C (Jan) – 9.7°C (July)
- Mean annual rainfall: 312.5 mm
- Mean annual rain days (≥1 mm): 32 days

3.1.2 Geology

The site occurs primarily within the Marra Mamba and Brockman Formations. The geology of the site comprises a number of different landforms including rocky hills and slopes, ridgetops and breakaways, lower hills, plains and floodplains. Thorne and Tyler (1992) mapped the geology of the area containing the site as consisting of seven units which are described as follows:

- Colluvium: partly consolidated and consolidated ferruginised silt, sand, gravel; valley-fill deposits dissected by present drainage.
- Metadolerite sills intruded into Fortescue Group: medium- to coarse-grained, massive grey-green rock, usually foliated.
- Jeerinah Formation: formed of interbedded mudstone, siltstone and chert with minor felsic tuff, dolomite and sandstone.
- Marra Mamba Iron Formation: chert, ferruginous chert and banded iron-formation with minor shale.
- Mount McRae Shale and Mount Sylvia Formation: interbedded shale, chert and banded iron-formation.
- Wittenoom Dolomite: thin to medium-bedded metadolomite, dolomitic pelite and metatuff.
- Brockman Iron Formation: banded iron-formation, chert and pelite.

3.1.3 Land systems

The site is located within the major physiographic unit of the Hamersley Basin which is typically characterised by a rugged topography of high rounded hills and strike ridges (Thorne and Tyler 1992). Based on the geographic information system mapping layers provided in Van Vreeswyk *et al*. (2004), seven land systems occur across the site; these are described in Table 3.

Table 3: Land systems occurring within the site

LAND SYSTEM	DESCRIPTION	LAND TYPE	GEOLOGY
Marandoo	Basalt hills and restricted stony plains supporting grassy mulga shrublands.	Hills and ranges with *Acacia* shrublands.	Proterozoic basalt, volcanic breccia, shale, chert, mudstone and quartzite.
Rocklea	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands.	Hills and ranges with spinifex grasslands.	Archaean basalt, Lower Proterozoic basalt, dolerite, tuff and agglomerate, minor shale and jaspilite.
Paraburdoo	Basalt derived stony gilgai plains and stony plains supporting snakewood and mulga shrublands with spinifex chenopods and tussock grasses.	Plains with *Acacia* shrublands.	Quarternary colluvium and alluvium derived mainly from basalt.
River	Active floodplains, major rivers and banks supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands.	Riparian woodlands and floodplain grasslands.	Quarternary alluvium.
Robe	Low plateaux, mesas and buttes of limonites supporting soft spinifex (and occasionally hard spinifex) grasslands.	Hills with spinifex grasslands.	Tertiary pisolitic limonite and laterite (Robe pisolite).
Newman	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands.	Hills and ranges with spinifex grasslands.	Lower Proterozoic jaspilite, chert, siltstone, shale, dolomite and minor acid volcanic.
Platform	Dissected slopes and raised plains supporting hard spinifex grasslands.	Stony plains with spinifex grasslands.	Partly consolidated Tertiary colluviums.

3.1.4 Hydrology

Watercourses in the Pilbara region are generally ephemeral. The rivers and creeks are generally dry between August and November, with only occasional brief flows. During the summer months major rainfall events, usually resulting from cyclones, can cause major flows in a number of rivers.

There are no major watercourses or drainage lines within the site. The eastern portion of the site drains into the Turee Creek catchment to the south while the western portion drains into Bellary Creek, a major creekline which ultimately joins the Ashburton River, southwest of Paraburdoo. Additionally, there are a

number of small and intermittent drainage lines within the site which would only flow after major rainfall events.

3.1.5 Hydrogeology

The anticipated depth to groundwater at the site is likely to be highly variable due to significant changes in topographic relief. It is estimated that the regional groundwater level is approximately 480 m reduced level (RL) with the topography varying between 650 to >800 mRL.

The main aquifers in the Proposal area are the fractured basement aquifers of the Wittenoom Formation (along the elevated valley of the strike length), the Jeerinah and Bunjinah Formations (plains to the north in association with Bellary Creek), and Boolgeeda Iron Formation (plains to the south of Brockman Hills). The Jeerinah Formation comprises shale, chert and mudstone, which has been intruded extensively by meta-dolerite sills. The Bunjinah Formation is north of the Jeerinah Formation and consists of meta-basalt. The Boolgeeda Iron Formation aquifer is likely to be enhanced by the presence of an overlying alluvial sequence associated with the Turee Creek catchment within the core of the strike length.

3.2 BIOLOGICAL ENVIRONMENT

Information used to describe the local biological environment of the site below was sourced from the following documents, unless otherwise stated:

- Biota 2003: Turee Creek Rare Flora Surveys.
- Specialised Zoological 2008: Survey for Conservation Significant Bats at Turee Syncline.
- GHD 2009a: Turee Syncline Infrastructure Area Flora, Vegetation and Fauna Surveys.
- GHD 2009b: Report for Turee Syncline Phase 2 Flora Survey.
- GHD 2009c: Report for Turee Syncline Project Vegetation, Flora and Fauna Baseline Surveys.
- Phoenix 2009: Turee Syncline Short Range Endemic Invertebrate Fauna Survey.
- Specialised Zoological 2009: Turee Syncline Bat Monitoring.
- Biota 2009: Turee Syncline Troglofauna Preliminary Assessment.

3.2.1 Pilbara IBRA bioregion

The Proposal is located within the Hamersley subregion (PIL-3) of the Pilbara biogeographic region as defined in the Interim Biogeographic Regionalisation for Australia (IBRA) (Thackway and Cresswell 1995). It is described by Kendrick (2001) as:

> "Mountainous area of Proterozoic sedimentary ranges and plateaux, dissected by gorges (basalt, shale and dolerite). Mulga low woodland over bunch grasses on fine textured soils in valley floors, and *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils of the ranges."

3.2.2 Vegetation communities

Based on flora and vegetation surveys undertaken to date, 23 vegetation communities have been recorded at the site. The site is dominated by large swathes of hummock grasslands, characterised by *Triodia epactia, Triodia longiceps* or *Triodia wiseana*. Variations to these hummock grasslands occur at the site due to variations in the densities of cover by various shrub and tree species. In addition, there

are flowlines dominated by *Eucalyptus* and *Acacia* species, and some areas where mulga woodlands (with associated species) occur.

None of the vegetation types that have been recorded to date are considered to be underrepresented in the Pilbara region and subsequently no Threatened or Priority Ecological Communities (TEC's or PEC's) have been recorded at the site.

3.2.3 Flora

The site supports a diversity of flora species with most considered to be well represented within the Pilbara region. Based on surveys conducted at the site to date, no Declared Rare Flora (DRF) species have been recorded. Potential habitat for *Lepidium catapycnon* (DRF) occurs on the site; however, the species has not been recorded from the site to date. Four Priority (P) Flora species have been recorded within the site as follows:

- *Oxalis* sp. Pilbara (M.E. Trudgen 12725) (P2)
- *Eremophila coacta* (P3)
- *Sida* sp. Barlee Range (S. van Leeuwen 1642) (P3)
- *Ptilotus mollis* (P4)

A further nine species of Priority Flora species identified from database searches may potentially occur at the site given the presence of potential habitat for these species at the site.

Two flora species recorded from the site exhibited an extension to their known range; these species being:

- *Oxalis perennans*: nearest location is approximately 400 km to the west.
- *Aristida burbidgeae*: nearest location is approximately 150 km to the south.

The regionally significant weed species *Acetosa vesicaria* (Ruby dock) has been identified at several locations, and is considered to be relatively widespread at the site.

3.2.4 Terrestrial fauna

Thirteen species of conservation significant fauna have been identified from database searches as potentially occurring within the site. Eight have been recorded in or adjacent to the site during field assessments undertaken to date and include:

- *Rhinonicterus aurantia* (Pilbara leaf-nosed bat): Vulnerable, *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act); Schedule 1 *Wildlife Conservation Act 1950* (WC Act).
- *Liasis olivaceus barroni* (Pilbara olive python): Vulnerable, EPBC Act; Schedule 1 WC Act.
- *Neochmia ruficauda clarescens* (Star finch): Near Threatened International Union for Conservation of Nature (IUCN) Red List.
- *Pseudomys chapmani* (Western pebble-mound mouse): Priority Four, Department of Environment and Conservation (DEC) listing.
- *Ardeotis australis* (Australian bustard): Priority Four (DEC listing).

- *Merops ornatus* (Rainbow bee-eater): Marine and Migratory, EPBC Act.
- *Chrysococcyx basalis* (Horsfield's bronze-cuckoo): Marine, EPBC Act.
- *Eurostopodus argus* (Spotted nightjar): Marine, EPBC Act.

Although not recorded at the site to date, there is potential for *Dasyurus hallucatus* (Northern quoll) to occur on the site due to the presence of suitable habitat.

A number of species considered endemic to the Pilbara region have been recorded from the site and include:

- *Dasykaluta rosamondae* (Kaluta).
- *Planigale* sp. (small marsupial).
- *Diplodactylus savage* (gecko).
- *Diplodactylus wombeyi* (gecko).
- *Ctenotus rubicundus* (skink).
- *Varanus pilbarensis* (Pilbara rock monitor).
- *Demansia rufescens* (Rufous whipsnake).

No terrestrial invertebrate species recorded at the site to date are considered highly restricted in habitat preference and therefore, none are considered to be a short range endemic (SRE) species.

3.2.5 Subterranean fauna

Results from the preliminary troglofauna assessment concluded that the site may provide habitat for troglofauna. This is supported by the nature of the landforms, the geology of the site, and the large amount of potential subterranean habitat space available (that was determined by downhole video camera).

The Proposal will not involve dewatering as the target resource is entirely above the water table. However, the Proposal includes water supply from the Boolgeeda aquifer to the south of the site as a water source option (Section 2.6.2); it is considered unlikely that stygofauna are present in the target aquifer due to the depth to water table (>170 m below ground level).

3.3 SOCIAL ENVIRONMENT

3.3.1 Existing land uses

The site is approximately 15 km north-east of the town of Paraburdoo and approximately 7 km east of Paraburdoo Airport. The Innawonga Indigenous Community is situated approximately 15 km north of the site on the Bellary Creek. The entire site consists of remnant vegetation and has a history of pastoral land use.

The eastern boundary of the site lies adjacent south-western most boundary of Karijini National Park. The proposed mining area lies less than 2 km to the west of the Park boundary and the proposed camp will be located in the area closest to the Park (Figure 2).

The site includes land held under State Agreement ML252 (Sections 12 to 15) which was granted in 1974 under the Mount Bruce Agreement and Hamersley Iron Exploration Licence E47/1478 (Figure 3). A section of the Rocklea Pastoral Station (incorporated under Exploration Licence 47/1478) within the site is subject to the 2015 Pastoral Station Exclusion and is proposed to be a 16A Agreement co-management area. Additional mining infrastructure tenure may be required to the north of the exploration licence and the west extending to Paraburdoo.

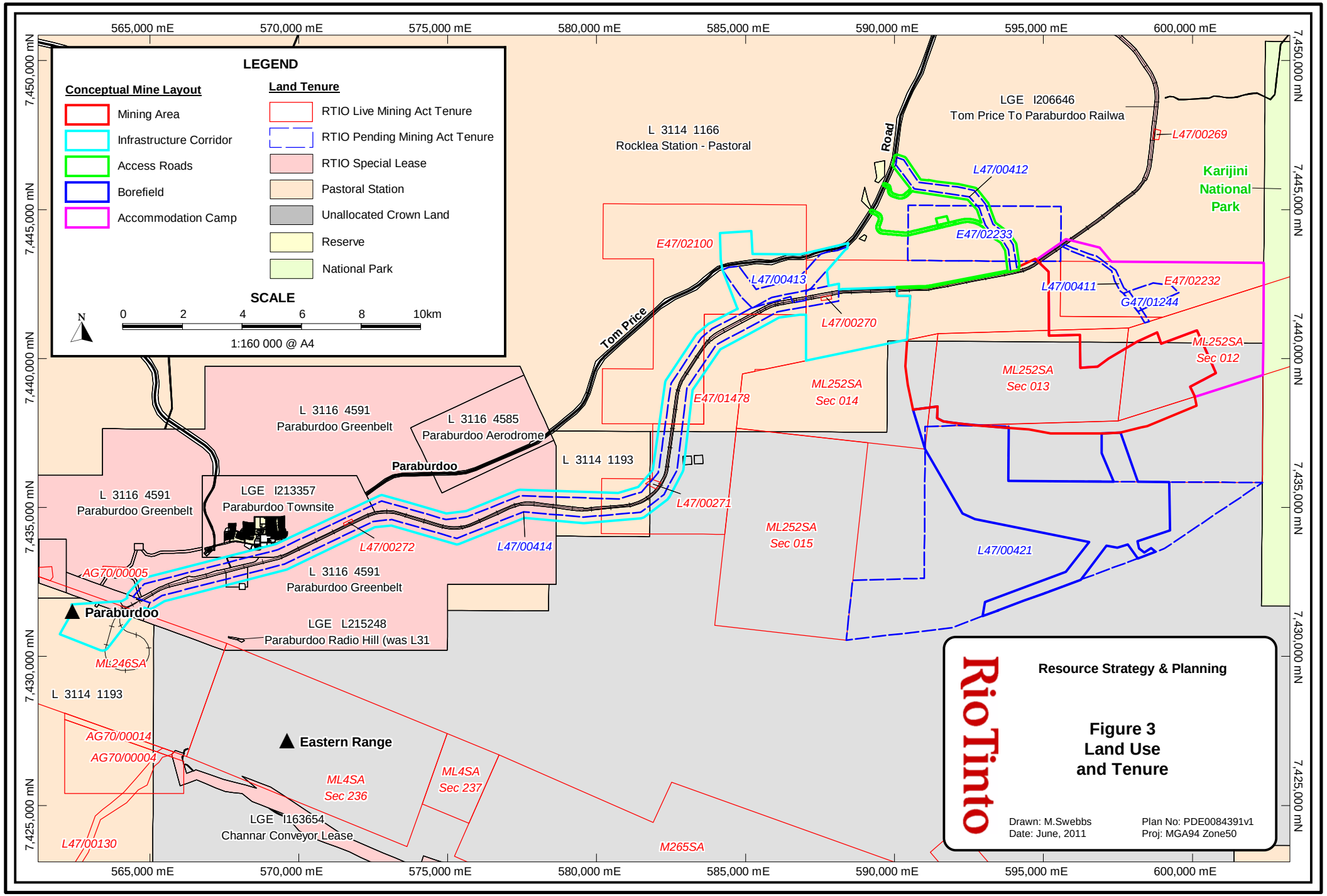
3.3.2 Aboriginal heritage and Native Title

The site is currently subject to a Native Title Claim (WC96_061) by the Pilbara Native Title Service representing the Innawonga and Bunjima people. The status of the claim indicates it is registered and is currently in mediation with the National Native Title Tribunal.

The existing site tenure was granted in 1974, prior to the enactment of the *Native Title Act 1993* and consequently claimants have limited rights over the existing tenure. These include the 'right to be consulted' over additional infrastructure tenure required and a 'right to negotiate' over any additional mining tenure required.

The Proponent is engaged in ongoing consultation with both the Innawonga and Bunjima and the Gobawarrah Minduarra Yinhawanga claimant groups. The Gobawarrah Minduarra Yinhawanga claim does not intersect the Proposal but does overlap with a portion of the Innawonga and Bunjima claim and is also the subject of the negotiations for the "Innawonga Country" agreement.

A number of ethnographic and archaeological heritage surveys have been undertaken at the site since July 2003. The surveys have involved extensive participation with representatives from the Innawonga and Bunjima people. The area covered by the combined surveys to date is approximately 30 km^2 and over 100 Aboriginal heritage sites have been identified, several of which are considered significant sites. To date, no ethnographic sites have been recorded as occurring at the site.


LEGEND
Conceptual Mine Layout
Mining Area
Infrastructure Corridor
Access Roads
Borefield
Accommodation Camp
Land Tenure
RTIO Live Mining Act Tenure
RTIO Pending Mining Act Tenure
RTIO Special Lease
Pastoral Station
Unallocated Crown Land
Reserve
National Park
SCALE
N
0 2 4 6 8 10km
1:160 000 @ A4
565,000 mE
570,000 mE
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595,000 mE
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7,450,000 mN
7,445,000 mN
7,440,000 mN
7,435,000 mN
7,430,000 mN
7,425,000 mN
L 3114 1166
Rocklea Station - Pastoral
LGE I206646
Tom Price To Paraburdoo Railwa
L47/00269
L47/00412
Karijini
National
Park
E47/02233
E47/02100
L47/00413
L47/00411
E47/02232
G47/01244
L47/00270
ML252SA
Sec 012
ML252SA
Sec 013
ML252SA
Sec 014
E47/01478
Tom Price
Road
L 3116 4591
Paraburdoo Greenbelt
L 3116 4585
Paraburdoo Aerodrome
Paraburdoo
L 3114 1193
LGE I213357
Paraburdoo Townsite
L47/00271
L47/00272
L47/00414
ML252SA
Sec 015
L47/00421
AG70/00005
L 3116 4591
Paraburdoo Greenbelt
Paraburdoo
LGE L215248
Paraburdoo Radio Hill (was L31
ML246SA
L 3114 1193
AG70/00014
AG70/00004
Eastern Range
ML4SA
Sec 236
ML4SA
Sec 237
LGE I163654
Channar Conveyor Lease
L47/00130
M265SA
Resource Strategy & Planning
Figure 3
Land Use
and Tenure
Drawn: M.Swebbs
Date: June, 2011
Plan No: PDE0084391v1
Proj: MGA94 Zone50

4 Summary of potential environmental issues and management responses

4.1 IDENTIFICATION OF POTENTIAL ENVIRONMENTAL ISSUES

An initial assessment of the potential environmental impacts associated with the Proposal, using available survey data and Proposal information, identified the following key potential impacts/issues:

- Disturbance to flora and vegetation (and associated fauna habitat) that will result from clearing activities for the development of the mine and associated infrastructure.
- Disturbance to cave habitat from excavation and blasting activities.
- Removal of subterranean habitat for excavation of mine pits.
- Changes to the landscape associated with the excavation of ridges and placement of infrastructure and stockpiles, potentially including changes to the landscape as viewed from visitor usage areas within Karijini National Park.
- Possible increased visitation to Karijini National Park by the Proposal workforce which may detrimentally affect the values of the Park.
- Disturbance to Aboriginal heritage sites from clearing activities for the development of the mine and associated infrastructure.
- Alteration to surface water drainage patterns associated with changes to landforms and placement of infrastructure.
- Emissions of noise, vibration, dust and greenhouse gases during construction and operation of the Proposal.
- Possible alteration to groundwater dependent ecosystems (although considered highly unlikely) through groundwater abstraction from the proposed new borefield or through increased drawdown in the existing borefield (currently servicing the Greater Paraburdoo area).
- Possible reduction in surface water quality due to inappropriate management of contaminated wastewater and/or stormwater.
- Possible contamination of soils, ground or surface water bodies through inappropriate storage and management of non-mineral waste (e.g. putrescibles waste).
- Creation of a post-closure landscape that is not ecologically sustainable and physical stable due to inadequate consideration of closure and rehabilitation in the mine planning process.

Based on this assessment the following environmental factors were identified by the Proponent as representing the key risks and associated environmental and social impacts associated with the Proposal:

- Flora and vegetation: The Proposal will involve clearing of approximately 2,245 ha of native vegetation. The site does not contain vegetation types with high conservation significance, is not considered to contain unique flora habitat types and is not ecologically isolated. There are several species of Priority flora and flora at possible range extensions that are known to occur within the site. No DRF have been recorded from the site to date.

- Terrestrial fauna: The Proposal will involve the clearing and disturbance of vegetation and landforms that provide fauna habitat. There is the potential for fauna species of conservation significance to be affected by habitat removal, including Pilbara leaf-nosed bat, Pilbara olive python and Northern quoll.

- Subterranean fauna (troglofauna): Preliminary surveys based on downhole video survey indicate that troglobitic fauna may occur at the site. A significant stygofauna population is not expected to occur in the aquifer that is the target of the proposed borefield given the depth to the water table (>170 m below ground level).

- Aboriginal heritage: Over 100 Aboriginal archaeological heritage sites have been identified from within a 30 km^2 area covering the site, several of which are considered to be of high significance. Avoidance of all such sites is not possible. No ethnographic sites have been recorded to date.

- Closure and rehabilitation: The Proposal will result in a modified post-closure landscape that will need to be decommissioned and rehabilitated to a stakeholder acceptable standard. Considerations for closure and rehabilitation will need to be ongoing throughout the life of the Proposal.

Most of the above environmental factors were identified as requiring additional investigations in order to support the environmental impact assessment; these investigations are described in Section 5.1.

The following environmental factors are considered by the Proponent to require less detailed assessment than those listed above as they are either subject to controls under other legislation, routine environmental management procedures or the Proposal poses a very low risk to them:

- Surface water: The Proposal is not anticipated to have an impact on any significant waterways, drainage lines or sheetflow systems. Localised modification of surface water flow paths will be necessary to protect mine infrastructure from stormwater flood risks. Wastewater and/or stormwater is not expected to lead to detrimental contamination of nearby waterways as appropriate methods of wastewater and stormwater treatment will be implemented throughout the life of the Proposal.

- Groundwater: Mining will be above the water table and there are no known groundwater dependent ecosystems associated with the potential (new) borefield target aquifer given this aquifer is at considerable depth (>170 m below ground level). Abstraction from the existing borefield servicing the Greater Paraburdoo area would only proceed if the source area could reliably meet supply requirements over the life of the mine and would not lead to significant detrimental environmental impacts.

- Emissions (noise, vibration, dust and greenhouse gases): Such emissions will be generated throughout the life of the mine; however, given the distance between the site and nearby sensitive receptors, standard management approaches will be sufficient to manage emissions so that they do not result in unacceptable levels at nearby receptors.

- Mineral waste and acid and metalliferous drainage (AMD): A risk assessment was conducted to determine the level of risk associated with AMD. Given the Proposal is entirely above the water table and unlikely to intercept any pyritic material the Proposal was determined to pose a low AMD risk.

- Non-mineral waste: The generation and management on site of these wastes is not anticipated to lead to any detrimental contamination of soil and water resources.

- Landscape amenity: The view of proposed mining areas from the Paraburdoo to Tom Price Road and the Innawonga Community will be largely obscured by the Marra Mamba ridge. The infrastructure associated with ore handling and rail/loading may be more visible during the life of mine. The changes to the landscape may also be visible from visitor usage areas within Karijini National Park (e.g. creek pools and access tracks).

- Workforce management: A comprehensive induction program for all personnel will be implemented to ensure any use of Karijini National Park by the workforce does not lead to a detrimental impact to the recognised Park values.

4.2 PROPOSED ENVIRONMENTAL MANAGEMENT RESPONSES

4.2.1 Proposed environmental management framework

Overview

The Rio Tinto Group, of which the Proponent is a member, aims to conduct business in an efficient and environmentally responsible manner that meets the expectations of shareholders, regulatory authorities and the community. The Rio Tinto Group also recognises that environmental responsibilities go beyond those required under statutory regulations to include social obligations, leadership in sustainable development and minimising environmental impacts.

The Proponent operates under an ISO14001 framework through the Iron Environmental Management System (IEMS). In addition, the Proponent will operate under the RTIO Health, Safety, Environment and Quality Policy (HSEQ Policy). The HSEQ Policy is the guiding document for environmental management and provides context and specific direction for continuous improvement. The Proponent will also consider the RTIO Sustainable Development Principles. These principles are applied to all proposals to assist in achieving sustainable development outcomes consistent with the sustainability principles of the WA State Sustainability Strategy and the Rio Tinto 'The Way We Work' sustainable development policy.

Proposal-specific environmental management plans

The environmental aspects of the Proposal during the construction phase are proposed to be managed in accordance with a Construction Environmental Management Plan (CEMP) to be developed. Implementation of the CEMP will ensure that the Proposal is constructed in accordance with legislative requirements and that all internal and external environmental objectives and obligations are met.

The operation of the Proposal is proposed to be primarily managed through an operational Environmental Management Plan (EMP) to be implemented to manage specific environmental aspects of the Proposal. Implementation of the Proposal in accordance with the EMP will ensure that the Proposal meets all respective environmental obligations including internal objectives, legislation regulations and conditions of approval relating to the Proposal. The EMP will comprise a series of management sub-plans that will address the key environmental risks and impacts identified in Section 4.1. Each sub-plan will describe measures to be applied to avoid and minimize the

environmental impact of the Proposal, monitoring measure to measure performance of management against targets, and contingency measures to mitigate unavoidable or accidental impact. The operational EMP is proposed to be prepared in parallel to preparation of the PER document and will be appended to the PER document.

A Mine Closure Plan is proposed to be developed to address potential long-term/permanent impacts of the Proposal. The Mine Closure Plan is proposed to be developed in consultation with key stakeholders and regularly reviewed and revised throughout the life of the Proposal to allow for incorporation of new information. The Plan will be prepared in accordance with the Department of Mines and Petroleum (DMP)/EPA 'Guidelines for Preparing Mine Closure Plans' (June 2011).

Additional information relating to proposed management responses are provided in Section 6.

4.2.2 Principles of environmental protection

During assessment of the environmental impacts associated with the Proposal, consideration has been given to the principles contained in the EPA Position Statement No. 7, 'Principles of Environmental Protection' (EPA 2004a). Table 4 summarises how these principles will be considered with respect to the Proposal. These principles will be considered in further detail in the PER.

Table 4: Principles of environmental protection

PRINCIPLE	RELEVANT (YES/NO)	IF YES, CONSIDERATION
1. The precautionary principle Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by: (a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and (b) an assessment of the risk – weighted consequences of various options.	Yes	The Proponent includes a risk assessment process in the development of all new projects to identify potential issues and management actions early in the Proposal study phases. Part of this process includes undertaking detailed site investigations of the biological and physical environs to identify existing conditions and significance to properly undertake and environmental impact assessment of the Proposal.
2. The principle of intergenerational equity The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.	Yes	An environmental impact assessment will be carried out at the site to ensure that the proposed development aligns with Rio Tinto's sustainable development principles.
3. The principle of the conservation of biological diversity and ecological integrity Conservation of biological diversity and ecological integrity should be a fundamental consideration.	Yes	Baseline studies have and will continue to be undertaken at the site to assess the environmental value of areas which could be impacted by the Proposal. Environmental management plans will be developed and implemented as required.
4. Principles relating to improved valuation, pricing and incentive mechanisms (a) Environmental factors should be included in the valuation of assets and services. (b) The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement. (c) The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste. (d) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solution and responses to environmental problems.	Yes	The full life cycle costs of the Proposal, including costs associated with decommissioning and closure, will be estimated for internal purposes at various stages of the life of the Proposal. The Proponent recognises the 'polluter pays' principle, and will design the development to ensure that pollution type impacts are avoided and minimised as far as practicable.

PRINCIPLE	RELEVANT (YES/NO)	IF YES, CONSIDERATION
5. The principle of waste minimisation All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.	Yes	The Proponent aims to apply the waste management hierarchy: avoid, reduce, reuse, recycle and recover waste.

5 Scope of works for Public Environmental Review

The scope of works proposed to support the environmental impact assessment and public review of the key environmental factors likely to be relevant to the Proposal (identified in Section 4.1 by the Proponent), is described in Sections 5.1 and 5.2 below.

5.1 KEY ENVIRONMENTAL FACTORS

5.1.1 Flora and vegetation

Purpose

To undertake detailed flora and vegetation surveys across all areas potentially affected by the Proposal to identify and assess the significance of vegetation and flora at the site, including any DRF, Priority Flora and other flora species or vegetation of conservation significance and to conduct an assessment of potential impacts (extent and significance) to these values that may result from the Proposal.

Scope of assessment

The PER will:

- Collate publicly available flora and vegetation studies that have been conducted in the region that are relevant to the site.
- Document the flora recorded at the site.
- Define and map the vegetation at the site.
- Define the condition of the vegetation at the site.
- Identify flora and vegetation communities considered to be rare, threatened, vulnerable or geographically restricted, or those that occur as range extensions.
- Assess the status of introduced plant species at the site.
- Assess the regional and local conservation status (both at the species and ecosystem levels) of the site.
- Discuss any alternatives considered/implemented to avoid, minimise and reduce potential impacts to significant flora and vegetation values.
- Evaluate the potential impact of mining, proposed infrastructure and associated activities on flora and vegetation.

Studies completed

The following studies relating to flora and vegetation at the site have been undertaken and completed:

- Rare flora surveys were undertaken over three separate survey periods between July to September 2003 (Biota 2003). The focus of the surveys was to record locations of any DRF or

unknown flora species and to briefly describe vegetation types within the survey area, which included the proposed mining area (proposed location of pits), the main existing access track and proposed track locations.

- A Level 1 flora and vegetation survey was undertaken in June/July 2008 (GHD 2009a). The flora and vegetation survey included both desktop and field assessments. The flora field survey verified the desktop study and provided a detailed assessment of the existing environment in the survey area and its relationship to adjoining areas. The survey area included the proposed mining area (proposed location of pits) and an area proposed for the rail load out facility.

- A Level 1 flora and vegetation survey was conducted between May to September 2008 for the proposed infrastructure area, in line with previous surveys conducted by GHD in 2008 (GHD 2009b). The survey area included the proposed infrastructure area and covered approximately 1,400 ha, including a 100 m corridor following the railway from Paraburdoo to Turee Syncline, an extension to the original proposed rail loadout area and three options for an accommodation village and main access road.

- A Level 2 flora survey was undertaken by GHD in April 2009 to enhance the collection of annual and ephemeral plant taxa previously identified within the study area, as the 2008 Level 1 flora survey was deemed to have been undertaken following a period of poor rainfall (GHD 2009c). The study area included the proposed mining area (proposed location of pits) and an area proposed for the rail load out facility.

Studies proposed to be undertaken

A Level 2 flora and vegetation survey has recently been completed within areas of the site which were surveyed in the abovementioned surveys, including the camp and potential borefield areas. The survey results are pending and will confirm the presence of any conservation significant flora or vegetation types at the site in line with previous surveys undertaken at the site.

Collection and interpretation of data for flora and vegetation at the site has been and will continue to be conducted by external technical consultants in accordance with the requirements of EPA Guidance Statement No. 51 for the 'Assessment of Environmental Factors for Terrestrial Flora and Vegetation Surveys' (EPA 2004b). All relevant flora and vegetation survey reports will be appended to the PER document.

5.1.2 Terrestrial fauna

Purpose

To undertake both systematic and opportunistic sampling for vertebrate fauna and invertebrate groups regarded as potential short-range endemic taxa. This sampling will be undertaken across all areas potentially affected by the Proposal and will be appropriate to the level of potential impact. This will enable identification of existing terrestrial fauna, including fauna species of conservation significance, and any significant fauna habitats present at the site to inform the assessment of potential impacts (extent and significance) to these values that may result from the Proposal.

Scope of assessment

The PER will:

- Collate publicly available fauna studies that have been conducted in the region that are relevant to the site.

- Document survey results for vertebrate and invertebrate groups at the site including:

- Avifauna censuses.
- Bat echolocation recording.
- Targeted invertebrate sampling for groups known to exhibit short range endemism.
- Opportunistic collection of vertebrates and invertebrates.

- Present an inventory of the vertebrate and invertebrate fauna recorded and likely to occur at the site.
- Assess the presence and implications of feral animals at the site.
- Assess the relationships between vertebrate and invertebrate fauna and the vegetation communities of the site in order to identify any habitats of significance.
- Assess the regional and local conservation status (both at the species and ecosystem levels) of fauna within the site.
- Discuss any alternatives considered/implemented to avoid, minimise and reduce potential impacts to significant fauna values.
- Evaluate the potential impact of mining, proposed infrastructure and associated activities on terrestrial fauna at the site.

Studies completed

The following studies relating to terrestrial fauna at the site have been undertaken and completed:

- A Level 1 fauna survey was undertaken in June/July 2008 (GHD 2009a). The fauna survey identified terrestrial vertebrate fauna of conservation significance that may occur within the study area, habitat types and potential for species to occur. A Level 2 fauna survey was undertaken in a warmer season (October 2008) to supplement the information collected by the Level 1 survey. The study area for all surveys included the proposed mining area (proposed location of pits) and an area proposed for the rail load out facility.
- A Level 1 fauna survey was undertaken between May to September 2008 for the proposed infrastructure area, in line with previous surveys conducted by GHD in 2008 (GHD 2009b). The survey area included the proposed infrastructure area and covered approximately 1,400 ha, including a 100 m corridor following the railway from Paraburdoo to Turee Syncline, an extension to the original proposed rail loadout area and three options for an accommodation village and main access road.
- A SRE survey was undertaken between June to August 2008 to determine the occurrence and extent of SRE invertebrate fauna species and habitats within the study area and to provide advice on the conservation significance of any SRE species found to be present or that could reasonably be expected to be present (Phoenix 2009). The study area included the proposed mining area (proposed location of pits) and an area proposed for the rail load out.
- Two targeted bat surveys were undertaken in September 2008 and November 2009 (Specialised Zoological 2008; Specialised Zoological 2009). The surveys were designed to maximise the likelihood of detection of two conservation significant species; *Rhinonicteris aurantia* (Pilbara leaf-nosed bat) and *Macroderma gigas* (Ghost bat). Survey methods included daytime searches for caves likely to be used as roosts; assessment of potential roost caves

using video and acoustic recording equipment; night traverses with hand-held acoustic recording equipment; and passive detection with stationery acoustic recording equipment. The survey area included the proposed mining area (proposed location of pits), an area proposed for the rail load out and locations outside the study area.

Studies proposed to be undertaken

A Level 1 fauna survey has recently been conducted within the areas proposed for the camp and potential borefield. The survey was conducted in accordance with the requirements of EPA Guidance Statement No. 56 for 'Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia' (EPA 2004d).

A targeted Northern quoll survey has recently been completed in accordance with the advice provided in the Department of Sustainability, Environment, Water, Populations and Communities (SEWPaC) Policy Statement 3.25 'Northern Quoll Survey Design and Effort Requirements' (SEWPaC 2011) and in consultation with Mark Harvey of the Western Australian Museum.

A SRE invertebrate survey is proposed to be undertaken over areas of the site which have not yet been surveyed. This survey will be in accordance with the requirements of EPA Guidance Statement No. 20 for 'Sampling of Short Range Endemic Invertebrate Fauna for Environmental Impact Assessment in Western Australia' (EPA 2009).

All relevant terrestrial fauna survey reports will be appended to the PER document.

5.1.3 Subterranean fauna

Purpose

To undertake an assessment of subterranean fauna, including sampling where relevant, to determine the distribution and conservation status of subterranean fauna which may be present within the site and to conduct an assessment of potential impacts (extent and significance) to these values that may result from the Proposal.

Scope of assessment

The PER will:

- Document troglofauna sampling results from a representative spread of drillholes both inside and outside the proposed mining area.
- Include identification of troglofauna specimens collected to species level where possible.
- Demonstrate the low likelihood of presence of stygofauna in the aquifer that would be the target of the potential borefield.
- Assess the conservation significance of troglofauna at the site.
- Discuss any alternatives considered/implemented to avoid, minimise and reduce potential impacts to significant subterranean fauna values.
- Assess the potential impact of mining (and borefield development, if relevant) on subterranean fauna within the site.

Studies completed

Sampling of troglofauna was undertaken within the proposed mining area (proposed location of pits) using custom built litter traps suspended in drillholes between May to June 2009 (Biota 2009). A selection of 19 drillholes were also profiled using a Geovision downhole video system in order to provide a visual appraisal of the subterranean habitat of the site and also to record the presence of any troglobitic animals on video.

Studies proposed to be undertaken

A second phase of troglofauna sampling is proposed to be undertaken at the site and at drill hole locations outside the site to provide regional context. The survey will be in accordance with the requirements of EPA Guidance Statement No. 54 (EPA 2007a) and Technical Appendix No. 54a for 'Sampling Methods and Survey Considerations for Subterranean Fauna in Western Australia' (EPA 2007b).

A further detailed risk assessment is proposed to be undertaken by an expert subterranean fauna specialist to confirm the expected low likelihood of stygofauna occurrence in the aquifer that would be the target of the potential borefield. Given the relatively deep depth to the water table (>170 m below ground level), it is likely that the density of any stygofauna collected would be very low as stygofauna are typically rarely collected at such depths. The risk assessment will utilise available site specific hydrogeological/geological data and stygofauna data from other analogous sites and does not propose to supplement the risk assessment with stygofauna sampling and/or hydrogeological modelling. Stygofauna sampling and/or hydrogeological modelling would only be pursued if the risk assessment determined a moderate to high likelihood of a significant stygofauna population being present in the target aquifer.

All relevant subterranean fauna survey reports will be appended to the PER document.

5.1.4 Closure and rehabilitation

Purpose

To assess closure options, rehabilitation objectives and management of post-closure impacts and to develop a Mine Closure Plan for the Proposal.

Scope of assessment

The PER (and the Mine Closure Plan to be appended to the PER) will:

- Summarise legislative and corporate closure requirements.
- Identify proposed closure vision, post-closure land-use and preliminary completion criteria.
- Identify potential closure issues and workable management measures to address issues.
- Document stakeholder consultation with respect to mine closure.
- Propose plans for progressive rehabilitation and ongoing closure monitoring and maintenance.
- Describe the criteria the Proponent will use when assessing whether or not backfilling of mine pits will occur for the Proposal.

Studies completed

A risk assessment was conducted to determine the level of risk associated with acid and metalliferous drainage (AMD). This risk assessment was based on analysis of drill log data from the site to determine

the presence of Mount McRae Shale (of which pyritic black shale is the major lithology), estimate total sulfur concentrations and determine the presence of geochemical enrichment of the lithologies. In addition, an assessment of the current mine plan was undertaken to determine whether pyritic black shale would be intersected during normal operations.

Studies proposed to be undertaken

A Mine Closure Plan is proposed to be prepared in accordance with the Guidelines for Preparing Mine Closure Plans (DMP and EPA 2011). To support the preparation of the Mine Closure Plan, the following studies are proposed:

- Geochemical characterisation work to verify the results of the AMD risk assessment already undertaken. Although it is widely accepted that kinetic testing is not required for the Pilbara formations present at the site, the Proponent has commenced kinetic testing and this will be ongoing until such a time as deemed no longer required. As this testing has recently commenced and is ongoing, the results will not be available for presentation in the PER.
- Waste materials characterisation work to identify the presence of dispersive materials, which may affect rehabilitation outcomes. Waste characterisation studies will also include an assessment of the potential to encounter asbestos and other fibrous materials.
- Collation and assessment of data from rehabilitation and closure studies undertaken at other analogous sites.
- An assessment of the risk from the release of metals (including selenium) from neutral drainage.

These studies are proposed to be undertaken by both external technical consultants and internal RTIO geochemists and geologists.

In addition, the Mine Closure Plan proposes to draw upon the outputs of other relevant activities such as the biological studies already completed and proposed to be undertaken as part of the environmental impact assessment process, stakeholder consultation outcomes, financial analysis of closure options and requirements, and ongoing research into rehabilitation and closure being facilitated by the wider Rio Tinto Group.

5.1.5 Aboriginal heritage

Purpose

To determine the potential for the Proposal to impact on Aboriginal heritage sites, and to alter the Proposal design as far as practicable to minimise the impact on Aboriginal heritage sites and manage other Aboriginal heritage sites accordingly.

Scope of assessment

The PER will:

- Report the results of Aboriginal heritage surveys of the site.
- Identify potential impacts of the Proposal on sites of Aboriginal heritage significance.
- Identify avoidance, mitigation and management measures to be implemented to protect sites of Aboriginal heritage significance from the potential impacts of the Proposal.
- Provide a summary of issues raised by Traditional Owners in relation to the Proposal.

Studies completed

Since 2003, several archaeological and ethnographic surveys of the site have been undertaken in consultation with Traditional Owners and the Department of Indigenous Affairs (DIA). To date these surveys have covered approximately 30 km^2 of the site.

Studies proposed to be undertaken

Additional surveys are proposed to be undertaken over areas associated with the Proposal that have not yet been covered by surveys. Further heritage survey work will be carried out in consultation with the Innawonga and Bunjima people (and the DIA) and in accordance with the principles in EPA Guidance Statement No. 41 for 'Assessment of Aboriginal Heritage' (EPA 2004c) and the requirements of the DIA.

5.2 OTHER MANAGEMENT ISSUES

5.2.1 Surface water

A surface hydrology assessment is proposed to demonstrate that the Proposal will not affect any significant watercourses, drainage lines or sheetflow systems. The assessment will be undertaken within and surrounding the site to identify preferred water flow paths, catchment areas and overland flows in or near the site to assist with the design of appropriate water management infrastructure. This assessment will also consider a 100 year flood event.

5.2.2 Groundwater

Additional hydrogeological, geological and ecological assessment will be conducted to demonstrate that the aquifer subject to the proposed (new) borefield development does not support any significant environmental values and therefore, the proposed abstraction of water from the aquifer will not affect any groundwater dependent ecosystems. Groundwater studies already completed include: desktop assessment of four initial water options (subsequently narrowed to two options as presented in Section 2.6), including the potential (new) borefield, undertaken by Aquaterra (2009) to support the pre-feasibility study for the Proposal; and analysis of Landsat imagery (which can give an indication to moisture content in the top 1 m of the ground and thickness of alluvial cover) and magnetic data (which can give an indication of regional and local structural features at depth) over the area covering the proposed borefield. A similar assessment would also be undertaken if the option to source water from the existing borefield servicing the Greater Paraburdoo area was pursued.

In addition, the PER will provide evidence that sufficient water is available for the Proposal from the different water supply options being considered.

5.2.3 Emissions (noise, vibration, dust and greenhouse gases)

A noise and vibration assessment is proposed to be undertaken to demonstrate such emissions will not exceed prescribed noise[1] and vibration[2] levels at nearby sensitive receptors, including the Innawonga Community and any that may be present in Karijini National Park. An assessment to demonstrate the likely movement of dust will not impact nearby sensitive receptors is also proposed to be undertaken. It is estimated that greenhouse gas emissions will not exceed 100,000 tonnes CO_2 equivalents per annum

[1] As prescribed in the Environmental Protection (Noise) Regulations 1997.

[2] As prescribed in Australian Standard (AS) 2187.2-1993.

over the life of the mine and management of greenhouse gases will be in line with the Proponent's greenhouse gas emission reduction policy. The PER document will discuss these greenhouse gas reduction initiatives.

5.2.4 Landscape amenity

As the site can be viewed from the Paraburdoo to Tom Price Road and the Innawonga Community (and potentially from areas in Karijini National Park), an assessment of future changes to the landscape is proposed to be undertaken to demonstrate that such changes will not significantly alter the landscape amenity of the local area. It is anticipated that the outputs from this assessment would assist with consultation with the Traditional Owner groups. Outputs from the assessment will include developing photomontages from key visual receptors in the Proposal view-shed, which will include sites within Karijini National Park if present in the modelled view-shed. The Proponent will consult with DEC in relation to the proposed landscape assessment.

5.2.5 Mineral waste and AMD

As the Proposal was determined to pose a low AMD risk (Section 4.1), it is proposed to address potentially adverse geochemical or acid forming material as part of the closure and rehabilitation considerations for the Proposal (Section 5.1.4) rather than as a separate environmental factor in the PER document.

5.2.6 Non-mineral waste

Appropriate management measures will be developed to ensure non-mineral wastes generated and disposed of on site do not lead to detrimental contamination of soil and water resources. The PER will also include a description of the design standards which will be applied to the storage of hydrocarbons and hazardous materials; such design standards will be in accordance with relevant legislation and/or Australian Standards.

5.2.7 Workforce management

Appropriate management measures will be developed to ensure workforce visitation to Karijini National Park does not lead to a detrimental impact to the Park values. An understanding of the potential for workforce visitation (from the Proposal) to affect the Park values would first be determined in order to develop the most appropriate management response. This will also include an assessment of the various options considered for workforce accommodation.

5.3 CUMULATIVE IMPACTS

Cumulative impacts, where applicable, will be considered during the assessment of the abovementioned environmental factors and management issues. Consideration of cumulative impacts will be based on the Proponent's knowledge of current and proposed developments in the area and their potential impacts whilst acknowledging that full details of such developments may not be available to the Proponent.

6 Key environmental factors for this Proposal assessment

The key environmental factors identified for this Proposal (as identified by the Proponent) are considered to be limited to (as identified and discussed in Section 4.1):

- Flora and vegetation.
- Terrestrial fauna.
- Subterranean fauna (troglofauna).
- Aboriginal heritage.
- Closure and rehabilitation.

A summary table that identifies the EPA objectives, potential impacts, proposed investigations and management responses for these key environmental factors is presented in Table 5.

Other environmental factors relevant to the scope of the environmental impact assessment of the Proposal are summarised in Table 6.

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Table 5: Key environmental factors relevant to the scope of the environmental impact assessment

ENVIRONMENTAL FACTOR	RELEVANT AREA	EPA OBJECTIVE	POTENTIAL IMPACTS	ADDITIONAL INVESTIGATIONS	POTENTIAL MANAGEMENT	APPLICABLE STANDARDS, GUIDELINES AND POLICIES
Biophysical						
Flora and vegetation	In the Pilbara bioregion, with emphasis on the site (Turee Syncline and immediate surrounds).	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge	▪ Approximately 2,245 ha are required to be cleared over the life of the Proposal, including the loss of Priority Flora species. ▪ Vehicle and earth movements which could potentially introduce and/or spread weed species.	▪ Undertake detailed flora and vegetation surveys (to supplement earlier work) to identify the presence of any DRF, Priority Flora or other flora species of conservation significance and to assess the significance of vegetation communities present at the site. ▪ Assess the regional conservation significance of flora and vegetation communities present at the site and identify any impacts on regional conservation status of these values.	▪ Development of a CEMP and EMP that is proposed to address: - Minimising clearing of vegetation where practicable. - Relocating infrastructure where practicable to avoid disturbance to significant flora species. - Demarcating areas around individual significant species where practicable to avoid disturbance. - Obtaining the required approvals for disturbing and/or removing significant species where disturbance is unavoidable. - Implementing a weed management program and hygiene procedures. - Implementing an environmental awareness training program for all personnel. - Stockpiling topsoil for later use in rehabilitation. - Rehabilitating temporary cleared areas not required for operation, on completion of construction.	▪ EPA Position Statement No. 2: Environmental Protection of Native Vegetation in Western Australia (EPA 2000a). ▪ EPA Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002a). ▪ EPA Guidance Statement No. 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA 2004b).
Terrestrial fauna	In the Pilbara bioregion, with emphasis on the site (Turee Syncline and immediate surrounds).	To maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	▪ Loss of habitat due to clearing activities. ▪ Disturbance to cave habitat due to excavation and blasting activities. ▪ Death of individual animals due to loss of habitat and/or vehicle movements. ▪ Isolation or fragmentation of populations as a result of physical barriers imposed by placement of infrastructure.	▪ Undertake detailed terrestrial fauna studies and surveys (to supplement earlier work) to identify existing terrestrial fauna, including fauna species of conservation significance and to identify significant fauna habitats within the site. Studies proposed to include a targeted Northern quoll survey and further SRE surveys. ▪ Assess the regional conservation significance of fauna populations present at the site and identify any impacts on regional conservation status of these values.	▪ Development of a CEMP and EMP (and/or Significant Species Management Plan) that is proposed to address: - Minimising disturbance to fauna habitats where practicable. - Revising the Proposal layout to avoid disturbance to significant fauna habitats (if present) as far as practicable. - Implementing an environmental awareness training program for all personnel.	▪ EPA Guidance Statement No. 56: Terrestrial fauna surveys for Environmental Impact Assessment in Western Australia (EPA 2004d). ▪ EPA Technical Guide: Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA 2004e). ▪ EPA Guidance Statement No. 20: Sampling of short range endemic invertebrate fauna for Environmental Impact Assessment in Western Australia (EPA 2009).
Subterranean fauna (troglofauna)	Areas within the site that are subject to below ground level disturbance (i.e. the mine pits).	To maintain the abundance, diversity, geographic distribution and productivity of subterranean fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	▪ Loss of subterranean fauna habitat through the excavation of ore in the mining process.	▪ Undertake subterranean fauna (troglofauna) sampling (to supplement earlier work) to determine the distribution and conservation status of troglofauna which may be present within the site. ▪ Undertake a risk assessment to confirm the low likelihood of stygofauna being present in the target aquifer subject to the proposed borefield. It is not proposed to supplement this risk assessment with tygofauna sampling or hydrogeological modelling in the first instance.	▪ Development of a CEMP and EMP that is proposed to address minimising disturbance to subterranean fauna populations by restricting mine pit disturbance areas where possible.	▪ EPA Guidance Statement No. 54: Consideration of subterranean fauna in groundwater and caves during Environmental Impact Assessment in Western Australia (EPA 2007a). ▪ EPA Guidance Statement No. 54a (Draft): Sampling methods and survey considerations for subterranean fauna in Western Australia (EPA 2007b).

ENVIRONMENTAL FACTOR	RELEVANT AREA	EPA OBJECTIVE	POTENTIAL IMPACTS	ADDITIONAL INVESTIGATIONS	POTENTIAL MANAGEMENT	APPLICABLE STANDARDS, GUIDELINES AND POLICIES
Social Surrounds						
Aboriginal heritage	The site (Turee Syncline) and immediate surrounds.	To ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation.	▪ Disturbance to Aboriginal heritage sites through physical disturbance of the land for development of the Proposal.	▪ Undertake archaeological and ethnographic surveys of the site (to supplement earlier work). ▪ Undertake consultation with Traditional Owners and the DIA.	▪ Development of a Cultural Heritage Management Plan that is proposed to address: - Altering layout of Proposal infrastructure to avoid sites of Aboriginal heritage significance where practicable. - Installing protective measures for sites in proximity to construction activities (i.e. demarcation, signage and/or fencing). - Consulting regularly with Traditional Owners regarding the Proposal including the ongoing management of Aboriginal heritage sites. - Reporting the results of Aboriginal heritage surveys consistent with internal and external guidelines and Native Title agreements. - Monitoring places of importance which may potentially be impacted by the Proposal in consultation with Traditional Owners. - Obtaining clearance under the *Aboriginal Heritage Act 1972* to disturb heritage sites where necessary. - Actively promoting cultural (heritage) awareness to all personnel involved in the Proposal.	▪ EPA Guidance Statement No. 41: Assessment of Aboriginal Heritage (EPA 2004c). ▪ DIA, Western Australia, Section 18 Notice of Application for Ministers Consent to Use Land: Notes and Guidelines, 2006. ▪ DIA, Western Australia, Guidelines for preparing reports for applications to the Aboriginal Cultural Material Committee under Section 18 of the Aboriginal Heritage Act, 2005.
Other						
Closure and rehabilitation	The site (Turee Syncline).	To ensure, as far as practicable, that rehabilitation achieves a stable and functioning landform that is consistent with the surrounding landscape and other environmental values.	▪ Adverse impacts on flora, fauna, soil and water quality, visual amenity and economic and social impacts due to poor rehabilitation. ▪ Insufficient allocation of funds/resources for closure, particularly in the event of unforseen closure, due to poor closure planning.	▪ Assess closure options for the Proposal, including consideration of AMD and waste materials (e.g. dispersive and/or polluting materials) issues. ▪ Prepare a Mine Closure Plan for the Proposal for submission with the PER.	▪ Development of a Mine Closure Plan that is proposed to address: - Identifying post-closure vision and preliminary completion criteria. - Implementing progressive rehabilitation. - Ongoing research and development into rehabilitation and closure techniques to improve closure outcomes.	▪ DMP/EPA Guidelines for Preparing Mine Closure Plans (DMP and EPA 2011). ▪ EPA Guidance Statement No. 6: Rehabilitation of Terrestrial Ecosystems (EPA 2006a). ▪ Strategic Framework for Mine Closure, ANZMEC & Minerals Council of Australia (ANZMEC/MCA 2000).
Offsets	The site (Turee Syncline) and immediate surrounds.	-	▪ Residual environmental impacts that require offsets, e.g. emissions or loss of biodiversity.	▪ Investigate the significance of residual environmental impacts to ascertain whether offsets are required. This investigation will be undertaken in accordance with methodology described in EPA Guidance Statement No. 19 (EPA 2008).	-	▪ EPA Guidance Statement No. 19 (EPA 2008). ▪ EPA Position Statement No. 9 (EPA 2006b).

Table 6: Other environmental factors relevant to the scope of the environmental impact assessment

ENVIRONMENTAL FACTOR	RELEVANT AREA	EPA OBJECTIVE	POTENTIAL IMPACTS	ADDITIONAL INVESTIGATIONS	POTENTIAL MANAGEMENT	APPLICABLE STANDARDS, GUIDELINES AND POLICIES
Surface water (including wastewater/ stormwater)	The site (Turee Syncline) and immediate surrounds.	To maintain the quantity of water so that existing and potential environmental values, including ecosystem maintenance, are protected.	▪ Localised modification of surface water flow paths will be necessary to protect mine infrastructure from flood risks, however the Proposal is not anticipated to have an impact on any significant watercourses, drainage lines or sheetflow systems. ▪ Reduction in surface water quality due to inappropriate management of contaminated wastewater and/or stormwater, including runoff containing hydrocarbons, hazardous materials or acid (from acid forming materials).	▪ A surface hydrology assessment is proposed to demonstrate that the Proposal will not affect any significant watercourses, drainage lines or sheetflow systems.	▪ Development of a CEMP and EMP that is proposed to address: - Interactions between natural surface water drainage/ stormwater runoff and the mining operations/infrastructure, which will include standard management practices such as diversion bunds, drains, silt traps and in-pit sumps. - The management of septic/leach and Biomax type systems that may be installed at the site. - Storage and handling of hydrocarbons and hazardous materials in accordance with relevant legislation and/or Australian Standards.	▪ Environmental Water Provisions Policy for Western Australia: Statewide Policy No. 5 (Water and Rivers Commission 2000). ▪ Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ 2000).
Groundwater	The site (Turee Syncline) and immediate surrounds.	To maintain the quantity of water so that existing and potential environmental values, including ecosystem maintenance, are protected.	▪ The Proposal is not anticipated to have an impact on groundwater as mining will be above the water table and there are no known groundwater dependant ecosystems associated with the potential borefield target aquifer given this aquifer is at a considerable depth (>170 m bgl).	▪ Additional hydrogeological, geological and ecological assessments will be conducted to demonstrate that the aquifer subject to the proposed borefield development (i.e. new borefield) does not support any significant environmental values.	▪ Should the establishment of a new local borefield be pursued, the groundwater resource will be managed in accordance with the requirements of the *Rights in Water and Irrigation Act 1914*. This will include, but not be limited to, obtaining the necessary permits and licences, providing the necessary groundwater/aquifer management plans at that time and ongoing monitoring and reporting. Baseline groundwater data would be established as part of the ongoing monitoring requirement.	▪ Environmental Water Provisions Policy for Western Australia: Statewide Policy No. 5 (Water and Rivers Commission 2000). ▪ Hydrogeological reporting associated with a groundwater well licence (Department of Water 2009). ▪ Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ 2000).
Emissions: Noise and vibration	The site (Turee Syncline) and immediate surrounds.	To protect the amenity of nearby sensitive areas from noise and vibration impacts resulting from activities associated with the Proposal by ensuring that noise and vibration levels meet statutory requirements and acceptable standards.	▪ May affect the amenity at nearby sensitive receptors (if such receptors are present). ▪ May lead to occupational health and safety impacts for the workforce. ▪ Due to the relative remote location of the Proposal it is not expected that noise or vibration from construction or operation of the Proposal will result in impacts to nearby sensitive premises.	▪ Identify potential sources of noise and vibration that may result from the Proposal and develop management responses. ▪ Undertake a noise and vibration assessment should any sensitive premises be identified within proximity (within 3 – 5 km) to the site to demonstrate compliance with relevant standards.	▪ Conducting blasting only during daylight hours. ▪ Incorporating noise and vibration control requirements into design criteria. ▪ Incorporating noise and vibration performance criteria into purchasing requirements for relevant equipment and machinery.	▪ EPA Draft Guidance Statement No. 8: Environmental Noise (EPA 2007c). ▪ Environmental Protection (Noise) Regulations 1997.
Emissions: Dust	The site (Turee Syncline) and immediate surrounds.	To ensure that dust emissions do not adversely affect environmental values or the health, welfare and amenity of peoples and land uses by meeting statutory requirements and acceptable standards.	▪ May lead to occupational health and safety impacts for the workforce. ▪ May affect the amenity at nearby sensitive receptors (if such receptors are present) ▪ Due to the relative remote location of the site it is not expected that dust from construction or operation of the Proposal will result in impacts to sensitive premises.	▪ Identify potential sources of dust that may result from the Proposal and develop management responses. ▪ Undertake a dust assessment should any sensitive premises be identified within proximity (within 3 – 5 km) to the site to demonstrate compliance with relevant standards.	▪ Minimising clearing of vegetation as far as practicable to reduce the area of cleared ground that may be susceptible to dust lift-off. ▪ Implementing dust suppression techniques including, haul road watering, enclosing processing areas where dust emissions are significant and use of relevant dust extraction technologies on plant. ▪ Undertaking progressive rehabilitation where practicable.	▪ EPA Guidance Statement No. 18: Prevention of Air Quality Impacts from Land Development Sites (EPA 2000b). ▪ Air Quality Modelling Guidance Notes (Department of Environment 2006).
Emissions: Greenhouse gases	The Pilbara region.	To minimise greenhouse gas emissions to levels as low as practicable on an ongoing basis and consider offsets to further reduce cumulative emissions.	▪ Activities or aspects of the Proposal that may emit greenhouse gases include: - Fuel usage by mobile plant and equipment. - Energy usage by processing plant. - Explosives used for blasting. - Land clearing. ▪ Greenhouse gas emissions are not expected to exceed 100,000 tonnes of CO_2 equivalents per annum over the life of the mine.	▪ Undertake an assessment to identify the sources of greenhouse gas emissions and further evaluate emission levels.	▪ Management of greenhouse gas emissions will be in line with the Proponent's greenhouse gas emission reduction policy. This management will include, but not be limited to, selecting equipment and processes to ensure efficient energy use.	▪ EPA Guidance Statement No. 12 for Minimising Greenhouse Gas Emissions (EPA 2002b).
Mineral waste and AMD	The site (Turee Syncline).	Ensure that waste is contained and isolated from ground and surface water surrounds and treatment or collection does not result in long-term impacts on the surrounding environment.	▪ Contamination of soils, groundwater or surface water bodies through adverse geochemical or acid rock drainage or due to inappropriate storage and management of mineral waste. ▪ The Proposal was determined to pose a low AMD risk, therefore, it is proposed to address this factor as part of the closure and rehabilitation considerations for the Proposal.	▪ See investigations proposed for 'closure and rehabilitation' in Table 5.	▪ See management proposed for 'closure and rehabilitation' in Table 5	▪ EPA Position Statement No. 7: Principles of Environmental Protection (EPA 2007d).

ENVIRONMENTAL FACTOR	RELEVANT AREA	EPA OBJECTIVE	POTENTIAL IMPACTS	ADDITIONAL INVESTIGATIONS	POTENTIAL MANAGEMENT	APPLICABLE STANDARDS, GUIDELINES AND POLICIES
Non-mineral waste (including putrescible waste, hydrocarbons and hazardous materials)	The site (Turee Syncline).	Ensure that waste is contained and isolated from ground and surface water surrounds and treatment or collection does not result in long-term impacts on the surrounding environment.	▪ Contamination of soils, ground or surface water bodies from inappropriate storage and management of non-mineral waste.	▪ Identify non-mineral wastes that will be generated and develop appropriate sites and methodology for waste disposal.	▪ Employing the avoid, reduce, reuse, recycle and recover principles to waste management. ▪ Dispose of inert and putrescible solid wastes from the site and village to appropriately licensed and managed facilities. ▪ Dispose of liquid hydrocarbons to an appropriate off-site facility and ensure storage and handling of such materials is in accordance with relevant legislation and/or Australian Standards. ▪ Treat sewage effluent on site in appropriate sewage treatment plants (such facilities to be licensed if required) or dispose of to an appropriate off-site facility.	▪ Mining Environmental Management Guidelines, Safe Design and operating Standards for Tailings Storage (Department of Industry and Resources 1999). ▪ EPA Position Statement No. 7: Principles of Environmental Protection (EPA 2007d).
Landscape amenity	The site (Turee Syncline) and immediate surrounds.	To ensure that aesthetic values are considered and measures are adopted to reduce visual impacts on the landscape to as low as reasonably practicable.	▪ The alteration of the landscape associated with the excavation of ridges and the placement of infrastructure may detract from the visual amenity of the locality.	▪ Assess the potential changes to the landscape and how this will change the visual character of locality.	▪ Minimising adverse impacts to visual amenity are proposed to be addressed by: - Minimising disturbance as far as practicable. - Considering landscape amenity in the design of waste landforms during operation and post closure. - Appropriate placement of infrastructure and facilities.	
Workforce management	Karijini National Park	To ensure that the values of the Park are maintained.	▪ Workforce visitation to Karijini National Park may lead to a detrimental impact to the Park values.	▪ Development of a workforce induction program which includes educating personnel on appropriate low-impact behaviour in the Park.	▪ A comprehensive induction program for all personnel will be implemented.	

7 Stakeholder consultation

7.1 CONSULTATION TO DATE

A number of preliminary discussions and meetings have been held with government agencies (including Office of the EPA), non-government organisations and relevant Traditional Owners. The Proponent will carry out further consultation with relevant stakeholders as the Proposal develops.

7.2 PROPOSED FURTHER CONSULTATION

The Proponent will ensure the key local, state and Commonwealth decision-making authorities, non-government organisations and Traditional Owners continue to be consulted with in relation to the Proposal. The Proponent has identified the following stakeholders that are proposed to be included in the ongoing consultation program to support the environmental impact assessment and approval process for the Proposal:

- DEC: Environmental Management Branch, Science Division, Karratha Regional Office.
- Shire of Ashburton.
- DIA.
- The traditional land owners.
- Office of the EPA.
- DMP.
- Department of Water.
- Wildflower Society.
- Department of State Development.
- Conservation Council of Western Australia.

8 Proposal and assessment schedule

Table 7 indicates the indicative schedule for environmental assessment of the Proposal. This schedule is dependent upon availability of key information for each stage of the assessment.

Table 7: Indicative Proposal and assessment schedule

TASK	TARGET DATE FOR COMPLETION	APPROXIMATE DURATION
Submission of draft ESD (this document) to OEPA	August 2011	-
OEPA review of draft ESD	September 2011	~5 weeks
Finalisation of ESD	January 2012	~8 weeks
Submission of draft PER to OEPA	March 2012	-
OEPA review of draft PER	End of April 2012	~5 weeks
OEPA approve release of PER	End of June 2012	-
Public review period for PER	End of June to end of July 2012	4 weeks
Proponent response to submissions	October 2012	~12 weeks
EPA assessment and report	December 2012	~8 weeks
Two week public appeal period on EPA's report	December 2012	2 weeks
Ministers consideration of the EPA report	December 2012/January 2013	~2 weeks
Release of Ministerial Statement	January/February 2013	-

9 Study team

The environmental impact assessment of the Proposal will be carried out by the personnel listed in Table 8 in conjunction with other specialist consultants as required.

Table 8: Key study personnel

TITLE	NAME
Proponent Study Team (key personnel)	
Study Manager	Rob Parr
Mine Planning	Nikhill Halder
Hydrology/Hydrogeology	Niall Inverarity
Heritage	Lauren Heinritz
Environmental Approvals	Mark Taylor
Mine Closure and Rehabilitation	Garry Davies
PER Preparation	
EIA Consultant	Eco Logical Australia: Warren McGrath, Jody Neiman, Phillipa Tompson
Specialist Consultants	
Terrestrial Fauna	Dr Kyle Armstrong (Specialised Zoological): bats Anna Napier (GHD): terrestrial fauna Jarrod Clark (Phoenix): SRE's Dr Stuart Halse (Bennelongia): SRE's Jan Henry (Ninox): Northern quoll and terrestrial fauna
Subterranean Fauna	Garth Humphries (Biota): troglofauna Dr Stuart Halse (Bennelongia): trogolofauna Dr Peter Hancock (Eco Logical Australia): stygofauna
Flora and Vegetation	Michi Maier (Biota): rare flora Anna Napier (GHD): flora and vegetation Dr Libby Mattiske (Mattiske Consulting): flora and vegetation

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