Robe River Mining Co Pty Ltd
ABN: 71 008 694 246

West Angelas Closure Plan

February 2015

FDMS No. RTIO-HSE-0228290

Mineral Field 47 – West Pilbara

Contact details:

Garry Davies
Rio Tinto
Central Park
152-158 St Georges Terrace
Perth 6000

Corporate closure planning statement

Rio Tinto's iron ore group (Rio Tinto) considers closure planning to be an integral part of its business. The process of preparing for closure begins in the early stages of project development, and continues throughout the life of the mine.

A team of in-house rehabilitation and closure planning specialists has been established within the Rio Tinto iron ore business to manage this aspect of our operations. A Rehabilitation and Closure Working Group has been established to facilitate integration of closure planning into the broader mine planning framework, and to oversee the research and improvement projects recommended in each closure plan. In this way, Rio Tinto aims to continually improve both its understanding of closure risks, and the strategies employed to mitigate them.

This plan documents the current closure knowledge base for West Angelas. It outlines the objectives that need to be met at closure, the strategies and plans to be employed to achieve them, and provides an indication of the criteria that will be used to assess closure success.

However; this is not a static document. Rio Tinto will continue to revisit its closure plans on a regular basis to ensure that the objectives to which it is working towards remain relevant and aligned to stakeholder expectations, and to revise its strategies and plans where appropriate to achieve improved closure outcomes.

I hereby certify that to the best of my knowledge, the information within this closure plan is true and correct and addresses the relevant requirements of the *Guidelines for Preparing Mine Closure Plans* approved by the Director General of Mines.

David Bloor
General Manager - Health, Safety and Environment

Executive summary

Overview
West Angelas is an open cut iron ore mine located in the Eastern Pilbara region of Western Australia, approximately 105 km north-west of Newman. The mine uses conventional drill-and-blast and load-and-haul mining methods to remove iron ore from above and below the water table.

Scope
This closure plan is designed to address the closure requirements for Rio Tinto Iron Ore's West Angelas deposits, as well as associated mine site infrastructure. Closure is assumed to include progressive rehabilitation that will occur throughout the life of the mine. The goal of mine closure at West Angelas is to relinquish the site to the Government.

The closure plan has been developed to meet the requirements of the Rio Tinto Closure Standard and the joint Office of the Environmental Protection Authority / Department of Mines and Petroleum Guidelines for Preparing Mine Closure Plans (2011).

Primary obligations and commitments
West Angelas is subject to the *Iron Ore (Robe River) Agreement Act 1964* and Ministerial Statement 970 approved under Part IV of the *Environmental Protection Act 1986*.

Post-mining land use
Options for post-mining land use are limited, with mining and pastoralism the only industries that have historically proven viable. Land use options under consideration include a change to pastoralism or return to a native ecosystem.

Closure objectives and completion criteria
The following closure objectives have been agreed for West Angelas:
- Minimise the long term visual impact by reshaping the land so it is compatible with the adjacent landscapes;
- Re-establish self-sustaining ecosystems;
- Ensure no changes to groundwater quality through evaporation; and
- Address public safety hazards.

Note that these objectives do not represent the full range of closure issues that may be present at the site. Rather the objectives reflect key issues against which closure performance will be assessed by government regulators.

Indicative completion criteria have been proposed within the closure plan, however further work is required to clarify and quantify the completion criteria.

Anticipated closure outcome
The shape of the landscape at West Angelas is still evolving, with the final mine void areas and waste dump locations and dimensions still in development across all of the deposits.

On closure of the mine all infrastructure will be removed. The mine voids are expected to be backfilled to prevent the formation of permanent pit lakes; although water may temporarily pool at the base of the voids following heavy rainfall. The area around the mine voids will be unstable, as the pit walls are expected to collapse over time. However, caves containing important environmental and cultural features will remain outside of this zone of instability, and be left undisturbed.

Waste dumps will remain external to the voids. The waste dumps and other disturbance areas across the site will be shaped to create stable landforms and vegetated with native species of local provenance. It is not intended that creeks diverted during the operational life of the mine be restored as part of the closure strategy, as new drainage networks may be established over the disturbance areas in consideration of the new topography created following decommissioning activities.

DMP/OEPA Guidelines checklist

Q	Plan Checklist	Y/N	Page	Comments
1	Has the checklist been endorsed by a senior representative within the operating company?	Y	2	
2-5	Questions relevant to DMP administration of closure plans	n/a	-	
6	Does the project summary include land ownership details, location of the project, comprehensive site plans and background information on the history and status of the project?	Y	16	
7	Has a consolidated summary or register of closure obligations and commitments been included?	Y	19	Also see Appendix A
8	Has information relevant to mine closure been collected for each domain or feature?	Y	80	
9	Has a gap analysis been conducted to determine if further information is required in relation to closure of each domain or feature?	Y	72	
10	Have all stakeholders involved in closure been identified?	Y	60	
11	Has a summary or register of stakeholder consultation been provided, with details as to who has been consulted and the outcomes?	Y	61	
12 a	Does the plan include agreed post-mining land use?	N	67	Options still under discussion
12 b	Does the plan include closure objectives?	Y	67	
12 c	Does the plan include a conceptual landform design diagram?	Y	69	
13	Does the plan identify all potential (or pre-existing) environmental legacies which may restrict the post mining land use (including contaminated sites)?	Y	29	
14	Does the plan identify all (known) key issues impacting mine closure objectives and outcomes?	Y	26	
15	Does the plan include proposed management or mitigation options to deal with these issues?	Y	53	
16	Have the process, methodology and rationale been provided to justify identification and management of the issues?	Y	53	

Q	Plan Checklist	Y/N	Page	Comments
17	Does the plan include an appropriate set of specific completion criteria and/or closure performance indicators?	Y	76	
18	Does the plan include costing methodology, assumptions and financial provision to resource closure implementation and monitoring?	Y	79	
19	Does the plan include a process for regular review of the financial provision?	Y	79	
20	Does the plan include a summary of closure implementation strategies and activities for the proposed operations or for the whole site?	Y	80	
21	Does the plan include a closure work program for each domain or feature?	P	80	Programs for domains will be developed as part of the decommissioning plan
22	Have site layout plans been provided to clearly show each type of disturbance?	Y	80	
23	Does the plan contain a schedule of research and trial activities?	Y	75	
24	Does the plan contain a schedule of progressive rehabilitation activities?	Y	80	
25	Does the plan include details of how unexpected closure and care and maintenance will be handled?	Y	87	
26	Does the plan contain a schedule of decommissioning activities?	N	-	Will be developed as the site approaches closure. Decommissioning strategies are included in this closure plan.
27	Does the plan contain a schedule of closure performance monitoring and maintenance activities?	Y	88	
28	Does the plan contain a framework, including methodology, quality control and remedial strategy for closure performance monitoring including post-closure monitoring and maintenance?	P	88	An indicative monitoring program has been provided, with more detail introduced as the site approaches closure.
29	Does the mine closure plan contain a description of management strategies including systems and processes for the retention of mine records?	Y	90	

Table of common acronyms

Acronym	Description
AHD	Australian Height Datum
AMD	Acid and / or Metalliferous Drainage
ASL	Above Sea Level
BIF	Banded Iron Formation
BOM	Bureau of Meteorology
BWT	Below Water Table
CALM	Department of Conservation and Land Management (now DPAW)
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSMP	Contaminated Sites Management Plan
DEC	Department of Environment and Conservation (now DER and DPAW)
DER	Department of Environmental Regulation
DMP	Department of Mines and Petroleum
DPaW	Department of Parks and Wildlife
DSD	Department of State Development
EMP	Environmental Management Program
ENSO	El Nino Southern Oscillation
EP Act	*Environmental Protection Act 1986*
EPA	Environmental Protection Authority
FIFO	Fly In Fly Out
FMMP	Fibrous Minerals Management Plant
GAI	Geochemical Abundance Index
GIS	Graphical Information System
IOD	Indian Ocean Dipole
IODMS	Iron Ore Document Management System
IORR	Iron Ore (Robe River)
ISO	International Standards Organisation
LAORS	Legal And Other Requirements
MS	Ministerial Statement
OEPA	Office of the Environmental Protection Authority
PAF	Potential Acid Forming
PCO	Present Cost Obligation
SCARD	Spontaneous Combustion and Acid Rock Drainage
TPC	Total Projected Cost of closure

Contents page

List of Figures

List of Tables

Introduction to closure planning

1. What is a closure plan?

A closure plan documents strategies to achieve the desired post-closure landform and avoid or mitigate potential social and environmental impacts associated with site closure, to an extent that is fiscally appropriate. As such, closure plans provide the framework for planning and implementing closure of Rio Tinto iron ore mine sites. Closure plans also document tasks the company has committed to undertake to improve closure outcomes.

Closure plans are intended to be used by site personnel to inform on-going planning decisions, and to ensure closure is integrated into operational activities. Closure plans are also one of the methods used by the business to communicate its closure strategy to stakeholders, including regulators.

Closure plans are regularly updated to account for changes resulting from:

- amendments to the mine plan;
- improvements of the site closure knowledge base (e.g. through daily activities, technical studies and research actions);
- new or amended regulation;
- changes to surrounding land uses; and
- evolving stakeholder expectations.

A key output of closure planning is the development of a closure cost estimate. Closure provisions are subsequently integrated into our business planning processes to ensure funds will be available to close the site effectively.

The detail of each closure plan increases as the knowledge base develops. When the site moves to within five years of scheduled closure, a Decommissioning Plan is prepared. The Decommissioning Plan is the final closure plan produced for a site.

Decommissioning plans are used to direct the physical closure, dismantling and subsequent rehabilitation of the site (excluding progressive rehabilitation undertaken during operations), and include location specific management plans for each closure aspect in each closure domain identified. The Decommissioning Plan builds upon strategies developed in earlier closure plans and details how they are to be implemented.

A decommissioning study is undertaken at this time, to support development of the Decommissioning Plan. Stakeholder engagement and endorsement of final completion criteria is facilitated at this time. This study also investigates how infrastructure, decontamination, rehabilitation, the workforce and communications will be managed throughout the mine closure period (and beyond), specific to the site conditions at the end of mining.

2. The closure planning process

Rio Tinto integrates closure planning into the mine planning process. As a result, closure planning is not a stand-alone process. Activities within the business that specifically address closure and its potential impacts include:

- life of mine and shorter term mine plans;
- expansion studies;
- mine and waste dump design reviews;
- progressive rehabilitation;
- internal technical studies and Rio Tinto supported research activities; and
- the Rio Tinto Iron Ore group Closure and Rehabilitation Working Group.

Closure plans are reviewed on a regular basis in accordance with both internal and external planning obligations. The review process brings technical and site experts together to discuss current performance, changes including knowledge base improvements, stakeholder feedback on the current plan, future options and remaining knowledge gaps. At the end of the review improvement actions are assigned and

integrated into work plans, and the closure plan is updated to record the review outcomes.

Purpose and scope

3. Purpose

Planning for closure of a site is a critical business process that demonstrates Rio Tinto's commitment to sustainable development. The report follows the format and content requirements for mine closure plans as recommended by the Western Australian Government *Guidelines for Preparing Mine Closure Plans*[1], and is designed to comply with Rio Tinto's internal management expectations for mine closure as defined in the Rio Tinto Closure Standard[2].

This closure plan has been produced to:

- comply with Ministerial Statement 970 condition 9 for rehabilitation and closure;
- update the West Angelas closure plan to include the expansion areas of Deposit A West and Deposit F; and
- meet Rio Tinto internal compliance requirements to review and update the closure plan every six years.

4. Scope

This plan covers the closure, rehabilitation and decommissioning of facilities and disturbed areas associated with mining activities at West Angelas, including:

- open cut pits at deposits A, B, E, F and A West, mineral waste dumps, haul roads and associated ground disturbance;
- wet processing plant, administration buildings, associated facilities and infrastructure, sealed and unsealed roads;
- Turee Creek B borefield, dewatering borefield, pipelines, discharge outlets and associated infrastructure;
- accommodation camp;
- rail loop and spur; and
- airstrip.

The scope of this closure plan currently excludes:

- future expansions at the site. These deposits will be addressed in future updates to this plan when mine planning is sufficiently developed; and
- the mainline rail, which is captured in a stand-alone Rail Closure Statement.

5. Closure plan review history

A decommissioning and rehabilitation management plan for West Angelas was submitted to regulators in December 1999 and updated in November 2004 to fulfil the requirements of Ministerial Statement (MS) 514 condition 13, as part of the West Angelas Environmental Management Programme (EMP).

In 2008, a dedicated closure plan was developed for internal use only, in accordance with the Rio Tinto Closure Standard, addressing the closure requirements for deposits A and E only. (Deposit B had yet to be developed and was not considered in this closure plan.)

MS 970 was published on 12 June 2014; replacing and superseding all previous conditions of MS 514. Of importance to this closure plan, management of rehabilitation and closure was separated from the Environmental Management Programme, to form a separate Mine Closure Plan (MS 970 Condition 9, discussed further in Section 7.2 *Ministerial Statements*), and commitments specific to drainage diversion management were altered to create a holistic approach to surface water management (MS 970 condition 7).

[1] Department of Mines & Petroleum and Office of the Environmental Protection Authority (2011) Guidelines for Preparing Mine Closure Plans, June 2011, http://www.dmp.wa.gov.au/documents/Mine_Closure(2).pdf.

[2] Rio Tinto (2013) Closure Standard, March 2013, http://www.riotinto.com/documents/Library/Closure_Standard_EN.pdf

This closure plan is the first plan to be developed under MS 970. This mine closure plan has been developed using information current as at February 2015. The plan has been prepared for external review and supersedes all previous closure, decommissioning and rehabilitation plans.

Site overview

6. Description of operation

6.1 Overview

West Angelas is located in the Eastern Pilbara region of Western Australia, approximately 105 km north-west of Newman (as depicted in Figure 1). The location is very remote, with no neighbouring mining or pastoral activities, the dominant economic industries undertaken in the Pilbara. West Angelas is acknowledged to support diverse flora and fauna for its size due to the variety of relief and geological types which combine to provide a great diversity of habitats.

Figure 1: General location of West Angelas mine

West Angelas is operated by Rio Tinto iron ore, on behalf of the Robe River Mining joint venture (JV) of whom Rio Tinto is the largest stakeholder. The Robe River Mining JV comprises:

- Rio Tinto (53%);
- Mitsui Iron Ore Development Pty Ltd (32%)
- Pannawonica Iron Associates (10%); and
- Cape Lambert Iron Associates (5%).

6.2 Mining layout

West Angelas utilises standard truck and shovel methods to develop open pit iron ore deposits. The current mine layout is shown in Figure 2, which also highlights the location of deposits encompassed by this plan (Deposit A, A West, B, E and F). Note that Deposits A and B are divided into 'sub-deposits' for operational purposes (CEPN/CEPS and B1-3 respectively). This terminology is used in subsequent sections of the closure plan.

The operation includes:

- open cut pits that mine to depths below the natural groundwater table;
- mineral waste that is initially directed to surface waste dumps and, where practical, used in progressive backfilling of the mine pit;
- a network of dewatering borefield, pipelines, discharge outlets and associated infrastructure to facilitate access to below water table (BWT) resources;
- wet processing plant, associated infrastructure and facilities; and

- administration buildings, associated facilities, sealed and unsealed roads.

The Turee Creek B borefield is used to provide potable water to the mining operation and camp facilities and, when required, water to the processing plant. The borefield is located approximately 30 km west of the West Angelas minesite.

Note, a full site inventory is included in closure cost estimate reports for the site and is not reproduced in this report.

6.3 Mining schedule

Ore was first shipped from Deposit A in 2001. Mining at Deposit E commenced in 2011 and Deposit B is scheduled to commence in 2015. Major proposed milestones in the development, operation and closure of the respective deposits are presented in Table 1, however it should be noted that mine plans undergo constant review and modification, and consequently this information should only be used as an indication of future mining and development.

Table 1: Indicative mining schedule

Deposit	Indicative commencement	Indicative completion
Deposit A	Commenced	2019
Deposit A West	2023	2029
Deposit B	2014	2029
Deposit E	Commenced	2023
Deposit F	2016	2029

6.4 Post-mining and post-closure landforms

This closure plan differentiates between the post-mining landform and the post-closure landform.

- The post-mining landform refers to the landform that would be generated as a result of implementation of the current operational mine plan and standard operating practice. Issues that could potentially arise from this scenario, and strategies to manage them, are outlined in later sections of this closure plan.
- The post-closure landform is the final landform configuration that is proposed to remain after the implementation of rehabilitation earthworks during closure. The post-closure landform is described in Section 23.

Based on the current plan, the post mining landform will consist of nine separate mine voids which have been partially backfilled during operations to varying levels. The voids may require further backfill post operations to above the recovered groundwater table level(s).

Several mineral waste dumps will be present external to the mine voids, as well as one in pit waste dump at the western end of Deposit A that will extend above the pit crest.

It is assumed that all of the existing infrastructure and disturbance areas will be present at closure and will require decommissioning and subsequent rehabilitation.

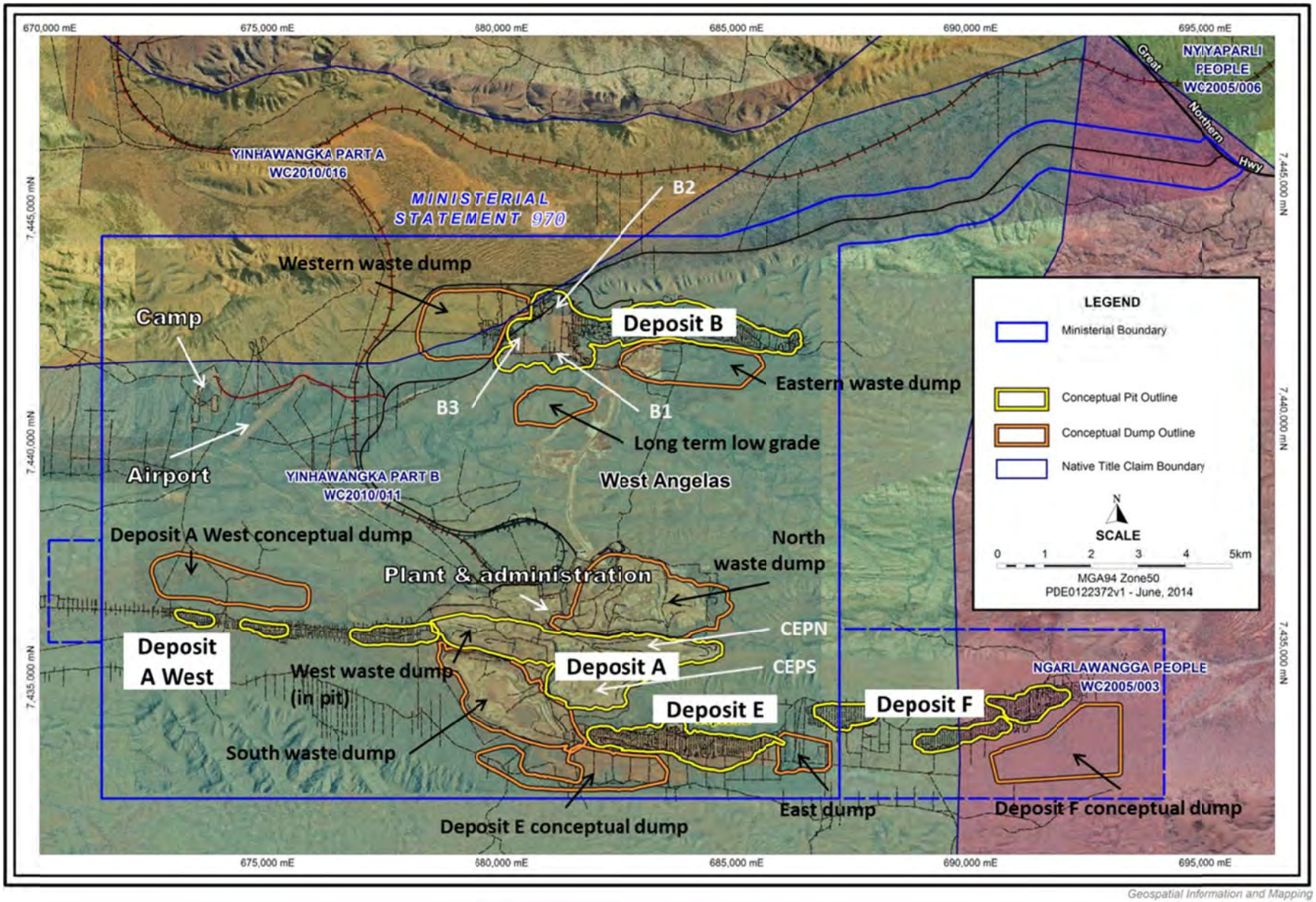

Figure 2: West Angelas deposits and supporting infrastructure. Existing Part IV environmental approval and Native Title boundaries are also illustrated. Subdivisions of the deposits subject to different backfill requirements are presented in grey.

Closure obligations and commitments

Closure obligations arise from a range of sources, from legislative requirements to actions agreed with individual stakeholders.

7. Important elements of the general legislative framework

7.1 State Agreement legislation

A State Agreement is an Act of the Western Australian Parliament to govern major resources activities that are of economic or strategic importance to the State. All of Rio Tinto's Western Australian iron ore mines are subject to State Agreement[3]. The Department of State Development (DSD) is the responsible agency.

A key consequence of State Agreements is that they override the *Mining Act 1978* requirement to submit mining proposals, and therefore closure plans, to the Department of Mines and Petroleum (DMP).

State Agreements are structured so that laws protecting the environment, in particular requirements under the *Environmental Protection Act 1986* (EP Act), will still apply. Sites subject to State Agreements are therefore subject to environmental impact assessment by the Environmental Protection Authority (EPA) in addition to licensing by the Department of Environment Regulation (DER).

The *Iron Ore (Robe River) Agreement Act 1964* (ML248SA) was enacted to reflect an agreement between the State of Western Australia and Robe River Iron Associates (now part of the Rio Tinto group) in relation to mining on relevant Crown Land. The agreement is one of a number that provide an over-arching framework for regulating sites of economic significance to the State.

7.2 Ministerial Statements

Ministerial Statements (MS) are the end result of the environmental impact assessment process for approved projects, as outlined in Part IV of the EP Act.

Part IV of the EP Act outlines the process whereby approval is given to projects which have the potential for significant impact on the environment. Approval is granted by the Minister for the Environment under advice from the EPA. The approval process is public, with opportunities for the public to make submissions in respect to the project and rights to appeal against the content and recommendations in the EPA's report to the Minister.

The EPA expects closure plans to be submitted with the approvals documentation to facilitate the incorporation of closure issues into its environmental impact assessment.

Environmental management commitments for West Angelas Deposits A, B and E relevant to closure were initially established under MS 514. These commitments were enacted through MS 514 conditions 4 and 13 requiring an Environmental Management Plan (EMP) to be prepared and implemented prior to ground-disturbance activities (condition 4), which included a decommissioning and rehabilitation management plan (condition 13). The EMP, approved by regulators in December 1999, addressed Robe River Mining's commitment to ensure no changes to groundwater quality through evaporation in below water table pits by proposing to backfill pits to a level that would prevent capillary rise in the soil cover.

MS 970 was issued for the West Angelas Iron Ore Project in June 2014, replacing and superseding all previous conditions of MS 514. MS 514 closure management

[3] Note that whilst all Rio Tinto iron ore mine sites are covered by State Agreements, some ancillary areas (e.g. camps, infrastructure services, etc.) may be located outside the Agreement boundary.

requirements were replaced by MS 970 condition 9 Rehabilitation and closure which states:

9-1 The proponent shall ensure that the mine is closed, decommissioned and rehabilitated in an ecologically sustainable manner, consistent with agreed post-mining outcomes and land uses, and without unacceptable liability to the State of Western Australia.

9-2 The proponent shall prepare a Mine Closure Plan for the West Angelas Iron Ore Project.

9-3 The Mine Closure Plan required by condition 9-2 shall:
(1) when implemented, manage the implementation of the proposal to meet the requirements of condition 9-1;
(2) be prepared in accordance with the Guidelines for Preparing Mine Closure Plans, June 2011 (Department of Mines and Petroleum and Environmental Protection Authority) or its revisions; and
(3) be to the requirements of the CEO on advice of the Department of Mines and Petroleum.

9-4 Within 12 months of commissioning of additional mine pits or as otherwise agreed by the CEO the proponent shall implement the approved Mine Closure Plan and continue implementation until otherwise agreed by the CEO.

9-5 Revisions to the Mine Closure Plan may be approved by the CEO on the advice of the Department of Mines and Petroleum.

9-6 The proponent shall implement revisions of the Mine Closure Plan required by condition 9-5.

7.3 Mining Act

Mining proposals are required to be submitted and approved under the *Mining Act 1978*. This is the primary legislation under which mine closure is regulated in Western Australia and the DMP is the responsible agency.

In accordance with amendments to the *Mining Act 1978* made in 2010, all new mining proposals are required to contain a mine closure plan prepared in accordance with the joint DMP/EPA Guidelines for Preparing Mine Closure Plans (2011).

The *Mining Act 1978* requirements also apply to operational areas that are not covered under State Agreement legislation. Some mining areas (e.g. waste dumps, fines dams) and ancillary infrastructure (e.g. mining camps) may fall into this category. However, the DMP has indicated that it does not necessarily expect formal closure plans to be submitted with such proposals.

The *Mining Act 1978* requires mining companies to review and lodge updated closure plans at least every three years (unless otherwise authorised). Rio Tinto iron ore mines in the Pilbara are subject to State Agreements, which are administered by the DSD. The DSD does not require closure plans to be submitted. As this site is subject to State Agreement legislation, the requirement to submit a closure plan under the *Mining Act 1978* does not apply.

Tenure held under the Mining Act at West Angelas and relevant to this closure plan includes:

- General purpose leases 47/1235 and 47/1236;
- Miscellaneous LicencesL47/409 issued for the West Angelas gas pipeline and power station; and
- other Miscellaneous Licences 47/52, 47/53, 47/54, 47/60, 47/61, 47/62 issued for the purposes of roads and power lines, the repeater station and road, pipeline and power lines.

Tenure boundaries are presented relative to the EPA Part IV MS 970 boundary in Figure 3.

7.4 Native vegetation clearing permits

Mining activities undertaken outside of the Part IV process of the EP Act are subject to Native Vegetation Clearing Permits (NVCP) under Part V of the EP Act. An area permit is required before clearing specific areas of native vegetation, or alternatively a purpose permit is required for programs of clearing, such as ongoing maintenance projects.

Some mining and petroleum activities are exempt from requiring a clearing permit. These activities involve clearing for 'exploration' (excluding environmentally sensitive areas) or 'low impact or other mineral or petroleum activities' (excluding non-permitted areas). Examples of low impact activities include temporary tracks, groundwater drilling and clearing less than two hectares for camp sites.

NVCPs that have been obtained to support operation and development of the West Angelas mine are listed in Table 2. It is noted that the rehabilitation requirements associated with these permits may be completed prior to or following expiration of these permits, but are expected to occur prior to mine closure.

Table 2: Native Vegetation Clearing Permits at West Angelas.

Clearing permit	Seed provenance area (km)	Time to commence rehabilitation
3047/3	Not specified	Not specified
3320/1	Not specified	Not specified
3758/1	50	Within 12 months
3893/2	200	Within 12 months
3893/3	Not specified	Not specified
4070/1	50	Within 12 months
4394/1	100	Within 12 months
4830/1	100	Within 12 months
4830/2	Not specified	Not specified
4722/1	100	Within 12 months
5185/3	Not specified	Not specified
4466/2	Not specified	Not specified
5246/1	100	Within 12 months
5996/1	Not specified	Not specified
6016/1	Not specified	Not specified

7.5 Native title

The Yinhawangka (Gobawarrah Minduarra Yinhawanga) People are the native title claimants and traditional custodians of the majority of the land identified in this closure plan footprint. The Ngarlawangga People are the native title claimants for a portion of the Deposit F area. Rio Tinto reached a Claim Wide Participation Agreement with the Yinhawangka People in 2013 and the Ngarlawangga People in 2011. Figure 2 shows the native boundaries across the site.

The Participation Agreement commits Rio Tinto to work together with Yinhawangka and Ngarlawangga on country to manage and maintain the areas in which Rio Tinto operates. These comprehensive agreements set clear guidelines for processes such as land access, tenure, heritage and environmental approvals, mining benefits payments and reporting and communication requirements. As part of the Agreement, Rio Tinto has committed to consult with Yinhawangka and Ngarlawangga in relation to life of mine planning. This includes consultation with regards to closure.

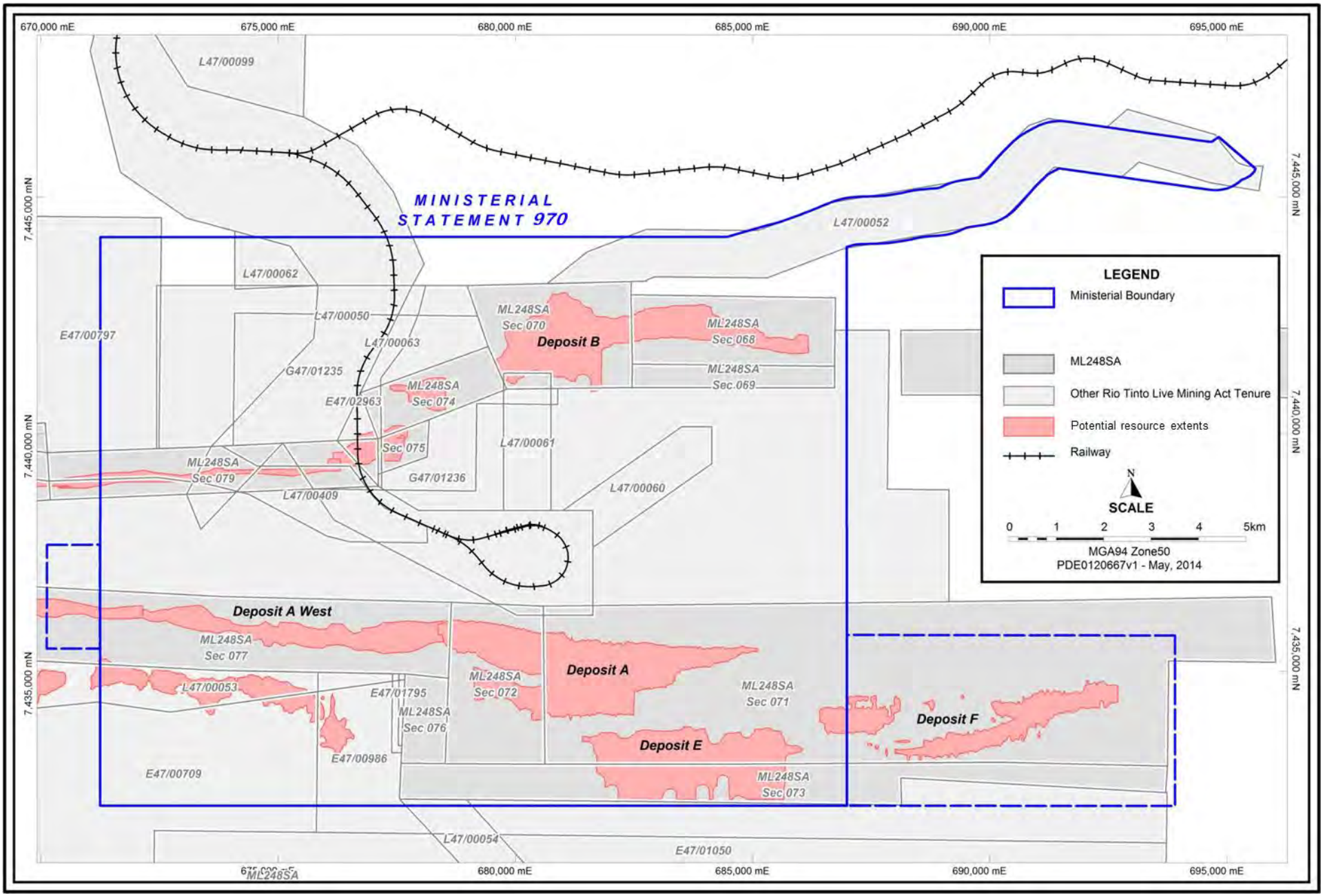

Figure 3: Tenure boundaries relative to potential resource extents at West Angelas.

7.6 Other statutory obligations relevant to closure

Additional statutes and regulations create obligations and/or considerations that may be of relevance to the rehabilitation and closure of the site, to the extent that they are not inconsistent with the provisions of the State Agreement. These include, but are not limited to:

- *Contaminated Sites Act 2003* (WA), and Guidelines gazetted under this Act;
- Environmental Protection (Controlled Waste) Regulation 2004 (WA);
- Environmental Protection (Unauthorised Discharges) Regulations 2004 (WA);
- Environmental Protection (Rural Landfill) Regulations 2002 (WA);
- *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth);
- *Rights in Water and Irrigation Act 1914* (WA);
- *Wildlife Conservation Act 1950* (WA);
- *Aboriginal Heritage Act 1972* (WA);
- *Mine Safety and Inspection Act 1994* (WA);
- Health (Asbestos) Regulations 1992 (WA);
- *Land Drainage Act 1925* (WA);
- *Dangerous Goods Safety Act 2004* (WA), and associated regulations;
- *Conservation and Land Management Act 1984* (WA); and
- *Land Administration Act 1997* (WA).

Although many of the above are not discussed further in this document, Rio Tinto iron ore has considered the relevance of each in the development of the closure plan and has taken appropriate action where required.

8. Regulatory and industry guidelines

8.1 Guidelines for preparing mine closure plans

The DMP and EPA have issued the Guidelines for Preparing Mine Closure Plans (the Guidelines) to establish standards for closure plans being submitted to State Government. The Guidelines have legislative force because the Mining Act 1978 has been amended to specifically state that mining proposals must include a closure plan, and closure plans are defined to be a document that:

- is in the form required by the guidelines; and
- contains information of the kind required by the guidelines.

Regulations routinely recommend the imposition of conditions on Ministerial Statements requiring plans that are compliant with the Guidelines to be prepared, even on mines subject to State Agreement.

Rio Tinto recognises that the Guidelines provide a suitable format for development of mine closure plans, and this closure plan has been prepared to comply with the key elements and structure of the guidelines.

8.2 Other guidelines

In addition to the guidelines, the DMP has developed a number of guidelines and environmental notes in relation to mining and rehabilitation, which include:

- Environmental Notes on Mining – Waste Rock Dumps[4];
- Mine Void Water Resource Issues in Western Australia[5]; and
- Mining Environmental Management Guidelines, Safe Design and Operating Standards for Tailings Storage[6].

Other key government and industry guidelines relevant to mine closure and rehabilitation include:

[4] Department of Mines and Petroleum 2009, *Environmental Notes on Mining – Waste Rock Dumps*.

[5] Johnson SL and AH Wright 2003, *Mine Void Water Resources Issues in Western Australia*, [Former] Water and Rivers Commission, Perth.

[6] [Former] Department of Minerals and Energy 1999, *Mining Environmental Management Guidelines, Safe Design and Operating Standards for Tailings Storage*.

- Strategic Framework for Mine Closure[7];
- Enduring Value – The Australian Minerals Industry Framework for Sustainable Development[8];
- Mine Closure and Completion[9];
- Mine Rehabilitation[10]; and
- Landform Design for Rehabilitation[11].

9. Closure obligations summary

Table 3 provides a summary of key actions related to site-specific closure obligations and associated information. These closure obligations arise from mining tenement conditions, commitments in mining proposals, conditions of environmental approvals and other agreed actions. A detailed register is presented in Appendix A of this closure plan.

Some of the information and obligations identified may not be legally binding, however the purpose of the summary is to identify all existing obligations as well as information and options that have been raised relating to closure. This information has been considered in defining closure objectives, strategies and indicative completion criteria employed in this closure plan.

The inclusion of a particular obligation is not a representation as to its legal effect nor is intended to give rise to any separate legally binding commitment.

[7] Australian and New Zealand Minerals and Energy Council and Minerals Council of Australia (ANZMEC/MCA) 2000, *Strategic Framework for Mine Closure*, National Library of Australia Catalogue Data.

[8] Minerals Council of Australia 2004, Enduring Value – *The Australian Minerals Industry Framework for Sustainable Development*.

[9] Department of Industry, Tourism and Resources (DITR) 2006, *Mine Closure and Completion*.

[10] Department of Industry, Tourism and Resources (DITR) 2006, *Mine Rehabilitation.*

[11] Environment Australia 2002, *Landform Design for Rehabilitation. Best Practice Environmental Management in Mining,* Commonwealth of Australia.

Table 3: Closure obligations summary

Aspect	Key sources of obligations	Intent of closure commitment
Decommissioning	Clause 10(e) of Iron Ore Robe River agreement Act 1964	On the cessation or determination of any lease license or easement the improvements and things erected other than plant and equipment shall remain or become property of the State The Company must notify the State immediately before deciding to remove its locomotives rolling stock plant or equipment, granting to the State the right or option to purchase the plant and / or equipment within three months.
	Mining Proposal 20934 Fibre optic cable	• Cable located 1m below ground level to be left in situ.
	Mining Proposal 33113 Power station	• Decommissioning and rehabilitation if no longer required for other projects or land users in the area • If decommissioned, infrastructure to be removed, bituminised surfaces removed to an appropriate disposal site and the area rehabilitated.
	GPL 47/1235, GPL 47/1236	• Buildings and structures removed from site or demolished and buried
	L47/409, L47/53, L47/54	• Remove installations, cover wells and holes in the ground and rehabilitate
	L47/52	• Holes drilled for the purpose of exploration are to be capped, filled or otherwise made safe • Backfill and rehabilitate disturbances to the land surface no later than 6 months after excavation • waste materials, equipment and temporary buildings to be removed
Rehabilitation	DEC Licence L7774/2000/6 Tyre storage and disposal	• Groups of not more than 1000 whole tyres or 40 cubic metres of tyre pieces are to be buried as soon as practicable after placement in the waste dumps. • A minimum cover to tyre ratio of 4 to 1 with a minimum of 100mm of soil cover is to be maintained over the buried tyres following disposal and a final cover of not less than 2 metres of soil.
	GPL 47/1235 GPL 47/1236	• Progressively where possible and at the completion of operations, disturbed areas rehabilitated and revegetated with local native grasses, shrubs and trees
	West Angelas Environmental Management Plan 2014	• Progressive rehabilitation of cleared / disturbed areas where possible. • Seeds from as many native plant species of local provenance as possible used for rehabilitation • Mineral waste progressively backfill into mine pit voids to above the natural ground water level as far as practicable
	Native Vegetation Clearing Permits	• See Table 2
Landform design	West Angelas Environmental Management Plan 2014	• Mineral waste progressively backfill into mine pit voids to above the natural ground water level as far as practicable • Mineral waste dump designs to consider shaping to blend in with the surrounding natural topography • Mineral waste dumps located near drainage features to use rock armouring or other stabilising material if erosion occurs
Local community		• No closure action specific obligations that relate to local communities or Traditional Owners have been identified.

Collection and analysis of closure data

This section forms part of the closure knowledge base, and is intended to summarise the anticipated post-mining landform conditions, present key baseline data and associated analyses, and identify knowledge gaps.

Information collated in this section reflects our current knowledge at the time of preparation of the plan. A summary of the technical reports that contribute to the closure knowledge base is provided in Appendix B.

The contents of the closure knowledge base will evolve over time. As a result, some components of some reports and studies are superseded by new research or studies or, as a consequence of changes in the mine plan, may constitute new gaps in our knowledge at the time of this closure plan update. For these reasons the technical reports are not appended to this closure plan. All technical reports relevant to the closure of the operation will be consolidated and presented as part of the Decommissioning Plan.

10. Climate

Climatic information, particularly rainfall, rainfall intensity, cyclone frequency and evaporation is relevant to many aspects of mine closure. In particular, it potentially has a significant effect on the geotechnical and vegetative stability of final landforms including waste dumps.

The general climate of the Pilbara can be described semi-arid, characterised by a hot summer (October to April) and a mild winter (May to September).

10.1 Weather stations

Rio Tinto iron ore has a monitoring station at the West Angelas operations, and has been recording data since July 2004. The Bureau of Meteorology (BOM) maintains a station at Newman Aerodrome (BOM station number: 007176). This station has been selected to provide long term climate data for closure planning as it is the closest BOM station to West Angelas, is located in a similar climate zone, and has been operational since 1971 thus providing 33 years of climate records.

Information provided in this section is based on information analysed from both the West Angelas (2005 to 2013) and Newman Aero (1971 to 2013) monitoring stations.

10.2 Rainfall and significant weather events

The north/north-western coastline of Australia has experienced more tropical cyclones than anywhere else on mainland Australia. Most tropical cyclones are observed during the late summer, occurring between November and May. Tropical cyclones can produce damaging wind gusts in excess of 150 km per hour, with heavy rains resulting in regional flooding. Five tropical cyclones are expected off the coast of the Pilbara each year, with two expected to make landfall.

Precipitation is driven by summer cyclonic activity, with the months of August, September and October have the lowest average rainfall, and December, January and February the highest average rainfall (Figure 4[12]). Annual rainfall is also highly variable, as evidenced by historical data from 1971 to 2013 (Figure 6).

[12] Bureau of Meteorology, Newman Aero dataset, Accessed: 20 March 2014

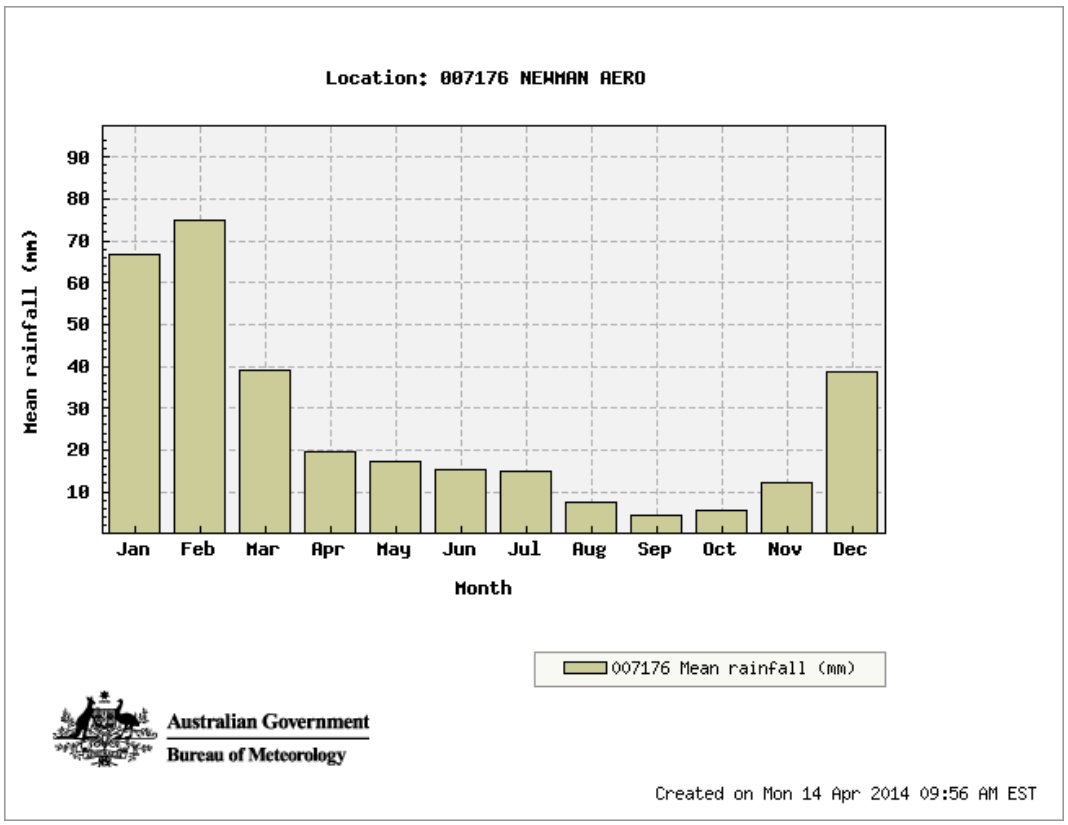

Figure 4: Mean monthly rainfall (1971 to 2013) at Newman Aerodrome

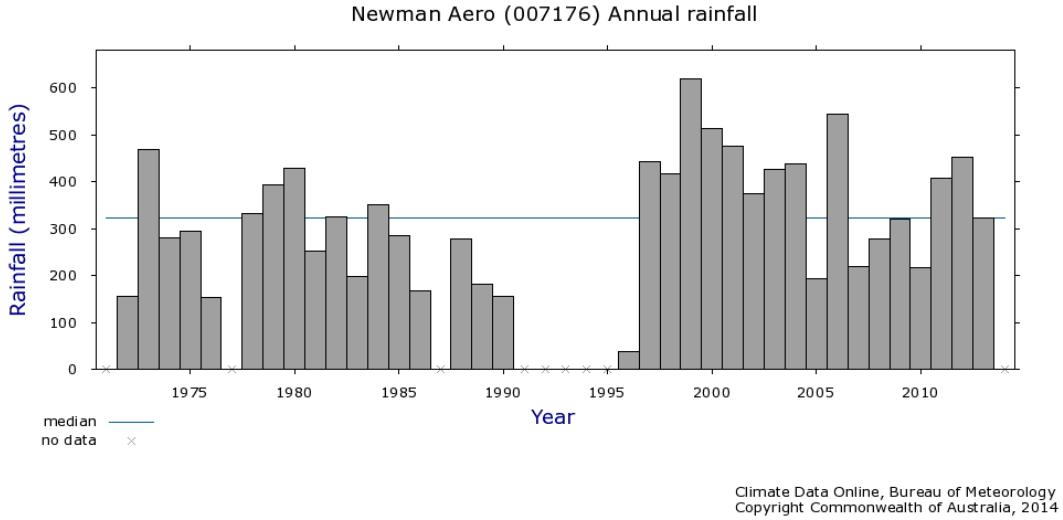

Figure 5 Historical annual rainfall (1971 - 2013) at Newman Aerodrome

10.3 Temperature

Temperatures at West Angelas range from an average maximum temperature of 44°C in January to an average minimum of 3°C in August[13].

Average temperatures at West Angelas during the day are typically between 36°C to 39°C over summer, and drop to 23°C to 26°C over winter. Average minimum temperatures are between 23°C to 24°C over summer, and 6°C to 7°C over winter. Monthly average temperatures recorded at Newman Aero between 1996 and 2013 are presented in Figure 6.

[13] Bureau of Meteorology, Newman Aerodrome dataset, Accessed: 20 March 2014

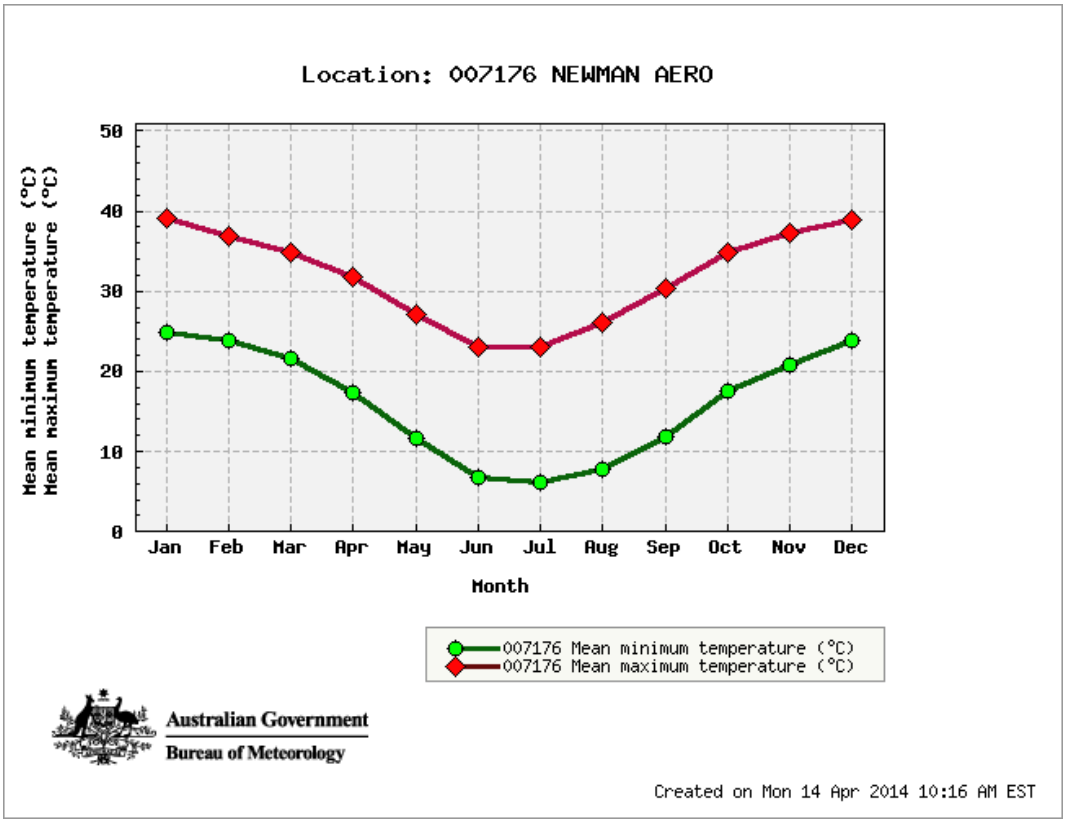

Figure 6: Mean maximum and minimum monthly temperature data (1996 to 2013) at Newman Aerodrome

10.4 Evaporation and humidity

Evaporation rates in the region greatly exceed rainfall. Evaporation at West Angelas is between 2500 to 3400 mm per annum while average humidity has been recorded as 37%, with higher humidity corresponding to higher annual rainfall.

10.5 Impact of climate change

The understanding of how climate will change in the future in the Pilbara is guided by the outcomes of climate modelling, commissioned privately by Rio Tinto iron ore and other Australian government agencies. The main climate drivers for the Pilbara are the El Niño Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD) ocean currents. However, these ocean currents are not well represented in most global climate models, and as a result climate predictions for the northwest of Western Australia vary significantly. Consequently the impact of climate change, the change in water availability and influence on ecosystems, in the Pilbara is still unclear.

The ENSO and IOD ocean currents are currently being researched by CSIRO. At the same time, modelling is being progressively improved by various Australian Government agencies to expand our understanding of the climate drivers in the southern hemisphere, to understand the associated impacts on water availability and to predict changes to existing ecosystems.

From the modelling completed to date, our understanding of Pilbara climate change suggests the region will experience the following climate trends:

- A shift in the historical tropical cyclone season, with an earlier start and potentially later finish.
- Continuation of the highly variable multi-decadal scale rainfall trends.
- A significant warming trend, influencing maximum temperatures, with the largest changes during the January to March period.

Given the closure date for in-scope deposits (i.e. 2023), potential impacts associated with climate change in the context of closure have not been considered at this stage of the project development and are not discussed further in this document.

11. Land

11.1 Geographical overview

West Angelas is located in the southern part of the Pilbara Block, which contains some of the oldest rocks on record in Australia. Mining operations are located within two valleys which trend east-west and are separated by a low plateau of Jeerinah Formation. These valleys join together upstream of Karijini National Park. Hills and ridges are of low to moderate relief, and are fringed by larger hills of the east-west trending Brockman Iron Formation. High hills dominate the eastern end of the Turee Creek B borefield area.

Mount Meharry, the point of highest elevation in Western Australia (1251 m ASL) is located approximately 20 km north-west of West Angelas. Mount Robinson (1142 m ASL) is located to the north of Deposit H. The maximum height within the range formed by the Brockman Iron Formation is 1191 m ASL, while West Angela Hill to the north is 1010 m ASL. Pandtherunga Hill is the highest point within the West Angelas mining leases, at 969 m ASL. The surrounding plains average approximately 700 m ASL.

Seven land systems were identified as occurring in the West Angelas Operations, as listed in Table 4. Most of the operations occur within the Newman, Boolgeeda and Rocklea land systems.

Table 4: West Angelas land systems and land units

Land System	Description
Newman	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands
Boolgeeda	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands and mulga shrublands
Rocklea	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands
Platform	Dissected slopes and raised plains supporting hard spinifex grasslands
Egerton	Dissected hardpan plains supporting mulga shrublands and hard spinifex hummock grasslands
Elimunna	Stony plains on basalts supporting sparse Acacia and cassia shrublands and patchy tussock grasslands.
Wannamunna	Hardpan plains and internal drainage tracts supporting mulga shrublands and woodlands (and occasionally eucalypt woodlands).

11.2 Mineral waste characterisation

11.2.1 Local geology

The deposits at West Angelas lie within Archaean rocks of the Marra Mamba Iron Formation and the West Angelas Member of the Wittenoom Formation. The Marra Mamba Iron Formation has been subdivided into three members. From oldest to youngest these are:

- Nammuldi Member: overlies the Jeerinah Formation of the Fortescue Group and is characterised by poorly bedded yellow and brown chert and cherty banded iron formation (BIF) with occasional intercalated, generally thin, fissile shale partings and rare dolomite bands.
- MacLeod Member: a sequence of BIF, banded chert and chert, interbedded with a number of thick shale bands.
- Mount Newman Member: composed of alternating broad mesobands of iron oxides and white to yellow chert.

The West Angelas Member of the Wittenoom Formation overlies the Marra Mamba Iron Formation and consists predominantly of laminated pink, grey and khaki shales interbedded with lesser chert and minor BIF bands.

Tertiary and quaternary colluvium / alluvium (detritals) extend over much of the area, occasionally forming economic deposits when present in significant enough grades and

volumes. Weathering has produced a widespread regolith profile over the iron rich bedrock. A significant hydrated zone or hardcap is present, commonly 20 - 50m thick but reaches to +100m in places.

Mineral waste generated at West Angelas is subsequently categorised with respect to the geological origins of the material, namely:

- detritals;
- hydrated;
- Nammuldi Member;
- MacLeod Member;
- Mt Newman Member;
- Wittenoom dolomite; and
- West Angelas shale

11.2.2 Physical characteristics

The erodibility potential of waste types at West Angelas was assessed using a combination of site-specific geophysical test work and extrapolation from equivalent material at similar sites. Table 5 lists the waste material types by erodibility class and percentage of total mineral waste predicted to be generated by closure.

Table 5: Waste material erodibility characterisation

Waste material type	Erodibility	Percent total waste
Detritals	High	48%
Hydrated	Low	16%
Nammuldi Member	Low	<1%
MacLeod Member	Low	3%
Mt Newman Member	Low	14%
Wittenoom dolomite	High	11%
West Angelas shale	High	7%

The average bulk density of waste material is 2.5t/m^3 and loose material density of 2.02t/m^3 (Deposit A) to 2.06t/m^3 (Deposit B) with a physical swell factor (from in ground to on waste dump) of 1.25 used for volume calculations.

11.2.3 Geochemistry

Rio Tinto Iron Ore group has undertaken an extensive program of geochemical testing, over several years, to understand the potential for acidification and/ or metal enrichment to occur as a result of the various waste types common to mining operations in the Pilbara. The geochemical characterisation process aims to establish sulphur content, as an indicator of acid generation potential, and to undertake static (acid base accounting) and, if appropriate, kinetic testing of materials. This information is applied to the geological block model and subsequent mining model, to ensure materials with potential geochemical issues are identified prior to mining and managed, in accordance with the Rio Tinto Iron Ore (WA) Mineral Waste Management Work Practice and Spontaneous Combustion and Acid Rock Drainage (SCARD) Management Plan.

The most significant geochemical risk in Pilbara iron ore bodies is associated with sulphides, such as pyrite (FeS_2), which can form sulphuric acid when exposed to oxygen and water. Mt McRae Shale, the geological unit most commonly associated with pyrite and acid mine drainage in the Pilbara, is not present at West Angelas. However, pyrite can also occur in Banded Iron Formations. Other sulphate minerals present at the site, such as alunite and jarosite, can also pose a geochemical risk, albeit the risk is usually lower due to self-limiting chemical processes.

Over 150 samples from the Greater West Angelas deposits (ore and waste samples) have been submitted for Acid Base Accounting (ABA) and geochemical characterisation. For lithologies such as banded iron formation (BIF) and detrital rock types, a value of 0.3% total sulphur concentration has been adopted as the boundary value to denote

potentially acid forming (PAF) material from inert/non-acid forming (NAF) material. Samples associated with elevated-sulphate (where sulphur values may range from 0.1% to greater than 1%) have been classified as PAF-LC. A sulphur cut-off of both 0.1% and 0.3% are considered for the purpose of characterisation.

To date, approximately 82% of the samples submitted for ABA were classified as non-acid forming (NAF). Approximately seven percent of the samples submitted for ABA were classified as Uncertain and were expected to be NAF. The remaining 11% of samples were classified as potentially acid forming (PAF) or PAF in a low capacity (PAF-LC).

The potentially acid forming (PAF) samples are predominately from the Newman Member of the Marra Mamba Iron Formation. These samples are banded iron formation waste samples and the majority had visible pyrite logged. The PAF-LC samples are expected to have few sulphides present with the majority of the acid produced from the precipitation of metallic ions as hydroxides between pH 4.5 and 7.

Further analysis of sulphur values was undertaken on those rock types identified with acid-forming potential (and any related metalliferous drainage). The risk posed by the high sulphur values is determined by comparing the occurrence of sulphur levels greater than 0.1% and 0.3% against the total number of recorded drill samples for all in-pit (waste and ore) samples. These results, summarised in Table 6, suggest the risk of acid drainage being generated during the operation and / or from mineral waste materials from all deposits is low.

Table 6: Acid-forming potential risk based on sulphur values.

Deposit	Sulphur levels greater than 0.1%	Sulphur levels greater than 0.3 %	AMD Risk
Deposit A	2.9 %	0.3 %	Low
Deposit E	1.7 %	0.2 %	Low
Deposit B	7.0 %	0.2 %	Low
Deposit F	1.3 %	0.1 %	Low
Deposit A West	1.1 %	0.1 %	Low

A multi-element analysis was also undertaken for all drillhole samples taken from Deposits A, B, E, F and A West. Results showed that most rock types are either enriched or elevated in Fe, as correlated with the iron mineralisation associated with the ore body. Arsenic is enriched in most rock types while tin is either enriched or elevated. Other elements found to be enriched in select geological units included calcrete and dolerite from Deposit F with lead elevated, Wittenoom Formation from Deposit D with elevated levels of manganese, and waste from Deposit B, E and A West with elevated of manganese, Nammuldi Waste from Deposit B with elevated manganese.

An analysis comparing the triggers against the medium concentration of select elements in each rock type indicates that:

- All rock types have average element values lower than DEC/EPA triggers for barium and phosphorus;
- The majority of rock types have elevated mean concentrations of manganese and vanadium;
- Lead levels are relatively high in Deposit E and F; and
- Zinc levels are relatively high in Deposit B.

In general, whilst concentrations of some trace elements of potential environmental concern (e.g. arsenic, lead) were enriched or elevated in some of the sampled ore and waste materials, these elements will not necessarily mobilise into groundwater. Arsenic in particular is commonly enriched in ore and waste for many Hamersley Group deposits. Iron oxy-hydroxides such as hematite and magnetite have high sorption capacities for arsenic. Groundwater contamination with arsenic is considered to be unlikely, based on historical groundwater assessments at West Angelas and experience from similar deposits in the Pilbara. Lead is similarly unlikely to mobilise into the groundwater and cause any environmental concern. These results suggest groundwater monitoring should initially include the following elements: Fe, As, Sn, Co, Cr, Cu, Mn, Ni, Pb and Zn.

11.2.4 Fibrous minerals

Fibrous minerals present a health hazard if fibres of a respirable size (approximately 6 microns) become airborne and are inhaled. The most common mineral associated with fibrous minerals encountered within the iron formations present at West Angelas is riebeckite. Riebeckite is usually found in fresh, unweathered BIF. The asbestiform variety of riebeckite is crocidolite or blue asbestos. The presence of riebeckite does not necessarily pose a fibrous mineral risk but it is a precursor to crocidolite, therefore, there is a higher probability of encountering crocidolite. If it is present, crocidolite seams occur primarily within the Newman Member close to, and often overlapping into the contact between the Newman Member and the underlying Macleod Member; although crocidolite can be found anywhere within the Marra Mamba Formation where iron ore mineralisation has not occurred.

Isolated occurrences of potentially hazardous fibrous material have been intersected during geological sampling and in the upper most benches of some deposits. The Rio Tinto Iron Ore (WA) Fibrous Minerals Management Plan and West Angelas Operations Fibrous Mineral Management Plan describe and provide guidelines for the management of fibrous minerals encountered during mine production, such as the encapsulation of intersected fibrous mineral waste in 2m thickness of non-fibrous mineral waste.

The small volume of potentially fibrous material that has been mined to date has been encapsulated in the Deposit A North waste dump. Similarly, fibrous material exposed in the WEPN final pit wall has since been backfilled, and poses no risk to closure. Similarly, fibrous materials excavated during the construction if the rail loop have been appropriately disposed within nominated fibrous materials burial areas.

No Potentially Hazardous or Designated Hazardous areas are demarcated in pit walls that will form the West Angelas post-mining landform and no geological units identified with a high risk of containing potentially fibrous materials are proposed to be mined in the future.

11.2.5 Waste materials inventory

Mineral waste dumps were initially established outside the active mining areas. As mining progressed, mineral waste has been progressively returned to the mine void in the form of in pit backfill (to prevent post-closure exposure of the groundwater table) and internal waste dumps, some of which will join and rise above the natural topography. Table 7 lists the waste dumps that are expected to be present at the site and require rehabilitation on closure.

Waste material is managed on site through the selective placement of highly erodible material in pit or towards the centre of waste dumps where possible. As a consequence of the mine sequencing and waste material management, the waste material types that are present on the outside of the dump do not necessarily reflect the average or largest percentage of waste material type, however the waste characteristics of the materials expected to be present on the outside of the waste dump are used to guide the waste dump design.

Table 7 lists the waste dump ‘tip to’ design criteria used for the construction of existing waste dumps that will subsequently have the rehabilitation designs applied to them. These design criteria were developed in consideration of the Rio Tinto Iron Ore (WA) Landform Design Guidelines, which outlines a process for developing waste dump designs that take into account both the specific mineral wastes present in each dump, and the climatic conditions present at the site, as well as:

- location, including in pit disposal / backfill and surface water considerations;
- maximum dump height and footprint constraints;
- shape of waste dump, preferably to minimise surface area to volume ratio;
- final landform slope criteria (lift height, slope angle, minimum berm width);
- supplementary measures e.g. surface treatment for dispersive materials; and
- shaping of options for the top of the waste dump.

Design criteria for waste dumps at Deposits F and A West will be updated as the understanding of the waste material scheduling develops and the designs are finalised.

Table 7: Inventory of waste dumps located external to the pit.

Waste dump	Batter slope angle (degrees)	Lift height (m)	Berm width (m)	Comments
Deposit A North	37	20	68.4	
Deposit A WEP	37	20	68.4	
Deposit A South	37	10 / 15 / 20	34.2 / 51.4 / 68.4	
Deposit B Western	37	20	48.4	Waste management will focus on dumping competent materials on the outer edge of the waste dump
Deposit B Eastern	37	20	48.4	
Deposit B Long term low grade	37	20	10	No rehabilitation design is available for this longer term stockpile.
Deposit E East dump	37	20	34.2	Material may be less competent that desired.
Deposit E Sth Dump 1	37	20	34.2	Backfill source
Deposit E Sth Dump 2	37	20	34.2	Backfill source

It should be noted that some in-pit waste dumps at Deposit B may extend above the pit crest during operations. This material is expected to be used to backfill the pit post-closure, and thus waste dump designs for these locations have not been created to facilitate rehabilitation.

The rehabilitation designs are discussed in Section 16.

11.3 Soil

11.3.1 Local soils

The dominant soil types covering the project area are shallow coherent and porous loamy soils with weak pedologic development.

In the hills and rock ridges, which represent the surface expression of the Marra Mamba Iron Formation, extensive areas without soil cover occur. Those soils that do occur are shallow and skeletal. Rocks of this Formation weather very slowly, and any soil which does form tends to be transported into the surrounding valleys and plains as a result of the sparse vegetation cover and erosion force of heavy rains derived from thunderstorms and cyclones.

The soils on slopes, although having had more time to develop than the soils of the adjacent ridges, are still influenced by the parent rock and may be shallow and stony sands or loams. These soils are generally unfavourable for plant growth due to low moisture holding capacity and poor nutrient status.

On pediments, older pediplains and alluvial plains, hard alkaline red loamy soils tend to be dominant, and may be considered as the regional mature soil type. The surface of these areas may carry a layer of small gravel, which is derived from the more resistant rocks in the area.

11.3.2 Soil recovery

The availability of topsoil significantly improves the potential for rehabilitation success. At West Angelas, like many sites in the Pilbara, the naturally shallow or rocky soil, topography can make it difficult to recover the quantities of topsoil required to successfully rehabilitate all of the disturbed areas.

The Rio Tinto iron ore Soil Resource Management Work Practice provides guidance on soil collection and appropriate management during the operation of the mine. The procedure aims to maximise topsoil recovery and retaining soil viability and productivity to improve future success of rehabilitation programs. This is accomplished by:

- collecting more than the minimum 200mm mandated quantity of topsoil when available;
- collection of subsoil to 600mm;
- collecting additional subsoil where practicable / available;
- maintaining a soil inventory; and
- regularly reconciling the available and project soil requirements to the projected life of mine disturbance areas.

11.3.3 Soil inventory

A soil inventory for West Angelas is provided in Table 8 based on predicted soil recovery and requirements for 200mm of soil to be returned to rehabilitate disturbed mine areas (e.g. infrastructure areas, haul roads and waste dumps) excluding mine voids. The majority of the infrastructure at the site is located at Deposit A, resulting in the higher disturbance footprint and subsequent higher soil requirements.

As shown in Table 8, there is predicated to be sufficient topsoil for Deposit B, E, F and A West. However top soil may need to be transfer from other deposit area to support the decommissioning related rehabilitation activities at Deposit A.

Table 8: Indicative soil balance

Soil required (m^3)	Current soil stockpile (m^3)	Estimated soil from future disturbance (m3)	Estimated surplus [+] or deficit [-] (m3)
6,600,000	2,300,000	5,600,000 (top soil only)	+1,300,000 [surplus]

Soil required by deposit (m^3)		Estimated soil recovery from future disturbance (m^3)	
Deposit A	3,700,000	0	0
Deposit B	900,000	2,300,000 (topsoil)	7,000,000 (subsoil)
Deposit E	800,000	1,300,000 (topsoil)	4,000,000 (subsoil)
Deposit A West	500,000	1,000,000 (topsoil)	4,000,000 (subsoil)
Deposit F	700,000	1,000,000 (topsoil)	4,000,000 (subsoil)

11.4 Geotechnical information

11.4.1 Pit wall design

Rio Tinto constructs pits to achieve conservative geotechnical factors of safety (Table 9). Whilst these do not safeguard against post-closure pit wall collapse, they do mitigate such risks.

Table 9: Rio Rinto geotechnical factor of safety design standards

Zone	Geotechnical factor of safety
Single batters	1.1
Interramps	1.2
Overall wall / ramps	1.3
Walls which abut critical infrastructure	1.5

11.4.2 Zones of geotechnical instability around pits

Preliminary zones of geotechnical instability have been identified around all of the pits covered in the scope of this closure plan. Methodology is based on the angle method described in DMP abandonment bund guideline[14], using the conservative assumption that all pit walls are embedded into weathered rock (i.e. the polygons are lines drawn at a 25º angle from the base of the pit). Further geotechnical evaluation is being undertaken, and may result in a reduction of the current polygons. These are shown in Figure 7 – Figure 11.

The Deposit A South Dump (Figure 7) and Deposit E South Dump (Figure 8) have minor intersections with the preliminary zone of instability defined by the default method prescribed by the DMP. However, it should be noted that:

- the zone of instability polygons may reduce in size following the outcomes of geotechnical evaluation; and
- waste material that is stored within these dumps will be utilized to backfill pits to a level that prevents the formation of pit lakes, and the dumps can therefore be reshaped if required to ensure that they are fully outside of the defined zone.

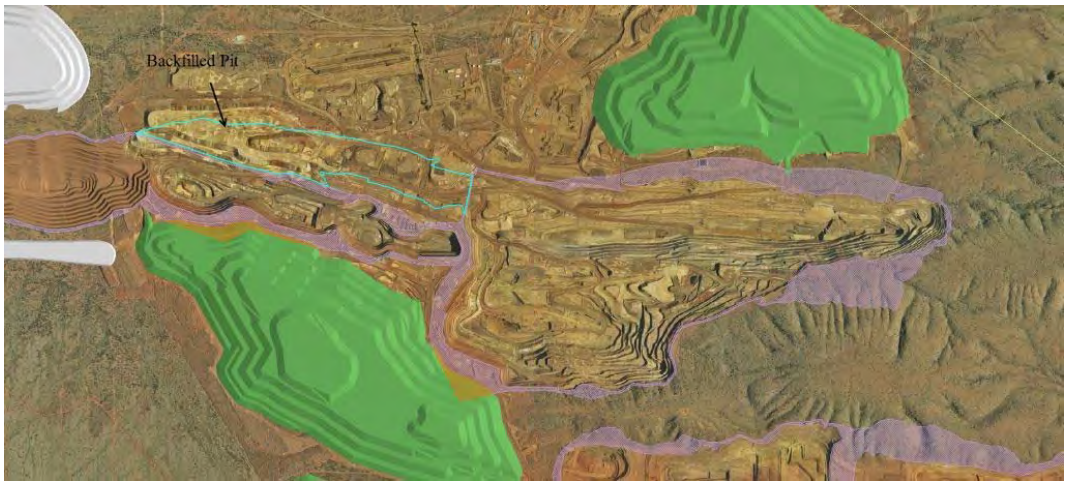

Figure 7: Zone of geotechnical instability around Deposit A

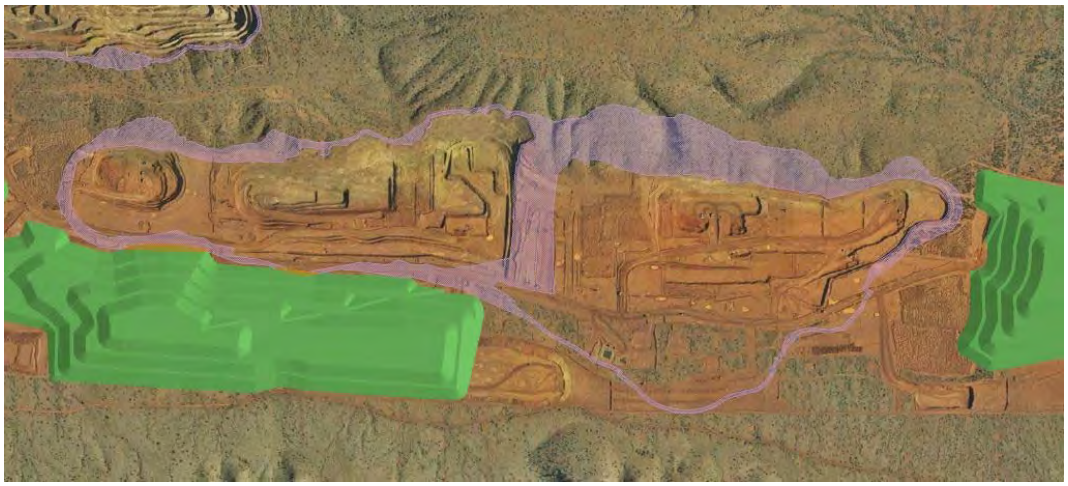

Figure 8: Zone of geotechnical instability around Deposit E

[14] Department of Industry and Resources (now DMP), *Safety Bund Walls Around Abandoned Open Pit Mines,* December 1997

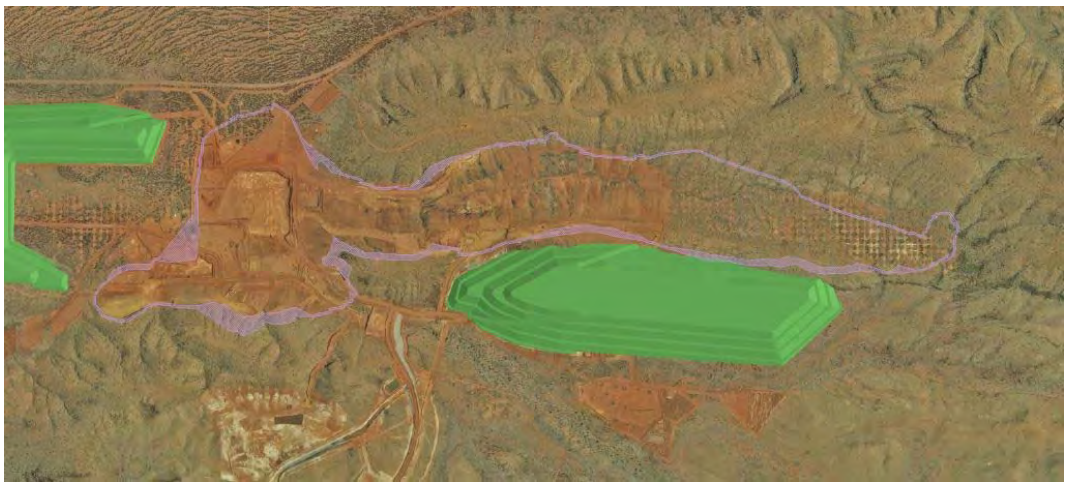

Figure 9: Zone of geotechnical instability around Deposit B

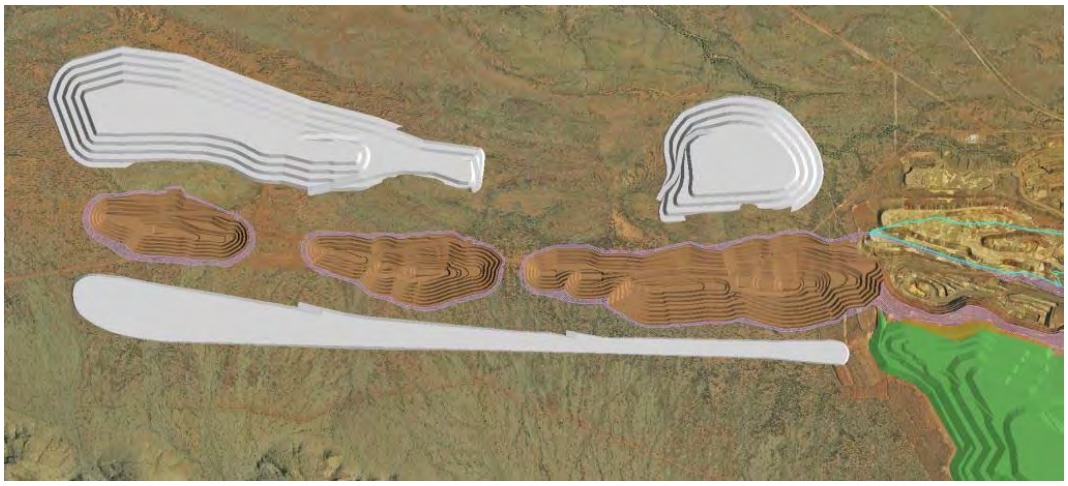

Figure 10: Zone of geotechnical instability around Deposit A West

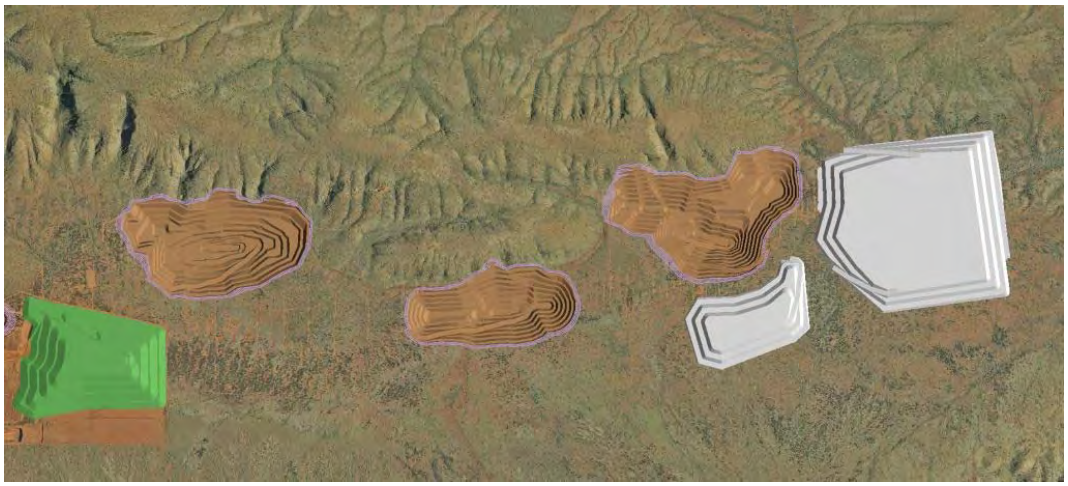

Figure 11: Zone of geotechnical instability around Deposit F

11.5 Site contamination

An internal contaminated sites register is maintained for West Angelas. Twenty-one locations have been identified, predominantly consisting of low level and localised hydrocarbon contamination. None of these locations has been assessed to trigger the threshold for reporting under the *Contaminated Sites Act 2003*.

12. Water

12.1 Surface water

West Angelas lies in the upper catchment of the Turee Creek East branch[15] (Figure 12), a highly ephemeral tributary of the Ashburton River. The upper catchment has a complex drainage pattern characterised by intermittent flow and infrequent wide-spread flooding, depending on the occurrence of high rainfall events.

The surface hydrology is dominated by small sub-catchments and small first-order streams that traverse the deposits. There are few well-defined creek channels and no permanent water bodies in the local area. Mining activities have terminated most of the flows through the Deposit A, E and F area, including a small catchment area of approximately 15km^2 that will be terminated and / or the drainage modified as part of the Deposit F mining activities.

Flows from an unnamed creek that crossed Deposit B prior to mining have been permanently diverted to a neighbouring catchment. It is expected that this diversion will remain at closure.

12.2 Groundwater

The primary aquifer identified at West Angelas comprises the mineralised Mount Newman Member of the Marra Mamba Iron Formation (MMIF) and where mineralisation or weathering has occurred, the overlying Wittenoom Formation. The basal MMIF (MacLeod and Nammuldi Members) form an effective hydraulic barrier to groundwater flow. The depth to groundwater is relatively deep with groundwater flow from east to west with a relatively flat lying gradient.

Groundwater quality at Deposit A is typically slightly alkaline to neutral with pH values ranging from 7.4 to 8.2 and salinity values ranging from 490 to 820 mg/l.

Water recover is expected to begin immediately after dewatering activities are stopped. Recharge will be dominated by direct rainfall infiltration and, due to the naturally deep water table and low permeability Tertiary overburden, outside of the mine voids recharge is assumed to be very low. Predicted water recovery levels and the approximate time to recovery are listed in Table 10[16]. The difference in groundwater recovery rates and levels within deposits reflect the interaction between recharge and groundwater movement controlled by the complex folded nature of the geology (e.g. limited groundwater connectivity in “bathtub” or “bowl / pocket” structures at Deposit A and Deposit B1 pits respectively).

Final water levels are expected to be slightly lower than pre-mining levels. The catchment created by the mine void will serve to focus rainfall runoff and thus recharge, resulting in localised ponding at the base of the mine voids following heavy rainfall, which will dissipate via infiltration and evaporation shortly after the event.

Table 10: Predicted groundwater level and approximate time to recovery.

Deposit	Pre-mining level (mAHD)	Recovery level (mAHD)	Time (years)
Deposit A CEPS	640	630	30
Deposit A CEPN	660	+610	>100
Deposit B B2 & B3	630	626	20
Deposit B B1	630	607	>100
Deposit E	668	650	>100

[15] With the exception of Deposit F which straddles the catchment divide between Turee Creek and Weeli Wolli Creek.

[16] Where groundwater recovery is predicted to take more than 100 years, the recovery level after 100 years is provided. Recovery levels are based on the continuation of current climate conditions.

12.3 Turee B borefield

The Turee B borefield abstracts water from a hydrated limonitic / goethitic hardcap (pisolite) and the underlying fractured bedrock (Brockman, Weeli Wolli, Wongara and Boolgeeda Formations and the Turee Creek Shale). The borefield is extensively monitored, in accordance with its license operating conditions, and based on the water levels recorded, groundwater chemistry and the results of a tree stress programme, there is no data to suggest the aquifer and its surrounds are being adversely impacted by the current amount of abstraction. As water demand from the Turee B borefield is not expected to increase over the life of the mine, decommissioning of the borefield is the only rehabilitation requirements anticipated on closure.

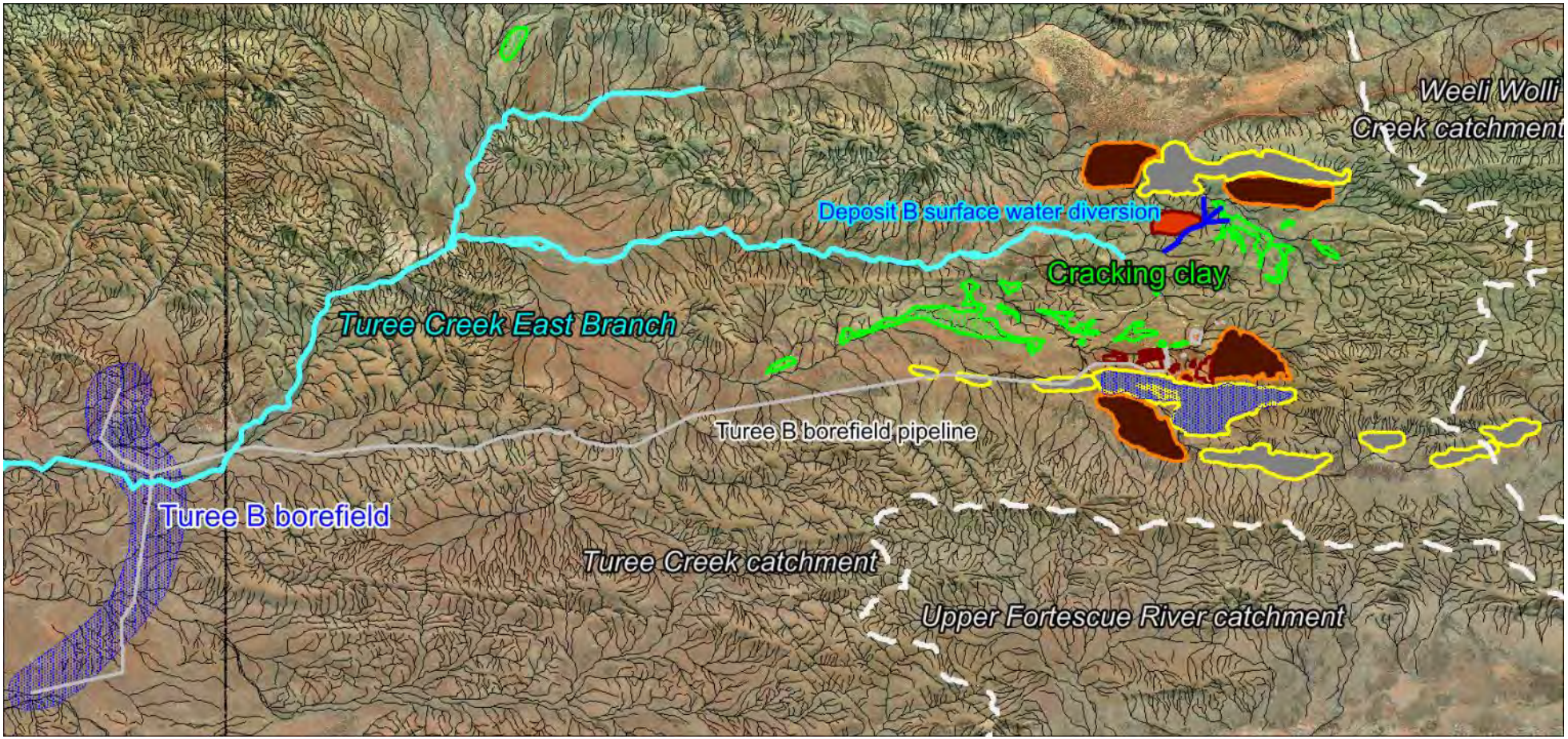

Figure 12: Creek and associated drainage network at West Angelas. The distribution of the cracking clay priority ecological community is highlighted in green, for reference. (Waste dumps still undergoing design reviews at Deposits E, F and A west are not shown in this figure.)

13. Biodiversity

Rio Tinto Iron Ore undertakes regular surveys at established reference sites throughout the life of its mines to ascertain temporal differences in vegetation composition and faunal distribution in reference sites across the Pilbara.

It is recognised that West Angelas has a great diversity of habitats and flora for its size because of a variety of relief and geological types. However, the conservation status of flora and fauna species, populations and fauna habitat is not expected to be impacted by the mining activities at West Angelas.

Baseline surveys undertaken at West Angelas and the surrounding environment, prior to and during mining, include (as captured in Appendix B Closure knowledge database):

- terrestrial vegetation and flora; and
- terrestrial and subterranean fauna (including Short-Range Endemic (SRE) invertebrates, troglofauna and stygofauna).

This data has been used to identify biodiversity / ecosystem values of relevance to the closure of West Angelas and inform the rehabilitation process.

13.1 Habitat

A habitat is made up of physical factors such as soil, moisture, range of temperature, shelter and availability of light as well as biotic factors such as vegetation, availability of food and the presence of predators. Habitats provide a simple method of dividing the land into areas with common characteristics.

The biodiversity significance of a habitat may subsequently be measured in terms of the range of habitat types, habitat coverage or with respect to the diversity or rarity of species within the individual habitats. Similarly, the consequence of mining may be strategically assessed through an understanding of the relative magnitude of habitat loss, linkage between habitats and / or the anticipated changes as a consequence on introducing of new habitat.

Eight broad habitat types were mapped at West Angelas prior to mining. Characteristics of these habitat types are provided in Table 11 and include:

- Hill habitats including,
  - hilltop, hillslope, ridge or cliff;
  - mesa top; and
  - major gorge and gully;
- Valley habitats including,
  - footslope or plain;
  - acacia woodland;
  - mulga woodland – these areas are considered to be environmentally sensitive areas; and
  - cracking clay – these areas are considered to be priority ecological communities;
- Drainage habitats: creek.

Plain, hilltop and acacia woodland are the dominant habitat types in the area. All of the habitat types are expected to be present in the environment, immediately outside the disturbance areas, on closure.

Of the habitat types, hilltop, gully, cracking clay and creek habitats are of high value due to the diversity of microhabitats and potential to support conservation significant fauna species. Mesa top and mulga woodland habitat is considered to have moderate habitat value due to the specialty habitat or number of fauna that may utilise the area, while plain and acacia woodland have the lowest value. In contrast, cleared habitat, created through mine disturbance, provides little food, shelter, water or any other life essential and is considered to have little to no habitat value.

Re-introduction of fauna is not considered as part of this closure plan. Instead, natural migration of fauna species into rehabilitated land is encouraged by creating habitats with similar composition to pre-mining communities in appropriate locations and with consideration of the post-closure soil and landforms design.

Habitat elements that are considered as part of the closure landform design include:

- vegetation known to provide preferred food or shelter preference;
- retaining and replacing woody debris;
- rapid generation and retention of leaf litter using small-scale topography (e.g. furrows created from ripping);
- introducing or leaving rocky features such as oversized waste burden or scree slopes;
- creating greater depths of friable soil (or suitable mineral wastes) for burrowing fauna;
- preserving connectivity with unmined areas, and maintaining the quality of these habitats; and
- managing feral predators and herbivores across both reference and rehabilitated areas.

Table 11: Habitats at West Angelas.

Type	Basic description
Hill habitats	
Hilltop	Hills, ridges, plateaux remnants, gorges and breakaways of varied geological origin. Soil is generally skeletal sandy clay loams with greater than 80% stony detrital material. Under natural conditions this habitat zone is characterised by a scattered overstorey of Snappy gum *Eucalyptus leucophloia* and mulga (*Acacia aneura* complex) isolated trees over sparse shrubland of a combination or selection of *Senna artemisioides* subsp. *artemisioides, S. artemisioides* subsp. *filifolia, Ptilotus rotundifolius, Tribulus suberosus, Eremophila fraseri* and *Acacia ancistrocarpa* sparse shrubland to isolated shrubs over *Triodia pungens* hummock grassland. Rocky, sheltered ridges and breakaways provide a suite of specialist plants or species more typical of lowlands. This habitat creates a diverse array of microhabitats and refugia. The habitat often contains rock shelters in the form of overhangs, cracks, crevices, caves and areas for water to pool during the wet season. Vegetation provides microhabitats in the form of logs, debris and hollows. This habitat zone will be present in undisturbed areas of the mine and may evolve around the edge of the disturbed mine area especially where the pit shell intersects local hills after erosion processes occur. However the characteristics of this habitat are not compatible with the closure landform is unlikely to be restored or introduced as part of the rehabilitation activities.
Mesa top	Mesa top habitat is distinguished by its elevated plateau topography. This habitat is characterised by *Eucalyptus leucophloia, E. gamophylla, Acacia pruinocarpa* and mulga (*A. aneura* complex) open woodland to sparse trees, over *A. maitlandii, A. hamersleyensis, Keraudrenia velutina* and *Senna glutinosa* subsp. *glutinosa* open shrubland, over *Triodia pungens, T. longifolia* and/or *T. wiseana* open hummock grassland This habitat is characterised by a low diversity due to the elevation and therefore the isolation from accessible surrounding habitats. However, invertebrate fauna can be quite diverse and specialised as a result of this isolation. This habitat zone will not be substantially disturbed by mining activities and will be present in undisturbed areas to the east of Deposit B. The characteristics of this habitat are not compatible with the closure landform is unlikely to be restored or rehabilitated as part of the rehabilitation activities.
Major gorge	Very steep topography with an irregular surface with little exposed soil. The soil, when available, is sandy to sandy-clay. This habitat commonly includes *Acacia aptaneura* open woodland over *Ptilotus obovatus* isolated shrubs over *Themeda triandra* and *Eriachne* sp. open tussock grassland and *Triodia pungens* isolated hummock grasses. *Astrotricha hamptonii, Ficus brachyopoda* and *Cyperus cunninghamii* are species found only in the major gorge are considered descriptive of this habitat type, although not dominant. This habitat creates a diverse array of microhabitats and refugia. The habitat often contains rock shelters in the form of overhangs, cracks, crevices, caves and areas for water to pool during the wet season. Vegetation provides microhabitats in the form of logs, debris and hollows. This habitat zone will be present in undisturbed areas of the mine. The characteristics of this habitat are not compatible with the closure landform is unlikely to be restored or rehabilitated as part of the rehabilitation activities.

Type	Basic description
Valley habitats	
Plains	Low and occasionally slightly undulating alluvial plains including outwash areas and broad drainage basins. Under natural conditions soils often consisting of sandy-clay soils covered by rocky lag gravel. The habitat is characterised by *Eucalyptus leucophloia, E. gamophylla, Corymbia hamersleyana, A. pruinocarpa, A inaequilatera* and species in the *A. aneura* complex open woodland to sparse trees over *Acacia* spp.*, Eremophila* spp., *Ptilotus* spp., *Senna* spp. and *Solanum lasiophyllum* open shrubland over *Triodia* spp. open hummock grassland. The habitat includes minor drainage lines, where *T. longifolia, Gossypium robinsonii and Acacia ancistrocarpa* are characteristic. This habitat type contains limited microhabitats with the dominant Acacia species providing no tree hollows, few logs, limited leaf litter and sparse vegetation. SRE invertebrate species usually comprise mygalomorph (trapdoor) spiders, scorpions, pseudoscorpions and isopods. Most SRE invertebrates prefer the southern footslopes where sun exposure is reduced and the level of moisture under shrubs and trees is increased. This habitat zone will be present in undisturbed areas of the lease. Characteristics of this habitat may be suitable for rehabilitation planning and could be considered where there is the opportunity for deep soils to develop, i.e. on waste dumps.
Acacia woodland	Flat with no or very small drainage channels, under natural conditions soils often consist of a clay loam with continuous layers of small ironstone pebbles on the surface. The habitat is characterised by open to medium dense woodland with a tree stratum of mulga (*Acacia aneura* complex) and scattered *Acacia pruinocarpa*, over *Acacia maitlandii* and *Ptilotus* sp. sparse shrubland, over *Triodia wiseana* and *T. pungens* open hummock grassland dominated the mixed *Acacia* woodland habitat. Similar to the plains habitat, this habitat type contains limited microhabitats with the dominant Acacia species providing no tree hollows, few logs, limited leaf litter and sparse vegetation. However, avifauna is most diverse after significant rainfall, and when acacia shrubs and trees are flowering. This habitat zone will be present in undisturbed areas of the lease. Characteristics of this habitat may be suitable for rehabilitation planning and could be considered on flat areas that sustained mixed acacia woodland vegetation prior to disturbance.
Mulga woodland	Flat areas dominated by overland surface water flows, rather than concentrated flow along drainage lines, following very heavy rainfall. Soils are typically comprised of sandy-clay with no rocks. This habitat consists of both groved and banded mulga, where different species of the *Acacia aneura* complex were present in a closed woodland, over *Ptilotus obovatus* and juvenile mulga trees sparse shrubland, over *Maireana* sp. and *Salsola australis* isolated herbs and *Aristida* sp. and *Cymbopogon obtectus* isolated tussock grasses creating distinct micro-habitats that include dense leaf litter and shaded zones. Similar to the acacia woodlands habitat, this habitat type contains limited microhabitats with the dominant Acacia species providing no tree hollows, few logs, limited leaf litter and sparse vegetation. Avifauna is most diverse after significant rainfall, and when acacia shrubs and trees are flowering. This habitat zone will be present in undisturbed areas of the lease. Characteristics of this habitat may be suitable for rehabilitation planning and could be considered on flat areas that sustained mulga woodland vegetation prior to disturbance.

Type	Basic description
Cracking clay	Characterised by sand-clay to clay soils with an undulating surface caused by crabholes and gilgai. Rocks and pebbles were very rare and when present, the rock type was consistently ironstone. This habitat supports very few trees or tall shrubs and is characterised by open and sparse low vegetation with approximately half of its area being bare ground. Isolated shrubs of *Salsola australis, Boerhavia paludosa* and *Ptilotus nobilis* subsp. *nobilis* were present over open tussock grassland of *Aristida* sp., *Brachyachne* sp. and *Astrebla pectinata.* This habitat is identified as Priority 1 ecological community due to its restricted distribution across the Pilbara, and contains species which are both rare and edaphically restricted (i.e. distribution is influenced by the soil rather than by the climate). This habitat zone will be protected as far as practicable during mining activities and will be present in undisturbed areas to the north of Deposit A West and south of Deposit B. The soil profile required to restore this habitat is not compatible with the closure landform; although, following further investigation, opportunities may exist to establish a community in an appropriate locations by relocating habitat scheduled to be destroyed (e.g. areas under Deposit B waste dumps).
Drainage habitats	
Creek	A linear habitat characterised by regular surface water flows, defined banks and associated riparian vegetation corridor. The creek habitat includes areas that are periodically flooded due to high surface water flow volumes (floodplains). Vegetation is characterised by open woodland of *Eucalypts victrix, Acacia citrinoviridis* and *Acacia aptaneura*, over *Senna artemisioides* subsp. *oligophylla*, *Rhagodia eremaea*, *Ptilotus obovatus*, *Tephrosia rosea* and Malvaceae spp. shrubland over *Themeda triandra* and *Bothriochloa* sp. sparse tussock grasses and/or *Triodia pungens* sparse hummock grasses. Creek habitats act as wildlife corridors that help flora and fauna disperse across the landscape. There is a high diversity of microhabitats including logs, debris, tree hollows and soft soils, as well as temporary and permanent pools. This habitat zone will be present in undisturbed areas outside of the mine. Disturbed creek habitat, i.e. access roads that cross creeks and discharge related infrastructure, will be rehabilitated with the aim of returning the land to functional creek habitat.

13.2 Fauna

13.2.1 Priority fauna

Species have been identified as present at or near West Angelas and have biodiversity value because of their rare and / or threatened status, as listed in Table 12. Invertebrate fauna potentially harbouring short-range endemics were also recorded. These include mygalomorph and araneomorph spiders, centipedes, pseudoscorpions and scorpions.

The Grey Honeyeater (*Conopophila whitei*) and the Ghost Bat (*Macroderma gigas*) are identified as Specially Protected Fauna. These species are managed through the operations environmental management plan with the aim of minimising disturbance of their habitat. No further management is proposed as part of this closure plan.

Table 11 and Table 12 suggest species associated with plains and acacia woodlands habitats have the potential to benefit from the rehabilitation of mine, as a consequence of returned or expanded habitat post-closure.

13.2.2 Subterranean fauna

Subterranean fauna are animals that inhabit underground habitats and include:

- stygofauna - obligate, groundwater dwelling aquatic fauna,
  - including occasional hyporheos stygophiles, i.e. the larvae of aquatic insects, are species considered to be either restricted to the hyporheic zone, the region beneath and alongside a stream bed where there is mixing of shallow groundwater and / or surface water, and
- troglofauna - obligate, subterranean dwelling fauna occurring in the unsaturated profile above the water table.

Stygofauna and troglofauna are known to occur in a range of habitats in the Pilbara region, but can potentially have restricted distributions based on their evolutionary history and specialised habitat requirements. Regional sampling at West Angelas has indicated the presence of a high density and diversity of stygofauna in the area. However, the presence of stygofauna at the sampling locations is variable, with four out of seven sampling campaigns failed to detect the presence of stygofauna. Stygofauna have yet to be detected within active mining areas.

No troglofauna have been recorded.

Disturbance to subterranean fauna and their associated habitat during operations is not anticipated to be significant, such that no management of subterranean fauna is proposed as part of the closure plan.

13.2.3 Common species

Common fauna species that are considered to be important indicators of rehabilitation success, and therefore have biodiversity value, include:

- micro-organisms brought into rehabilitated areas within re-spread topsoils;
- invertebrates, especially ants and parasitic wasps; and
- vertebrates.

Invertebrates have a major role in the success of rehabilitation efforts because they facilitate a variety of ecosystem processes, such as litter decomposition and nutrient cycling, herbivory, seed dispersal, soil aeration and drainage, pollination and provision of a source of food for vertebrate predators. Invertebrates can be encouraged by providing areas of thick, widespread litter cover over part of the area, logs and standing dead wood.

Vertebrates are usually the last to recolonise, once complex vegetation assemblages and invertebrate prey are established.

Table 12: Significant fauna and its relationship to habitat across the West Angelas mine lease.

Fauna species	Conservation status WA	EPBC Act status	Habitat occurrence	Comments
Dasyurus hallucatus (northern quoll)	Schedule 1	Endangered	Gullies Disturbed	Habitat for this species is rocky ridgelines and rocky gorges.
Rhinonicteris aurantia (Pilbara orange leaf-nosed bat)	Schedule 1	Vulnerable	Gullies Hilltop	Recoded in three locations within 30km of the study. Caves near water provide suitable roosts.
Liasis olivaceus barroni (olive python)	Schedule 1	Vulnerable	All hill habitats	Widespread in rocky areas, showing a preference for rocky habitats near water, particularly rock pools
Falco hypoleucos (grey falcon)	Schedule 1	Vulnerable	Acacia woodland Mulga woodland All drainage habitats	Previously recorded close to area. Ranges across habitats in search of food. Prefers lightly wooded coastal and riverine plains.
Ramphotyphlops ganei	Priority 1	-	All habitats	Prefers moist gorges.
Underwoodisaurus seorsus (Pilbara barking gecko)	Priority 1	-	All hill habitats	Recorded in area. Prefers rocky gorges and rock piles.
Falco peregrinus (peregrine falcon)	Schedule 4	-	All habitats	Ranges across habitats in search of food
Leggadina lakedownensis (short-tailed mouse)	Priority 4	-	All	Recorded in area. Known to occur across all habitats, from sandy soils and cracking clays to stony ranges.
Pseudomys chapmani (western pebblemound mouse)	Priority 4	-	All hill habitats	Recorded in area. Habitat for this species is rocky, hummock grasslands, with little or no soil. The western pebble-mound mouse occupies burrows beneath mounds of pebbles. Mounds are most common on the spurs and lower slopes of ridges
Sminthopsis longicaudata (long-tailed dunnart)	Priority 4	-	All hill habitats	-
Macroderma gigas (ghost bat)	Priority 4	-	Gullies Hilltop	Located in caves near Deposit E and Deposit B. Roost in caves, rock piles and abandoned mines. Will travel 2 km from roost to hunt.
Ardeotis australis (Australian bustard)	Priority 4	-	Plains	Recorded in area. Habitat preferred by this species lightly wooded country next to daytime shelter of thickets or long grass.
Burhinus grallariuss (bush stone-curlew)	Priority 4	-	All valley habitat	Recorded in area. Habitat preferred by this species is tussock grassland, Triodia hummock grassland, grassy woodland and low shrublands
Conopophila whitei (grey honey-eater			Mulga woodlands	Potentially threatened due to the destruction of its mulga habitat at West Angelas

Fauna species	Conservation status WA	EPBC Act status	Habitat occurrence	Comments
Merops ornatus (rainbow bee eater)		Migratory	All valley habitats	Recorded in area. Found within open forests, woodlands and shrublands, and cleared areas. Open pit walls may be utilised to build nesting tunnels
Apus pacificus (fork-tailed swift)		Migratory	All drainage habitats	Recorded in areas. Nomadic, almost entirely aerial lifestyle over a variety of habitats; associated with storm fronts.

Table 13: Significant flora and its relationship to habitat across the West Angelas mine lease.

Flora taxon	Conservation status WA	Habitat comments
Lepidium catapycnon	Threatened	Skeletal soils. Hillsides
Brunonia sp. Long hairs (D.E. Symon 2440)	1	Along creeklines and floodplains in clay or sandy clay
Eragrostis sp. Mt Robinson (S. van Leeuwen 4109)	1	Red brown skeletal soils, ironstone. Steep slopes, summits
Eremophila sp. Hamersley Range (K. Walker KW 136) PN	1	Summit of hill, high in landscape, steep rock slopes and scree, skeletal brown-red soil over massive banded ironstone of the Brockman Iron Formation
Eremophila sp. West Angelas (S. van Leeuwen 4068)	1	High in landscape, summit of hill, gently undulating to steep terrain, skeletal red gritty soil over massive banded iron of the Brockman Iron Formation
Grevillea sp. Turee (J. Bull & G. Hopkinson ONS JJ 01.01) PN	1	Breakaways and scree slopes, orange-brown loam soils
Josephinia sp. Marandoo (M.E. Trudgen 1554)	1	Outer edge of creek vegetation. Soil: Orange-brown (terracotta) coloured clay-loam
Rhodanthe ascendens	1	Clay
Tetratheca fordiana	1	Shale pocket amongst ironstone
Teucrium pilbaranum	1	Crab hole plain in a river floodplain, margin of calcrete table
Vittadinia sp. Coondewanna Flats (S. van Leeuwen 4684)	1	Flat plain. Red sandy clay loam.
Aristida lazaridis	2	Sand or loam
Eremophila forrestii subsp. Pingandy (M.E. Trudgen 2662)	2	Flat terrain, low in landscape, base of broad valley, stony gibber plain above shallow drainage line, red clay loam
Euphorbia clementii	2	Sandplains, gravelly hillsides, stony grounds
Hibiscus sp. Gurinbiddy Range (M.E. Trudgen MET 15708) PN	2	Near summit of hill, high in landscape, skeletal red brown stony soil over massive ironstone of the Brockman Iron Formation

Flora taxon	Conservation status WA	Habitat comments
Oxalis sp. Pilbara (M.E. Trudgen 12725)	2	Gully. Brown red loam, cobbles and pebbles
Pilbara trudgenii	2	Skeletal, red stony soil over ironstone. Hill summits, steep slopes, screes, cliff faces
Spartothamnella *puberula*	2	Rocky loam, sandy or skeletal soils, clay. Sandplains, hills
Acacia effusa	3	Stony red loam. Scree slopes of low ranges
Acacia aff. *subtiliformis*	3	On rocky calcrete plateaus
Dampiera metallorum	3	Rocky ledges and breakaways with loose scree material in lower section of plot.
Goodenia sp. East Pilbara (A.A. Mitchell PRP 727)	3	Red brown clay soil, calcrete pebbles. Low undulating plain, swampy plains
Indigofera sp. Gilesii (M.E. Trudgen 15869)	3	Pebbly loam amongst boulders & outcrops. Hills
Oldenlandia sp. Hamersley Station (A.A. Mitchell PRP 1479)	3	Cracking clay, basalt. Gently undulating plain with large surface rocks, flat crabholed plain
Olearia mucronata	3	Schistose hills, along drainage channels
Rhagodia sp. Hamersley (M. Trudgen 17794)	3	Broad plain at the base of hills (enclosed on all sides). Red brown clay/ loam. Ironstone pebbles
Rostellularia adscendens var. *latifolia*	3	Ironstone soils. Near creeks, rocky hills
Sida sp. Barlee Range (S. van Leeuwen 1642)	3	Skeletal red soils pockets. Steep slope.
Themeda sp. Hamersley Station (M.E. Trudgen 11431)	3	Red clay. Clay pan, grass plain
Triodia sp. Mt Ella (M.E. Trudgen 12739)	3	Light orange brown, pebbly loam. Amongst rocks & outcrops, gully slopes
Acacia bromilowiana	4	High in landscape, summit of hill and on steep slope, skeletal red gritty soil over massive basalt type rock
Goodenia nuda	4	Wide alluvial plain or creek beds. Red brown clay loam, ironstone.

13.3 Vegetation

13.3.1 Priority flora

Table 13 describes the Threatened and Priority flora that have been identified at or near the West Angelas operations and have biodiversity value because of their rare and / or threaten status.

The inclusion of rare and threatened species in rehabilitation programmes is limited by:

- habitat preference (preference for drainage lines, gullies, calcretes or other habitat not suitable or similar to those likely to be present in the rehabilitation landscapes);
- abundance – very few populations or small populations from which to source seed;
- difficult taxonomy / unresolved taxonomy issues and thus status of species highly uncertain; and / or
- growth form – e.g. short lived annual species with preference for growth under woodland canopies.

Other issues include the availability of seed at the time when rehabilitation occurs and seed dormancy.

In consideration of these issues, six species from Table 13 have been identified that could be considered in future rehabilitation programmes:

- *Acacia bromilowiana*;
- *Acacia subtiliformis;*
- *Grevillea* sp. Turee*;*
- *Indigofera* sp. Gilesii;
- *Sida* sp. Barlee Range; and
- *Themeda sp.* Hamersley Station (M.E. Trudgen 11431).

Propagation options for *Acacia bromilowiana* are under investigation to determine how to include this species in rehabilitation activities.

The suitability of *Acacia subtiliformis* for rehabilitation purposes is still under investigation. This species prefers flat areas near calcrete geology. These conditions may be limited within the closure landform.

Grevillea sp. Turee is suitable for rehabilitation on waste dumps, and could be easily integrated into rehabilitation activities. *Indigofera gilesii* subsp. *Gilesii* prefers broken rocks in areas where water may pond for short times, habitat characteristics that will also be common within the closure landform. Inclusion of *Grevillea sp. Turee* and *Indigofera gilesii* subsp. *Gilesii* are currently limited by seed collections issues due to the small populations present in the Pilbara.

Inclusion of *Sida* species Barlee Range is currently limited by seed collections issues and potential seed dormancy, but is otherwise expected to be suitable for revegetation in any habitat.

Themeda species Hamersley Station has a preference for heavy, clay soils. This restricts potential use of this species to areas with a high soil fine fraction. These conditions may develop in the closure landform in internally draining pit backfilled areas. However, conditions will need to be verified in the field, after landform shaping, to confirm suitability for rehabilitation purposes.

13.4 Progressive rehabilitation results

Land disturbed at West Angelas to date has been associated with mine pits for ore access, waste dumps and transport access and is at 65% of the total approved site disturbance at end of 2013. To date rehabilitation has been predominantly associated with construction laydown areas; borrow pits and tracks, which were cleared during the construction phase of the mine. A rehabilitation trial has been undertaken on two waste rock dumps in 2012 covering 7.5 ha. The rehabilitation trial is to confirm erodibility modelling outcomes that are to be used for future closure of waste dumps at Deposit A.

13.4.1 Borrow pits and rail loops

Rehabilitation at most of the West Angelas borrow pits and rail loop sites was undertaken between 2000 and 2003. Established monitoring transects include:

- Five borrow pits at the highway end of access road (Highway 1-5);
- Four rail loop rehabilitation areas (Rail Loop 1a, 1b, 2 and 3);
- Three borrow pits adjacent to the airstrip (Airstrip 1-3); and
- Three reference transects C7, C8 and C9.

The vegetation is well established (Figure 13), and in most cases sites compare favourably with one or more of the reference sites. Over half the species present in the rehabilitation sites were recorded in three reference sites. They include a range of perennial shrub and grass species. The absence of some species from rehabilitation may reflect pre-mining site differences as well as rehabilitation establishment and survival.

Other species were present in rehabilitation but not in reference sites. Likely reasons are the greater sampling effort in rehabilitation (i.e. more sites) and the increased presence of early colonizing species. The number of species in the rehabilitated sites is expected to increase with time through natural re-colonisation from surrounding areas.

All sites appear stable; and some sites may be nearing a stage where signoff could be considered.

Figure 13: Rehabilitation progress at Highway 3.

13.4.2 Waste dumps

Two waste dumps areas at Deposit A South waste dump (SouthWD) and North waste dump (EastWD) were rehabilitated in 2012. The South waste dump (Figure 14) area is a 6 ha portion of the lower lift, and North waste dump (Figure 15) area is a 1.5 ha section of the lower lift. Reference sites have been established in unmined areas that consist of similar vegetation, soil and terrain characteristics of the area to be rehabilitated.

Triodia species appear to be establishing well and in line with abundance recorded from reference sites. Rehabilitation between the sites is variable, with the flattest site recording the highest total plant numbers, spinifex establishment and cover of perennials.

Figure 14: Rehabilitation progress at Deposit A South waste dump (2013) 1 year after seeding.

Figure 15: Rehabilitation progress at Deposit A North waste dump (2013) 1 year after seeding.

14. Community

14.1 Cultural heritage

Note some social data used to inform closure decisions is gathered in confidence. This information remains confidential to Rio Tinto and the representative bodies, management committees and members of the relative interest groups. This information cannot be disclosed to any other person or organisation without the written permission of all of these

groups with the exception of State and Commonwealth agencies (e.g. Department of Aboriginal Affairs [DAA], EPA, DMP) for the purposes of demonstrating compliance with various regulatory and other requirements. Similarly some cultural heritage values information is not available to the general public and is unable to be released.

14.1.1 Relevant Aboriginal groups

The Yinhawangka (Gobawarrah Minduarra Yinhawanga) People and Ngarlawangga People are the traditional custodians of the land identified in this closure plan.

Yinhawangka is represented by Yamatji Marlpa Aboriginal Corporation (YMAC) for cultural heritage matters; Ngarlawangga is represented by Ngarlawangga Aboriginal Corporation assisted by Ngurra Barna Aboriginal Corporate Services. Members of these corporations are geographically dispersed with key locations being Wakathuni and Bellary near Tom Price, Onslow, Roebourne, Karratha and Port Hedland.

Consultation with regards to closure has been limited to date. Topics that require consultation include the on-going access to heritage sites post closure and the ultimate resting place of any artefacts salvaged.

14.1.2 Ethnographic and archaeological values

Archaeological and ethnographic surveys have been undertaken at West Angelas since 1977. All surveys were undertaken with the full participation and involvement of representatives from the Yinhawangka people.

Aboriginal heritage sites at West Angelas consist of rock shelters, stone artefact scatters, scarred trees, grinding patches, and mythological sites. One rock shelter, located above Deposit E, has been designated as a “Rights Reserved”[17] area as it holds special significance to the Yinhawangka people. Management of this site during operations is currently subject to ongoing discussion. If preservation of the site is deemed the most appropriate action, the long term stability of the pit wall below the rock shelter will need to be addressed through the closure plan.

14.2 Local community

The area surrounding the mine is unallocated crown land with no homesteads or Aboriginal communities in close proximity. The nearest town, Newman, is located approximately 120km south-east of West Angelas.

West Angelas operates solely as a Fly-In Fly-Out (FIFO) operation. The majority of the workforce flies in and out of the privately owned airstrip adjacent to the mine village. As a result, there is little direct social interaction between the workforce and any surrounding local communities.

14.3 Workforce

West Angelas is operated wholly as FIFO operations, with no personnel residing in the Pilbara. The majority of staff is flown directly from Perth to the site operated airport, with small numbers also flying directly from Busselton and Broome. Personnel are housed on site, in a fully serviced accommodation facility that will be decommissioned as part of this closure plan.

Mining activities are anticipated to continue at a similar rate within the wider region after the West Angelas mine ceases to operate. Thus employment opportunities and mine related services are not anticipated to be significantly impacted by closure of the mine.

[17] A Rights Reserved site is an area of recognised significance to the Traditional Owner group, where the group does not consent to a section 18 AHA approval.

Closure management strategies

This chapter documents the strategies that are currently in place to manage various aspects that need to be considered when closing a mine site. It also documents strategies to manage any additional aspects that have been identified as being significant for this site specifically.

The strategies will be converted into detailed plans as part of the Decommissioning Plan, developed five years prior to closure.

15. Removal of infrastructure

Decommissioning is anticipated to commence at the cessation of mining activities, as most areas of the mine, mine equipment and infrastructure will be fully utilised until the end of the mine life. However, as with progressive rehabilitation, opportunities to decommission areas in advance and facilitate rehabilitation will be reviewed through the mine planning process.

Rio Tinto iron ore has generic strategies for the removal of infrastructure, and develops location specific decommissioning plans as part of the decommissioning study, conducted 5 years prior to closure. Strategies involve:

- negotiating with Government prior to the removal of infrastructure as required under State Agreement requirements;
- actively seeking opportunities to recycle or reuse infrastructure that is to be removed;
- removing any environmentally hazardous materials in accordance with Controlled Waste Regulations; and
- where recycling and reuse opportunities are not available or viable, demolishing inert infrastructure and burying it onsite.

The decommissioning requirements for infrastructure at West Angelas are outlined in Table 14.

Table 14: Decommissioning requirements for West Angelas.

Category	Strategy
General	• Any equipment, steel structures or material that is not suitable for reuse are to be completely removed to an approved disposal site. • If encountered, any asbestos-containing building product or pipe work is to be disposed appropriately.
Above ground structures (e.g. buildings, tanks)	• Brick, block work and steel frame structures are to be dismantled and salvaged or appropriately disposed. • Any container or tank that has held hazardous materials is to be drained/emptied and then disposed. • Bullet tanks and storage tanks 4 m diameters and less will be disposed of whole. Bins and storage tanks greater than 4 m diameter will be cut into transportable sizes for removal.
Reinforced soil walls	• Remove any structures, footings, slabs and equipment supported by the wall and its backfill. • Dismantle wall and remove backfill back to a natural surface profile. Any part of the wall that will be more than 1m below the finished ground surface can remain in place.
Concrete or sleeper-type retaining walls	• Remove any structure, footings, slabs and equipment supported by the wall. • Excavate soil from back of wall to a depth sufficient to allow the next two steps to be safely accomplished.

Category	Strategy
	• Remove any tiebacks and deadmen that are within 1 m of the finished ground level.
Ground slabs	• Remove all attached steelwork, block work, services and equipment. • Break up and dispose of the concrete and full removal is practicable / required. • Otherwise leave the slab in place and cover with earth to a natural profile, and with minimum cover of 1 m.
Footings and associated pedestals	• Remove all attached steelwork and equipment. • If the footing and associated pedestals are less than 2 m^3, remove and dispose of them. • Otherwise cut and remove pedestals if required, and cover with earth to a natural profile, and with minimum cover of 1 m.
Above-ground concrete plinths (e.g. pump plinths) and structures (e.g. crusher blocks)	• Remove all attached steelwork and equipment. • Where practicable, remove concrete intact to disposal. • Otherwise, break concrete items and remove to disposal.
Culverts	• Remove all fill back to natural surface profile. • Remove culvert.
Sedimentation basins, ponds and reservoirs	• Dispose of liquid and sediments prior to deconstruction. • Break up and remove all concrete.
Roads and hardstand areas	• Remove any bituminous material to a disposal pit.
Below ground infrastructure	• Services and infrastructure less than 1 m below ground level to be removed. • Services and infrastructure greater than 1m below ground level to be left in situ.

16. Landform design

Note: The previous (July 2014) version of this closure plan contained a discussion of waste dump design in this section. Based on discussion with the DMP, the section has been revised and moved to the 'Closure Implementation' section (Section 28.3).

16.1 Pit void and backfill management

Pit void management is undertaken in accordance with the Rio Tinto iron ore Guidance for Achieving Mine Void Closure. West Angelas has committed to backfill the mine voids to ensure no changes to groundwater quality occur as a consequence of evaporation.

Due to the nature of the groundwater systems and recent climate conditions, and accounting for local catchment runoff, groundwater is not expected to recover to the pre-mining water table. With this understanding, backfill levels for the West Angelas pit have been revised and recommended as listed inTable 15.

These levels are designed to prevent the creation of permanent lake systems at West Angelas, which could impact groundwater quality. It is recognized that, based on these recommendations, ephemeral lakes may form in the base of the pits as a result of incident rainfall and local runoff. Although the quality of the water within these ephemeral lakes may deteriorate as the water evaporates, the relatively minor salts resulting from these seasonal ponding events are not expected to alter groundwater quality over the long term.

Table 15: Backfill levels recommended for West Angelas.

Pit	Backfill level (m AHD)
Deposit A CEPS	630
Deposit A CEPN	620
Deposit B B2 & B3	630
Deposit B B1	620
Deposit E	650

These values will be reviewed and revised as further hydrogeological information and local pit geometry are resolved during the operating life.

16.2 Waterway design

The aim of drainage management at closure is to ensure the long term safety and the stability of engineered landforms, and to ensure local drainage is reinstated in such a way that impacts on local hydrology is limited. This includes ensuring surface flows are maintained, erosion and sedimentation of drainage channels is minimised and appropriate vegetation is returned where appropriate.

A Surface Water Management Plan has been developed for West Angelas as part of a greater Environmental Management Program. This Plan describes the interaction between natural surface water runoff, the local environment and the mine. It also describes specific water management strategies to be adopted on site to eliminate and/or mitigate any adverse impacts the operation may have on the surrounding hydrology.

Surface water management structures that have been or will be built to be retained on closure include:

- The diversion berm and drainage channel to the south of Deposit B to divert water from the western extents of the pit and waste dump areas;
- A diversion berm and drainage channel to the south of Deposit F used to divert minor surface water flows to the east, away from the deposits; and
- A diversion berm that will re-direct sheet flow from the south of A West to the west of the deposit.

At closure and as part of progressive rehabilitation design, physical design and construction of surface water management structures is guided by the Rio Tinto Environmental Design Principles for Permanent Facilities.

Key waterway design guidelines that are used to inform the design include:

- AUSTROADS (1994) Waterway Design: a Guide to the Hydraulic Design of Bridges, Culverts and Floodways.
- Institution of Engineers, Australia (2001) Australian Rainfall and Runoff, Editor-in-chief D.H. Pilgrim, Revised Edition 2001, Barton, ACT.
- Water and Rivers Commission (2000 onwards) Water Notes series, Water and Rivers Commission, Western Australia.
- Water and Rivers Commission (2003) River Restoration Manual, Water and Rivers Commission, Western Australia.

Drainage management designs will be based on surface water hydrology principles and practices relevant to the local climate, topography and material types. The majority of the final landform waterway designs will be undertaken as part of decommissioning activities and rehabilitation activities. Challenging aspects that will need to be considered include:

- Runoff from ridge lines onto waste dumps;
- Internal draining / sump locations used during operations to manage runoff; and
- Topographic low areas adjacent to the toe of rehabilitated waste dumps.

17. Contamination and hazardous materials management

The contaminated sites register maintained during operations records the location and details of any suspected or known contaminated areas. Used at closure, this inventory

identifies sites that require specific decontamination and the measures employed to achieve the required standard.

The primary sources of contamination at West Angelas that may require management at closure include:

- localised hydrocarbon spills;
- putrescible materials at landfill sites; and
- sewage irrigation area.

Fibrous waste materials excavated while mining are encapsulated in demarcated areas that are not expected to be disturbed as part of rehabilitation and decommissioning activities. No fibrous exposures have been identified in the pit walls of the closure landform.

Site closure will undoubtedly involve a change in land use, as such; the significance of any site contamination may change. A contaminated sites assessment will therefore be undertaken prior to closure, and specific plans developed, as part of the decommissioning process, to remove or manage contamination where appropriate.

18. Land and biodiversity management

18.1 Habitat planning

Mine related activities such as the clearing of native vegetation and soils, termination and modification of minor drainage flow paths and the introduction of new topographical features (waste dumps, tailing dam, mine voids etc.) can substantially change the habitat characteristics of the land. When substantial changes to soil, water or topography occur, in order to ensure a natural self-sustaining ecosystems after closure, alternate habitat types may need to be introduced or the pre-existing habitat types modified to accommodate the change(s).

As discussed in Table 11, characteristics of the plains, acacia woodlands, mulga woodlands, cracking clay and creek habitats maybe suitable for inclusion in the rehabilitation planning at West Angelas. Further work is required to define where within the closure landform these habitats characteristics may be utilised, to ensure the rehabilitation is sympathetic to the surrounding environment.

18.2 Rehabilitation

18.2.1 Soil management

During rehabilitation, it is assumed topsoil will be spread to a depth of 200mm over all disturbed areas and landforms created, excluding the mine voids, to assist with vegetation growth. As a consequence of the naturally shallow or rocky soil, topography, West Angelas will have a topsoil deficit. However, sufficient volumes of subsoil are predicted to be available to address the shortfall. Subsoil has physical properties suitable for plant growth and generally has chemical properties amenable to plant growth, although it does lack the high nutrient content, organic matter, soil seed back and mychorrihizal fungi properties of topsoil.

Top soil will be prioritised by:

- restricting topsoil application to use on less competent materials, where high quality vegetation growth is required to assist with landform stability; and
- reducing the thickness of soil spread across the site.

Where subsoil is required to be used instead of top soil the subsoil will be spread to a depth of 200mm.

18.2.2 Revegetation and seed management

Monitoring has shown that in small disturbed areas adjacent to existing vegetation or in areas where fresh topsoil can be utilised (e.g. borrow pits) appropriate species generally re-establish without the need for additional seed. This is because the seed bank in the fresh topsoil remains viable, resulting in good germination and growth, and in very small areas seeds can ingress from surrounding vegetation.

In most cases, however, locally collected seed is needed to assist in revegetation and the creation of a self-sustaining ecosystem. Over time the viability of seeds in stockpiled topsoil decreases, and thus the quality of the topsoil deteriorates. In addition the topsoil that was salvaged prior to disturbance may not contain seeds of all the target species of its new location / habitat.

Seed mixes for rehabilitation are preferentially of local provenance. Specific seed mixes are selected to provide a range of species appropriate to the desired habitat, taking into consideration landscape position and slope. In areas where erosion risks are identified, seed mixes may be modified to include or increase the portion of species that provide rapid cover.

Seed mixes may also include species of cultural significance to Traditional Owners, such as bush tucker and medicinal plants, if and when identified through ongoing consultation with Traditional Owners.

Rio Tinto Iron Ore purchases seeds on an annual basis from commercial seed suppliers, with emphasis on ensuring that there are appropriate local provenance seeds available for rehabilitation of each of its sites. Seeds are stored in a purpose-built facility at the Rio Tinto Iron Ore Dampier port facility, or off-site at facilities owned and managed by third parties.

18.3 Invasive species management

18.3.1 Weed management

An active weed management program is currently undertaken at West Angelas. This weed management program will be adapted for the closure landform, during the decommissioning study. The Weed Management Plan will define procedures to identify, control and eradicate target weeds and monitor weed control measures to minimise the spread of weed species, prevent the introduction of new weeds and control and/or eradicate both noxious and environmental weeds across the rehabilitated area.

Ten species of weeds have been identified to date at West Angelas that may require management on closure (Table 16).Weed eradication programmes will target weeds of high concern, while control measures will be used to manage all other weeds.

Table 16: Weeds of West Angelas and surrounding areas

Scientific Name	Common Name	Priority Classification
Acetosa vesicaria (L.) A.Love	Ruby Dock	High
Cenchrus setiger Vahl	Birdwood Grass	High
Cenchrus ciliaris	Buffel grass	High
Malvastrum americanum	Spiked Malvastrum	Moderate
Lactuca serriola	Prickly Lettuce	Moderate
Sigesbeckia orientalis	Indian Weed	Moderate
Sonchus oleraceus	Common Sowthistle	Moderate
Setaria verticillata	Whorled Pigeon grass	Low
Conyza bonariensis	Flaxleaf Fleabane	Low
Bidens bipinnata	Beggars Tick	To be advised

18.3.2 Feral animal management

Feral carnivores (e.g. cats, dogs, foxes) can create locally increased predation pressure on native fauna as well as increase competition with native species for resources such as space, water and food.

Feral herbivores (e.g. cattle, camels, donkeys) can also have a significant impact in Rangeland areas, such as the Pilbara. In dry times, grazing pressure reduces the abundance of palatable native species, impacting biodiversity and can create conditions

that encourage weeds to grow. Foot traffic impacts the soil conditions, and in combination with over grazing, can encourage erosion. Foot traffic has also been the cause of damage to cultural landmarks and Aboriginal sites. Overgrazing and damaged soils has a flow-on effect to native fauna species that rely on this vegetation for food and shelter.

Programs are in place to control feral animals during operations. Strategies for post-closure management will be developed as the site approaches closure.

19. Social factors

19.1 Cultural heritage management

The West Angelas Cultural Heritage Management Plan (CHMP) provides management strategies and procedures for the protection and conservation of cultural heritage at the site

The management plan is an important component of RTIO's commitments under the Cultural Heritage Management Regional Standard. The plan is designed to enable all Rio Tinto iron ore personnel and contractors to be confident that their work practices are sensitive to, and respectful of, the heritage values within the management area and the cultural values of the Traditional Owners. The plan is also designed to ensure RTIO complies with the *Aboriginal Heritage Act 1972,* Department of Aboriginal Affairs guidelines and Rio Tinto Cultural Heritage Standards.

Regular consultation is undertaken with Yinhawangka and Ngarlawangga peoples through (separate) Monitoring and Liaison Committee Meeting processes. This committee is a joint forum of Rio Tinto senior leaders and the Yinhawangka and (separately) the Ngarlawangga people, and is used to convey key information, undertake consultation and where required seek Traditional Owner feedback. The obligations to hold this meeting are clarified in the Commercial Agreements signed between Rio Tinto and the Yinhawangka people and the Ngarlawangga people.

The Monitoring and Liaison Committee includes closure as an agenda item when appropriate. The outcomes of these sessions inform the development of closure strategies, and are fully documented using the Cultural Heritage Management System.

Consultation will be sustained throughout the decommissioning and closure phases of the mine life to ensure cultural heritage is managed appropriately.

19.2 Local communities

Engagement with the community is undertaken through Rio Tinto Iron Ore's established processes and protocols for consultation. This process expands on the principles established by Rio Tinto's approach to Communities and Social Performance, guided by Rio Tinto's global code of conduct *The way we work*. Most closure consultation is conducted within this existing framework.

The area surrounding the mine is unallocated crown land with no homesteads or Aboriginal communities in close proximity and as a result, impacts on community receptors from nuisance dusts, noise and disturbance of visual amenity are expected to be limited, and therefore no specific management strategy is required.

There are other mining companies that hold mining leases adjacent to West Angelas (namely Fortescue Metals Group (FMG) and BHP Billiton Iron Ore), although no operations have been constructed to date. Management strategies will come into effect if / when these companies engage in mining operations in close proximity to West Angelas.

19.3 Workforce management

A Rio Tinto iron ore closure workforce management strategy is under development. This strategy will detail appropriate measures to provide alternative training or employment opportunities for West Angelas employees upon closure of the mine site. Where this is not practicable, the strategy will detail appropriate compensation measures. Specific

implementation plans for workforce management will be developed as the site approaches closure.

Closure is expected to occur over at least a two year period and a workforce will be required to complete the closure and decommissioning activities. A smaller workforce will be subsequently required to undertaken monitoring of the site as determined in the monitoring procedures developed during the decommissioning study.

Strategies for workforce management will be defined in greater detail over time and are not discussed further in this document.

Stakeholder consultation

20. Stakeholder consultation

20.1 Key stakeholders

Key stakeholders with a potential interest in closure of West Angelas presently identified are listed in Table 17 below. This list is dynamic and is expected to evolve over time.

Table 17: Key stakeholders

Category	Stakeholder
Federal Government	Department of the Environment
State Government	Department of State Development (DSD)
	Department of Aboriginal Affairs (DAA)
	Department of Mines and Petroleum (DMP)
	Environmental Protection Authority (EPA)
	Office of the EPA (OEPA)
	Department of Environmental Regulation (DER)
	Department of Parks and Wildlife (DPAW)
	Department of Water (DOW)
	Department of Regional Development and Lands (RDL)
	Department of Health (DoH)
	Department of Agriculture and Food WA (DAFWA)
	Main Roads WA
	Chamber of Commerce and Industry - Perth
	Pastoral Lands Board (PLB)
Local Government	Shire of East Pilbara
Non-Government	Weeli Wolli Co-management Board
	Wildflower Society
	Conversation Council WA
Community	Newman Community
	Yinhawangka
	Yamatji Marlpa Aboriginal Corporation (YMAC)
	Ngarlawangga
	Pilbara Aboriginal Business (PABs)
Internal	Rio Tinto employees and contractors
	Rio Tinto shareholders

20.2 Stakeholder consultation process

Stakeholder consultation is undertaken to ensure all stakeholders have their interests considered during closure planning. Rio Tinto iron ore has established processes and protocols for consultation with each of its key stakeholders. This work expands on the principles established by Rio Tinto's approach to Communities and Social Performance, guided by Rio Tinto's global code of conduct *The Way We Work*. Most closure consultation is conducted within this existing framework.

Consultation is commenced in the early stages of the closure planning process, and continues through to site relinquishment. The consultation strategy used by Rio Tinto iron ore is designed to:

- identify stakeholders and interested parties;

- develop a targeted consultation plan to reflect the needs of the stakeholder groups and interested parties;
- integrate the consultation plan into the mine planning/closure planning process; and
- Where practicable, work with communities to manage the potential impacts of mine closure.

The focus for discussion on closure will change as the project matures. Examples of the focal areas for discussion are illustrated in Table 18.

Table 18: Closure discussion framework

Stage	Discussion focus
Prior to the commencement of operations	Stakeholder identification and stakeholder mapping. Commence closure-specific discussions with key stakeholders. Agree key environmental, cultural and social values and closure objectives.
During operations	Ensure closure objectives and indicative closure criteria remain relevant and appropriate. Communicate outcomes of studies undertaken to improve the closure knowledge base, reduce closure risks or improve closure strategies. Communicate proposed changes to the closure plan.
In the lead up to closure (development of Decommissioning Plan)	Final completion criteria consensus. Discussion future use of infrastructure post-closure. Commence workforce communication strategy.
Post-closure	Process to meet commitments. Progress against completion criteria.

20.3 Communication register

Closure consultation is usually conducted within a broader Rio Tinto iron ore operation centric or regional consultation framework, as a component of Rio Tinto iron ore's on-going consultation forums.

- During mine expansion phases, closure consultation is conducted as part of the environmental approvals process to resolve closure objectives, issues and closure strategies. The environmental impact assessment process then provides any member with the public with the opportunity to comment on all aspects of the expansion, including closure.
- Consultation with Traditional Owners is regularly undertaken through the liaison forums, established under the terms of Indigenous Land Use Agreements with relevant groups.
- Consultation with State and Local Government stakeholders occurs as part of regular meetings held with individual agencies. Consultation on specific issues is also undertaken outside of these regular meetings as the need arises.
- Consultation with other stakeholders is conducted in a manner that is appropriate to the stakeholder and the specific issues requiring discussion.

Table 19 summarises topics that have been raised with or raised by stakeholders with respect to closure and the general opinion expressed.

Table 19: Communication register

Stakeholders	Summary of discussion relevant to closure	Response
Monitoring and liaison meetings		
17 August 2006	West Angelas development and closure plans	
Gobawarrah Minduarra Yinghawanga (GMY)	RTIO informed: future deposits (E, B, F, D, and Angelo) are planned. No plans for large scale dewatering or discharge of ground water. Long term plans are investigating backfilling the pits with waste as much as possible. Environmental approval process specifies: Protect the environment; Minimal clearing of the vegetation; Pits and waste dumps to back filled; Process to rehabilitate the ground.	Agreed GMY group to be involved in environmental plans
21 May 2007	Environment	
Gobawarrah Minduarra Yinghawanga (GMY)	GMY concerned about environmental impacts of West Angelas activities. GMY would like involvement in rehabilitation program	RTIO agree to present environmental aspects at next meeting (note: action was delayed until further in the future)
Deposit E development proposal		
5 September 2005		
CALM (Karratha regional offices) – Stephen van Leeuwin, Hayley Valentine and DoE – Owen Bennett, Ben Drew, Kate Barr	RTIO presented Deposit E proposal.	SvL advised: the mulga in the Deposit E area is significant, the more mulga we cover with waste dumps now the harder it will be to get future approvals. Try to minimise the footprint, particularly of the waste dumps – try to put waste back into pits or try to put waste round the corner of range areas (rather than on the flats where the mulga is located). Diversion of drainage through the valley will result in mulga present there dying.
EPA Part IV		
January 1999	Deposit A and B referral	
EPA Bulletin 924	EPA advice provided for the Deposit A and B referral (relevant to closure) requested: location and design of waste dumps have no impact on vegetation with high conservation value or cracking clay areas; original drainage patterns be restored; and supports the commitment to pit infilling required to prevent evaporation of groundwater brought to the surface by capillary rise in the soil cover	Robe integrated advice into Decommissioning and rehabilitation plan.

Stakeholders	Summary of discussion relevant to closure	Response
1 April 2010	Deposit E closure plan	
EPA	RTIO submitted Preliminary Closure and Rehabilitation Management Plan developed for the Deposit E Operation	EPA advised: No EPA comments, Deposit E 'Not Assessed - Public Advice Given' on 4 August 2010.
22 June 2011	West Angelas Iron Ore Mine S46 MS 514	
EPA	RTIO submission of a new Conceptual Closure Management Plan (part of the updated Environmental Management Program), prepared to support the Ministerial Statement Update.	EPA advised : No EPA comments, Section 45C Approval (Att 4) received on 30 January 2012.
2 November 2011	West Angelas Iron Ore Mine S46 MS 514	
EPA	Discussion on West Angelas Ministerial Statement Update.	EPA proposed that a new Closure Condition would be imposed on the updated Ministerial Statement.
31 October 2013	West Angelas Iron Ore Mine S46 MS 514	
Anthony Sutton, Director, Assessment and Compliance Division, Office of the EPA	Correspondence to RTIO: EPA proposing a condition on “Rehabilitation and Closure”, consistent with recent Ministerial Statements for other Rio IO Mines. As a result, the “West Angelas Operations Environmental Mgt Program” will need to be amended to remove Section 8.9 Closure and Rehabilitation Mgt Plan, so that there is no duplication between Condition 7 and the EMP.	RTIO complied with this request
31 October 2013	West Angelas Iron Ore Mine S46 MS 514	
EPA	EPA provided West Angelas Ministerial Statement Update - Draft Conditions	-
6 December 2013	EPA Assessment No 1914	
EPA	RTIO request rewording of Condition 8-4 to include provision for revisions of the Closure Plan (as per other recent Ministerial Statements). Within 12 months of commissioning of the next mine pit or as otherwise agreed by the CEO the proponent shall implement the approved Mine Closure Plan and any subsequent approved revisions, and continue implementation until otherwise agreed by the CEO.	Recommendations were not carried through to MS 970.
2 October 2014	Consultation supporting referral of Deposit F and A West proposal	

Stakeholders	Summary of discussion relevant to closure	Response
DMP	RTIO met with the DMP to discuss various aspects of the approval submission, including the July 2014 closure plan (which had already been submitted to the OEPA Compliance and Assessment Division to comply with Condition 9 of Ministerial Statement 970). Concerns raised by the DMP included: 1. erosion of the toe of surface water diversion structures resulting in design failures 2. questions about whether the Deposit A South waste dump was located within the geotechnical zone of instability 3. abandonment bunds will be required outside the zone of instability 4. the whole site would need to comply with current standards rather than the standards that may have applied at the time that the site commenced operation 5. any pit lakes would need to be considered in light of the minimum expectation of landforms being safe and stable – given that there would be an expectation of increased access to a pit lake, expectations are likely to be higher than for a dry pit void. Furthermore, safe egress would need to be considered 6. safe access to heritage sites that have the potential to be accessed post-closure would need to be considered	1. Not considered in this update of the closure plan, but diversion designs (when developed) will consider erosion controls and be presented in future updates of the closure plan 2. See Section 11.4.2 3. Noted. The precise location of abandonment bunds will be determined in consultation with the DMP, and be presented in future updates of the closure plan 4. Noted. 5. Noted. Pit lakes are not currently planned. 6. Not considered in this update of the closure plan, but plans to provide safe access to heritage sites (where appropriate) will be presented in future updates of the closure plan.
Consultation undertaken for the February 2015 closure plan update		
27 November 2014	OEPA response to July 2014 closure plan	
OEPA	The OEPA advised that it had sought advice on the July 2014 closure plan from the DMP, and that it could not be approved until nine comments had been addressed: 1. demonstration of a risk analysis process 2. specificity of management controls 3. inclusion of rehabilitation designs for the Deposit B long term low grade stockpile 4. consultation with the DMP 5. given that the site is on vacant crown land close to Karijini National Park, the return of a native ecosystem would be supported, and acceptance of pastoralism as a final land use would require consultation with relevant stakeholders	See the record below of the 11 February 2015 consultation with DMP for discussion of each dot point.

Stakeholders	Summary of discussion relevant to closure	Response
	6. closure objectives do not encompass all aspects of the site 7. waste dumps appear to be within the zone of instability around pits 8. consultation with the DoW 9. completion criteria do not address all aspects of the site A compliance date of December 2015 was provided to address these concerns.	
11 February 2015	Discussion of OEPA response to July 2014 closure plan	
DMP	A meeting was held with the DMP to discuss the points raised in the November 2014 OEPA correspondence (see above). As a general comment, the DMP advised that it had not recommended for the closure plan to not be approved, but had advised that there were several improvements that should be addressed in the next scheduled update. With respect to each of the nine concerns raised: 1. Risk assessment: accepted by Rio Tinto with no further discussion 2. Management controls: DMP indicated that this concern related specifically to the absence of specific waste dump rehabilitation design information in the Implementation section of the closure plan, and reliance of adherence to Landform Design Guidelines without explanation of how these would be specifically applied. 3. Long term low grade stockpiles: accepted by Rio Tinto 4. DMP consultation: DMP indicated that it was generally comfortable with the level of consultation undertaken by Rio Tinto in relation to closure planning 5. Final land use: accepted by Rio Tinto 6. Closure objectives: DMP indicated that this concern related specifically to a failure to clearly articulate in the closure objectives that the site would meet the Department's minimum expectation of safe, stable and non-polluting landforms 7. Zones of instability: accepted by Rio Tinto. The DMP indicated that it may accept waste dumps within the zone of instability of a pit, but this would need to be approved on a case by case basis. 8. Consultation with the DoW: accepted by Rio Tinto 9. Completion criteria: accepted by Rio Tinto	1. A risk assessment report will be appended to a future update of the closure plan 2. Waste dump construction, design and rehabilitation implementation information was presented in Section 16 (Closure Management Strategies) of the July 2014 closure plan. This information has been updated and transferred to Section 28.3 (Closure Implementation) of the February 2015 update. 3. Addressed in Section 28.3.3 of this update 4. Addressed in Table 19 5. Addressed in Section 21.2 6. Some amendments have been made to the objectives presented in Section 22.2. Further amendments may occur when the closure plan is next updated. 7. Addressed in Section 11.4 8. Consultation with the DoW will be undertaken prior to the next update of the closure plan. 9. Some amendments have been made to the indicative completion criteria presented in Section 25.2. Criteria are expected to evolve throughout the life of the mine, and further amendments may occur when the plan is next updated.

Stakeholders	Summary of discussion relevant to closure	Response
12 February 2015	Discussion of OEPA response to July 2014 closure plan	
OEPA	The following outcomes arose from a telephone conversation with the OEPA Assessment and Compliance Division: • The OEPA would defer to DMP advice regarding the closure plan, as per standard arrangements between the two agencies; • The OEPA response was based on advice provided by the DMP; • Rio Tinto planned to resubmit the closure plan prior to the December 2015 compliance date; and • There was accordingly no need to meet further with the OEPA to discuss the response given that Rio Tinto had already met to discuss it with the DMP.	No action required

Post-mining land use and closure objectives

21. Land use

21.1 Historical land use

As of the early 1990s, much of the area in the vicinity of West Angelas was zoned as vacant Crown Land. The good condition of vegetation at West Angelas has been attributed to small amount of historic cattle grazing, owing to the lack of water for cattle use. Pastoral activity in the region has historically been limited to grazing of cattle on Juna Downs Station to the north (the most southern boundary of which is located approximately 20 km to the north) and Rocklea Station (approximately 75 km to the west).

21.2 Options for post-mining land use

Options for post-mining land use are limited in the Pilbara region, with mining and pastoralism the only industries that have historically proven viable. Inland regions are sparsely populated, with the largest inland towns (such as Tom Price, Paraburdoo and Newman) established specifically to support the mining industry. Beneficial uses for the mining area (e.g. recreation or aquaculture) that might have potential in areas supported with a higher population base are unlikely to be viable.

As West Angelas is underlain by Vacant Crown Land, and is located in close proximity to Karijini National Park, the return of a native ecosystem is considered to be the most appropriate final land use. This is consistent with advice provided by the OEPA in November 2014.

22. Closure objectives

22.1 Rio Tinto's vision for closure in the Pilbara

Closure objectives for West Angelas have been developed with consideration of Rio Tinto iron ore's general vision for closure of its Pilbara iron ore sites. Rio Tinto's vision for closure is to:

- Relinquish its mining leases to the Western Australian State Government;
- Preserve, protect and manage the cultural heritage values of the area in cooperation with the Traditional Owners and other stakeholders;
- Develop and implement strategies for closure which consider the implications on local communities;
- Achieve completion criteria which have been developed with stakeholders and agreed with Government;
- Develop landforms that are safe and stable and compatible with the surrounding environment and post-mining land use;
- Achieve environmental outcomes that are compatible with the surrounding environment;
- Implement a workforce strategy which addresses the impacts of closure on employees and contractors; and
- Achieve successful closure in a cost effective manner.

These vision statements reflect a broad range of closure issues relevant to all Rio Tinto operations in the Pilbara, and drive the development of strategies and plans for effective closure management.

22.2 West Angelas closure objectives

The ultimate goal of mine closure at West Angelas is to relinquish the site to the Government. This goal will be achieved once the government and community agree that the condition of the site is compatible with an agreed post-mining land use. Closure objectives reflect the aspects of the closure plan that the government and community agree are key to evaluating the site condition.

Table 20 lists the closure objectives stated in the July 2014 West Angelas closure plan, the first three of which arose during the original public environmental review and engagement processes prior to the commencement of mining. A fourth objective relating to management of public safety hazards was added.

Table 20: West Angelas closure objectives (as stated in the July 2014 closure plan)

Number	Objective (as stated in the July 2014 closure plan – now obsolete)
1	Minimise the long term visual impact by reshaping the land so it is compatible with the adjacent landscapes.
2	Re-establish self-sustaining ecosystems.
3	Ensure no changes to groundwater quality through evaporation.
4	Address public safety hazards.

The OEPA and DMP have subsequently raised the concern that these objectives do not clearly articulate its minimum expectation that final landforms will be safe, stable and non-polluting. Further to this, Rio Tinto considers that the objectives as stated in the July 2014 closure plan no longer reflect the key issues of concern (e.g. the first objective focuses on visual impacts; whilst this will always be a consideration in rehabilitation designs, it will not be the primary reason to undertake landscape reshaping at a remote site like West Angelas).

The objectives have accordingly been amended in this closure plan update, as listed in Table 21.

Table 21: Revised (current) West Angelas closure objectives

Number	Revised (current) closure objective
1	Rehabilitated landforms are stable
2	Final landforms are rehabilitated to be compatible with the final land use
3	Changes to surface water flows or groundwater quality are within acceptable limits
4	Public safety hazards have been addressed

Note that these objectives do not represent the full range of issues that need to be addressed upon closure of West Angelas: rather they represent the key objectives against which the ability to relinquish will be assessed.

Indicative completion criteria and measurement tools have been drafted for each of these objectives, and are discussed further in Section 25.

Post-closure landform

This chapter documents the outcomes that are expected to occur when the strategies for managing closure aspects documented in this closure plan have been implemented, assuming no changes to current mine plans.

23. Post-closure outcomes

Through the decommissioning and rehabilitation process, the post-mining landform is reshaped and vegetated to create the closure landform. When the wider environment and landscape is considered, including interactions with neighbouring hills and creeks, the area is referred to as the post-closure landform. The following sections provide a description of the anticipated post-closure landform following execution of the closure management activities.

23.1 Land

The shape of the landscape at West Angelas is still evolving, with the final mine void areas and waste dump locations and dimensions still in development across all of the deposits.

In the vicinity of Deposit A (Figure 16) the landforms will be similar to those currently established. The Deposit A pit will create a large void area, with unstable pit walls that will collapse into the void over time. The Deposit A south west waste dump will be rehabilitated and used form part of the abandonment bund for the Deposit A pit, providing a visual barrier to the unstable area around the edge of the mine void. The topography to the north, east and south west of Deposit A is too steep to successfully install an abandonment bund.

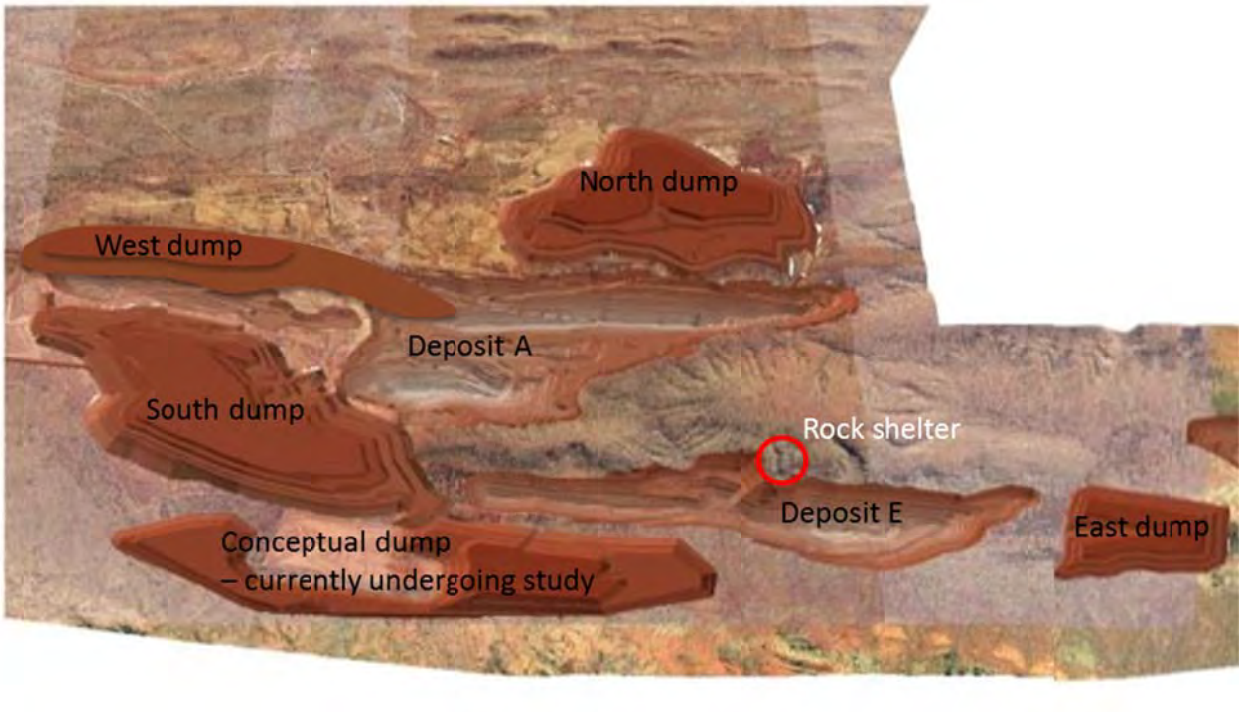

Figure 16: Post-closure landscape looking over deposits A and E.

At Deposit E, like Deposit A, the valley system that existed prior to mining will be completely transformed. The pit will create a large void area, with unstable pit walls that will collapse into the void over time. Preservation requirements for the rock shelter on the northern pit wall of Deposit E are under negotiation and will be resolved prior to closure. If the rock shelter is preserved, actions may be required to strengthen the wall, to ensure the site remains stable post-closure. An abandonment bund will be required along the southern and eastern edges of the pit, whereas the steep ridge to the north will provide a physical barrier in lieu of an abandonment bund.

The landform configurations for Deposits A West and F have yet to be defined. A concept sketch for Deposit F is presented in Figure 17, based on conceptual mining studies. The landforms through Deposit F will be similar to Deposit E, consisting of three satellite mine voids surrounded by rehabilitated waste dumps.

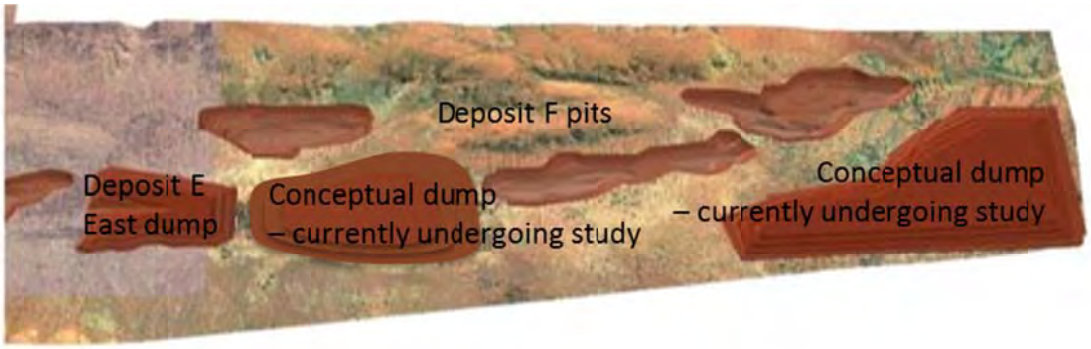

Figure 17: Post-closure landscape looking over Deposit F

A concept sketch for Deposit A West is presented in Figure 18, based on conceptual mining studies. The deposit is located in an area subject to overland flows. It is proposed that the diversion berm built to manage surface water flows for the mining phase would be retained at closure, to continue to the diversion of the flow to the west. Unlike other deposits at West Angelas, the crest of the Deposit A West mine voids are expected to be highly erodible and unstable due to the depth of alluvial material present around the pit crest. This is of particular concern due to the presence of downstream cracking clay ecosystems. A long abandonment bund is likely to be required around the entire perimeter of the mine voids.

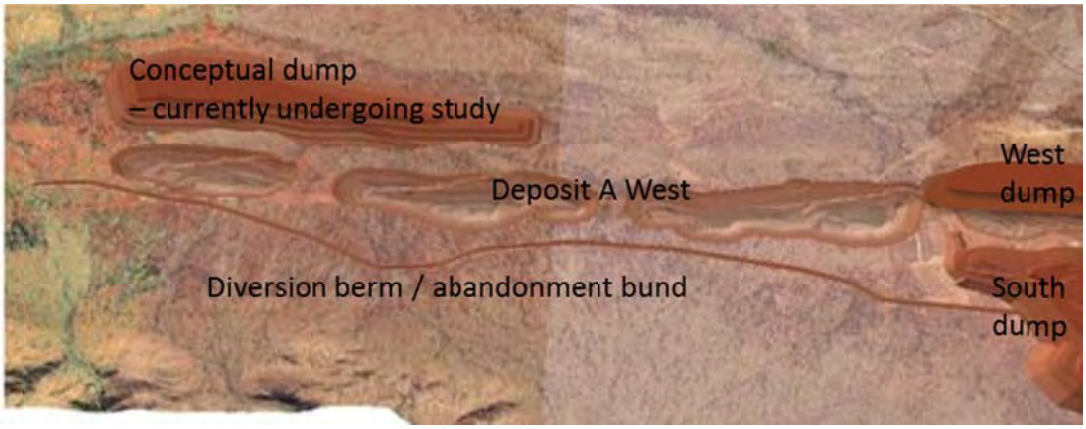

Figure 18: Post-closure landscape looking over Deposit A West, immediately west of Deposit A.

At Deposit B (Figure 19) the mine void is situated between two high ridge areas, flanking the void to the north and south. The Western waste dump almost closes off the valley, such that the valley mouth in the north western corner of the Deposit, immediately south of important Mulga vegetation communities, will be closed off with an abandonment bund.

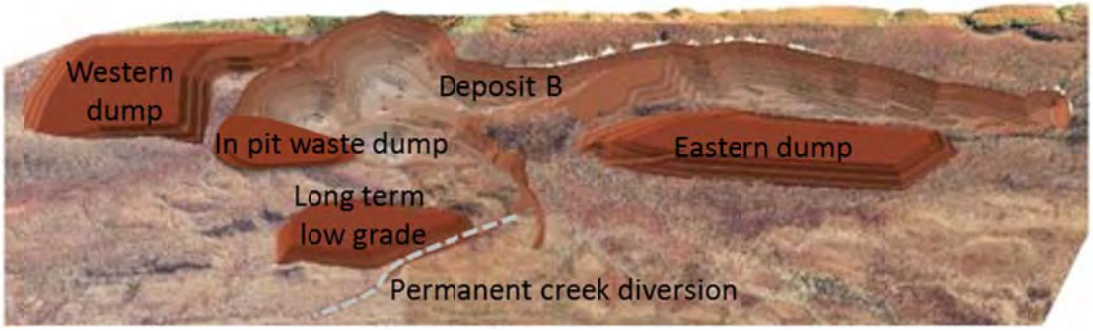

Figure 19: Post-closure landscape looking over Deposit B

23.2 Water

Local surface water hydrology has been substantially altered and redirected during the operating life of the mine. On closure, the landscape will be rehabilitated with consideration given to the changed topography and associated surface water flows that topography will generate. The original surface water flow paths will not be reinstated, and a new hydrological regime will be established across the disturbed areas of West Angelas. (It should be noted that these local alterations are not expected to significantly alter the hydrological regime beyond West Angelas compared to the conditions during mining.)

As mentioned, surface water control structures associated with Deposit A West, Deposit F and Deposit B are expected to be retained on closure and the areas surrounding the diversions rehabilitated to function as a natural drainage line.

It is expected that the groundwater levels in the pits will begin recovering immediately after cessation of mine dewatering, with water level rises slowing down gradually until equilibrium is reached between groundwater inflow, rainfall/runoff, groundwater outflow and evaporation. It is expected that the post-closure groundwater table will recover to a point below the pre-mining water table without affecting local and regional groundwater quality.

Following large rainfall events and prolonged (sequential) higher than average rainfall years, the formation of ephemeral pools within the mine voids are possible. It is expected that these pools will dissipate naturally during the following dry season.

23.3 Biodiversity

Revegetation will be undertaken across all disturbance areas and rehabilitated landforms other than within mine voids. Further resolution as the biodiversity outcomes for West Angelas will be presented once revegetation plans have been developed.

Outstanding closure issues and knowledge gaps

A risk-based approach has been taken in the development of this closure plan. This chapter documents outstanding issues to be addressed prior to closure in order to achieve appropriate outcomes. A formal risk assessment report will be presented in the next closure plan update.

24. Issues identification

24.1 Evaluation process

Rio Tinto iron ore has identified several aspects that require consideration when planning for closure of its Pilbara mining operations, including:

- Mineral waste (including PAF and fibrous materials);
- Pit lakes and ground water;
- Landform stability;
- Surface water impacts;
- Biodiversity;
- Visual impact;
- Cultural heritage;
- Local communities;
- Decontamination;
- Communication and consultation; and
- Other issues that may be relevant at a specific site.

A process for evaluating and managing issues has been developed which involves:

1) Identifying work that has been undertaken on each aspect, as it pertains specifically to the site in question. This may include baseline studies, stakeholder consultation, learning's from work undertaken at other sites, research and impact assessment studies. This review is used to identify any knowledge gaps;

2) Identifying the controls that are in place to manage each issue. This may include management plans / procedures, work practice guidelines etc. This review is used to identify any management gaps;

3) Reviewing the information in relation to identified gaps with a multidisciplinary team. This is undertaken to determine if the gaps are in the process of being closed, e.g. through on going knowledge development in line with the mine development, or if the gap constitutes a closure issue, requiring dedicated resources;

4) Establishing actions needed to resolve the issue, time to complete the task, and associated accountability;

5) Collating those actions into the Pilbara wide closure task register.

24.2 Issues list

The current status of closure issues for West Angelas are summarised in Table 22. Key issues are subsequently described in further detail.

Please note that the following categories have been applied based on the level of identified risk:

- **Managed** current management procedures controls and commitments are considered appropriate to allow stated closure objectives to be met.
- **Further investigations / discussions** the current level of knowledge is insufficient to determine whether closure objectives can be met, and will require specific investigations over and above current management procedures.

Table 22 Summary of identified site issues assessment

Aspect	Current status	Conclusion
Landform stability	• Waste material is highly erodible and requires large footprint for waste dump to achieve stable design. • Footprint for waste dumps constrained in some locations. • Historic dumping practice may create additional challenges for cost-effective rehabilitation. • Stability of pit wall below significant sites is uncertain and may require amelioration or mine design changes to accommodate closure requirements.	Further investigations
Biodiversity	• Post-closure landforms will not impact on functioning of communities. • Opportunity to identify different habitat suitability of closure landform to guide species selection during rehabilitation.	Further investigations
Groundwater	• Closure strategy to prevent formation of permanent pit lakes by backfilling to groundwater recovery levels. • Opportunity to investigate if permanent pit lakes would impact groundwater quality.	Further investigations & discussions
Cultural heritage	• Significant heritage sites located in and around site. • Access to sites and repatriation requirements yet to be discussed.	Further discussions
Surface water	• Local surface water systems altered by mining operations won't be restored on closure. • Surface water dependent ecosystems will not be further impacted by closure landform.	Managed
Mineral waste	• Geochemical characterisation of mineral indicates a low potential for AMD generation. • Management plan in place to encapsulate fibrous materials when encountered.	Managed
Visual impact	• Potential for public access is limited	Managed
Contamination	• Standard management measures sufficient to manage contaminated areas	Managed
Decommissioning of infrastructure	• Demolition strategy with potential salvage current strategy • Fixed assets unlikely to present potential complications to implementing current strategy	Managed
Other stakeholders	• Minimal impact to local communities due to proximity of site to population centres. • Regulatory expectations for closure criteria untested.	Managed

24.3 Key issues

24.3.1 Waste dump stability

A large proportion of the mineral waste at West Angelas is highly erodible. If the outer slopes of the dumps were to be composed of these highly erodible materials, the current waste dump designs would be costly to rehabilitate and new waste dumps designed to comply with the Landform Design Guidelines would require very large footprints.

Strategies have been developed for the Deposit A and Deposit B waste dumps to (theoretically) achieve a stable landform design. These activities include:

- minimising the amount of highly erodible material presenting on the outer waste dumps, through waste material separation and handling during operations;
- using in pit waste dumps where ever practicable; and
- utilising large berms on waste dumps, in accordance with the Landform Design Guidelines, to contain sediment and rainfall runoff, and prevent waste dump failure.

Part of the lowest lift of Deposit A south dump has been rehabilitated. Lessons learnt from the rehabilitation of this area will be used to inform future planning decisions.

The footprint available for establishing waste dumps at Deposit E is significantly constrained. The pit design for Deposit E has yet to be finalised, thus the percentage of highly erodible waste to competent material has yet to be determined. Current design assumptions suggest a stable landform will only be achieved by wrapping the outer dump in a layer of competent material. Stockpiles of competent material have been accommodated in the current design; however the implementation of such a treatment is unproven in the Pilbara.

Waste dump designs for Deposits A West and F are conceptual and will be reviewed and revised in line with future mining studies. Deposit A West is located close to the cracking clay community and has the potential to impact the community post-closure if a stable waste dump design is not achieved.

24.3.2 Pit slope stability

Sites of significant heritage and environmental value occur at several locations immediately above the pit walls. In general, the pit walls are not designed to be stable in perpetuity, and the pit walls are expected to collapse over time. This is especially true where a catchment exists above the pit wall, such that runoff from the catchment can also erode the pit crest even if the pit wall is geotechnically stable.

It is unclear if the sites of significant heritage and environmental value may be impacted by the collapse of the pit wall or erosion over the pit crest. Further work is required to verify the potential impact and develop appropriate mitigation strategies for locations that may be impacted.

24.3.3 Biodiversity in rehabilitation

West Angelas has a high level of biodiversity, with eight distinct habitats present in close proximity. Although the West Angelas development has removed some small parts of the habitats considered important, i.e. Mulga communities, there is the opportunity to review West Angelas' post-closure landform configuration to identify locations that may be rehabilitated to create a range of new habitats, with characteristics similar to those pre-disturbance habitats.

Further work will be undertaken to identify different habitat suitability within the closure landform. This information will be used to guide species selection during rehabilitation.

24.3.4 Groundwater quality

A pit backfill strategy has been adopted to prevent the formation of permanent pit lakes, to meet our obligation to ensure no changes to groundwater quality through evaporation. Backfill post-closure is costly, and an opportunity to reduce closure cost while continuing to achieve the closure objectives has been identified in terms of leaving pit lakes on closure.

It has been observed in other groundwater modelling studies that the creation of a pit lake that acts as a groundwater sink can have limited impact on the surrounding groundwater quality, as the salts are largely trapped within the lake. However, it is recognised that the creation of a pit lake can raise social concerns and have other environmental impacts.

Further investigations and discussions with stakeholders are required to determine if pit lakes can provide an acceptable closure alternative at West Angelas.

24.4 Research and investigation task list

Table 23 summarises the actions identified through the issues evaluation process.

Table 23: West Angelas closure task list

Aspect	Reference	Task	Progress status
Objectives and criteria	-	Undertake stakeholder consultation to confirm that objectives, completion criteria and measurement tools are appropriate, and revise if required	Ongoing
Ongoing reviews and updates	-	Review data collected and information developed through the operation life. Use data / information to improve models, interpretations and verify predictions.	Ongoing
Closure landform	WA-01	Develop and implement waste dump designs that appropriately mitigate erosion risks.	Ongoing
Closure landform	WA-02	Geotechnically evaluate post-closure pit walls to assess long term stability in areas that may impact environmental or cultural heritage values (e.g. bat caves, culturally significant rock shelters)	Ongoing
Biodiversity	WA-03	Identify appropriate locations for developing different habitat "types" to guide rehabilitation activities	Yet to start
Water	WA-04	Investigate if the closure objective "to ensure no changes to groundwater quality" can be achieved in a more cost effective method than the current backfill approach. 1. is water quality of pit lakes acceptable 2. can pit wall stability issues be resolved (safe access to water, egress, caves) 3. can biodiversity implications be managed	Yet to start

Completion criteria

25. Completion criteria

25.1 Development process

Completion criteria are the checklist by which our stakeholders verify the site is presented in a condition suitable for relinquishment. Stakeholder feedback is sought during the mine life so that the completion criteria may be reviewed at each closure plan update, and may be refined accordingly. Stakeholder agreement on the completion criteria is negotiated as part of the Decommissioning Plan development (commencing at least five years prior to closure).

Rio Tinto Iron Ore recognises that the process of developing criteria needs to commence early in the planning process to enable baseline information to be collected, provide clear performance goals for progressive rehabilitation conducted during the mine's operational phase, and provide sufficient time for measurement methodologies and technologies to be developed, reviewed and agreed with stakeholders. Developing closure criteria early in the planning process also provides some contingency in the event of unplanned closure.

However, completion criteria finalised too early in the mine life may no longer be appropriate at the point of closure because:

- mine plan changes could have significant impacts on closure strategies and outcomes;
- the closure knowledge base can be expected to improve;
- stakeholders and stakeholder expectations may change; and
- environmental and social values, on both a local and regional level, may change (e.g. due to impacts of climate change, changes to post-mining land use etc.).

For these reasons, completion criteria need to be viewed as an evolving process, and criteria developed early in the mine life should be considered indicative only.

25.2 Indicative completion criteria

Table 24 lists the indicative completion criteria for each site closure objective[18]. These criteria are subject to ongoing review and update, and have yet to be extensively discussed with stakeholders.

To support the development and communication of the final completion criteria, indicative measurement processes and supporting data (evidence and/or metrics) lists are included in Table 24. The evidence and metrics column includes a range of information types that will be collected during the mine life or post-closure (as appropriate) and may be required to demonstrate, through the measurement process, that the completion criterion has been achieved.

The final, agreed completion criteria are expected to contain significantly greater detail than the indicative completion criteria.

[18] These objectives and completion criteria align with previous commitments made during the initial 1998 Mining Proposal for West Angelas, as reviewed by the EPA in Bulletin 924, and subsequently reported in the associated Decommissioning and Rehabilitation Management Plan (now superseded by this closure plan).

Table 24: Indicative completion criteria

Objective	Indicative completion criteria	Indicative evidence / metrics that completion criteria have been met	Indicative process and/or monitoring methods
Landform stability			
Rehabilitated landforms are stable	Demonstration that rills and gullies are stable	Less than 10% changes in gully width in the 5 years prior to relinquishment	Rehabilitation monitoring program that includes quantitative evaluation of rills and gullies, with evaluation of trends over time.
Biodiversity			
Final landforms are rehabilitated to be compatible with the final land use	Vegetation is similar to the natural environment	Greater than 75% of the species present on rehabilitation transects are also present on appropriate reference sites	Monitoring program that: • compares species present within rehabilitation transects with those of reference sites
	Weed species are not unduly prevalent on rehabilitated areas	Weed species are not more prevalent on rehabilitated areas than on nearby reference sites	• identifies the prevalence of weed species on both rehabilitation and reference transects
	Habitat is present for a variety of fauna species	A range of vegetation strata (perennials, grasses, shrubs, trees) and landscape features are present in rehabilitation areas	• measures percentage cover of vegetation strata • measures the presence or absence of fauna indicator species
Water			
Changes to surface water or groundwater quality are within acceptable limits	AMD risks are appropriately identified and managed	Sign-off from an independent expert that the extent of AMD modelling and/or impact assessment is proportional to the level of risk, that outcomes are reasonable, and that appropriate controls have been adopted.	Review by an independent expert to confirm that AMD risks have been correctly identified and managed.
	There are no unapproved changes to surface water flow regimes	All changes to surface water flows have been endorsed by relevant stakeholders	Post-closure evaluation of surface water flow regimes to confirm that they fall within the bounds of changes endorsed by relevant stakeholders. If changes are outside of these bounds, agreed mitigation measures have been adopted.

Objective	Indicative completion criteria	Indicative evidence / metrics that completion criteria have been met	Indicative process and/or monitoring methods
	Pit voids do not cause unacceptable impacts to groundwater quality	Pit voids have been backfilled to a level that prevents the formation of permanent or semi-permanent pit lakes, unless it can be demonstrated that any resulting salinization is acceptable within the local context. If pit lakes are approved, specific water quality metrics would be developed.	If pit lakes are approved to be present within the final landform, monitoring against agreed metrics.
Public safety			
Public safety hazards have been addressed	Public safety hazards have been addressed	Sign-off from an independent expert(s) that public safety risks have been identified, and that appropriate controls have been implemented to mitigate them.	Public safety evaluation report(s) • geotechnical risks • contaminated sites • electrical safety • public access Review by independent expert to confirm that recommendations to mitigate public safety risks are reasonable and appropriate. Audit to confirm that recommendations have been adopted.

Financial provision for closure

Rio Tinto considers specifics of the closure cost estimate to be commercially sensitive information. This section outlines the general processes used to develop the estimate.

26. Principles of Rio Tinto iron ore closure cost estimation

Closure cost estimates are determined based on methods outlined in the Rio Tinto Closure Standard and the Rio Tinto Accounting Policy. Two closure costs are developed for each site:

- A Present Closure Obligation (PCO) which is indicative of costs associated with closure of the mine given its current footprint; and
- A Total Projected Closure (TPC) cost which predicts the cost (in current terms) associated with closure at the end of the life of the mine. The TPC includes areas that are not currently approved, but that feature within the life of mine plan and that are considered likely to be developed in the future

The cost estimates consider the following components:

- Decommissioning (i.e. removal of infrastructure)[19];
- Final landform construction;
- Rehabilitation and biodiversity management;
- Heritage management;
- Workforce management (i.e. training costs and redundancy payments)[20];
- Monitoring costs;
- Costs associated with the development of a Final Decommissioning Plan;
- Costs associated with undertaking a final shutdown of operations;
- Allowance for failed rehabilitation or pollution that may necessitate rework of rehabilitation areas;
- Assignment of indirect costs in accordance with Rio Tinto Accounting Policy; and
- A contingency allowance.

27. Closure cost estimation methods

The amount recognised for closure at any given time will be determined by using the best and most recent estimate of the expected cost at that time. The closure cost estimation methodology is based on methods outlined in the Rio Tinto Closure Standard and Rio Tinto Accounting Policy, with the level of accuracy increasing as the site approaches closure.

The PCO estimate for each site is revised on an annual basis, whilst the TPC estimate is revised whenever a formal closure plan review is conducted. Note that for commercial reasons the actual estimate is not documented in this closure plan.

[19] The decommissioning cost estimate assumes that infrastructure will be demolished and buried on site. However; opportunities for salvage and recycling will be sought as the site approaches closure.

[20] Workforce management costs are only included in the TPC.

Closure implementation

This chapter documents how closure for each site domain will be implemented.

28. Closure implementation

28.1 Closure domains

Closure domains are used to group areas with common features, rehabilitation and decommissioning requirements. Figure 20 illustrates the closure domains that have been established for West Angelas. These domains include:

- **Open pits**: Includes currently operating, developing or proposed pits associated with deposits A, A West, B, E and F, and areas where waste material has been backfilled into pits for which no rehabilitation is required or planned;
- **Waste dumps**: Includes inert external waste dumps and long term low grade material stockpiles that are not currently planned to be utilised in processing;
- **Landfill**: Refers to site landfill including general waste;
- **Borrow pits**: shallow pits created by the excavation of materials for construction purposes;
- **Disturbed areas – high**: Areas that will require significant earthworks to achieve final landforms, including ROM pad, product stockpile and surrounding areas, sealed light vehicle access roads, haul roads and rail loop;
- **Disturbed areas – moderate**: Areas that will require a moderate level earthworks to achieve final landforms including buildings (office and plant), airstrips, camp; and
- **Disturbed areas – low:** Areas that will require a low level of earthworks to achieve final landforms including laydown yards, unsealed roads and access tracks.

28.2 Implementation strategies and schedule

Implementation strategies that are unique to specific closure domains are presented in Table 25. The broader strategies for closure, previously been discussed in the *Closure management strategies sections 15 to 19*, will be used to inform the later development of the detailed plan, and consequently is not repeated below.

Refinement of the closure domains and associated detailed plans for the rehabilitation and decommissioning of these areas will be developed as rehabilitation areas become available or during the decommissioning study.

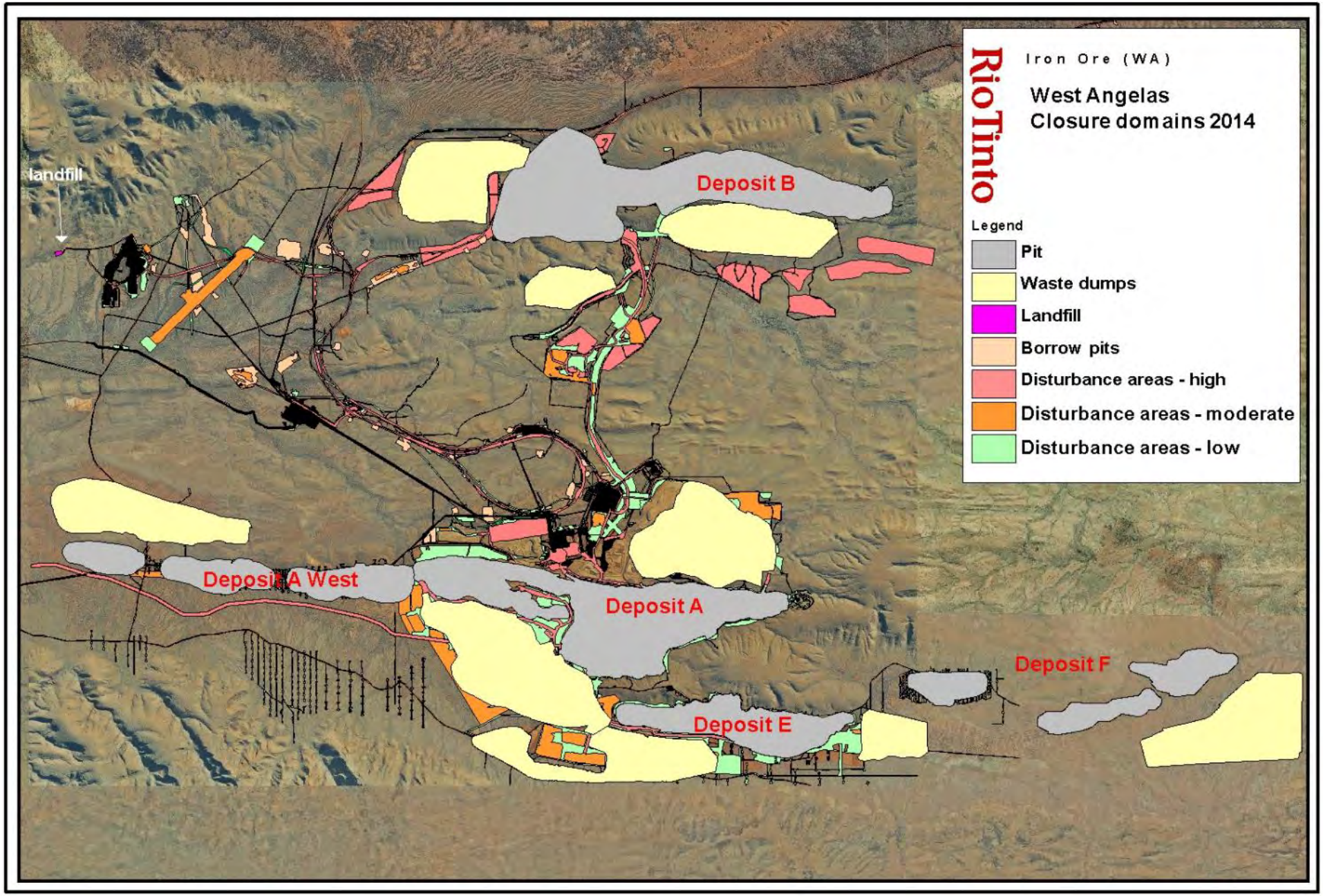

Figure 20: West Angelas closure domains.

Table 25: West Angelas implementation strategies and schedule by domain

Domains	Area	Closure method	Indicative Closure Schedule
Open pits	All deposits and internal backfill areas	Backfill to the long term predicted groundwater recovery levels: Deposit A CEPS to 630m AHD Deposit A CEPN to 620m AHD Deposit B B1 to 620m AHD Deposit B B2 and B3 to 630m AHD Deposit E to 650 m AHD Deposit A West (multiple areas) levels yet to be resolved Deposit F (multiple areas) levels yet to be resolved Backfill not achieved during operations will be sourced from nearby waste. Abandonment bunds are to be constructed around the perimeter of pit / pit clusters, where topography allows, outside of the zone of geotechnical instability. Waste dumps in close proximity to the pits may be used in place of sections of the abandonment bunds. No rehabilitation treatment will be applied within the zone of geotechnical instability.	2023
Waste dumps	All external waste dumps and long term low grade stockpiles	Refer to Section 28.3	Under review
Landfill	Site landfill	Cap with at least 2m of competent inert material. Re-spread topsoil windrows and stockpiled vegetation onto disturbed area. Shallow rip and seed.	2023
Borrow Pits	Borrow pits	Shape borrow pit to be self-draining. Re-spread topsoil windrows and stockpiled vegetation onto disturbed area. Deep rip and seed if required.	2023
Disturbed area - High	ROM Pad Product stockpile and surrounding area Sealed LV access roads Haul roads Rail loop	Demolish or dismantle built structures to footing level. Remove bitumen and concrete. Dispose of demolition material to an appropriate waste site. Undertake extensive earthworks and reshaping of areas to create a compatible landform consistent with the surrounding natural relief and landforms. Natural drainage lines to be re-established where practicable. If the area is very compacted it may require preliminary ripping prior to topsoil, deep rip and seed treatment.	2023

Domains	Area	Closure method	Indicative Closure Schedule
Disturbed area- Moderate	Buildings (office and plant) Airstrip (new) Airstrip (exploration) Main camp Muir's camp Topsoil stockpile areas Fire training (and laydown) area	Demolish or dismantle built structures to footing level. Remove bitumen and concrete. Dispose of demolition material to an appropriate waste site. Undertake earthworks and reshaping of areas to either return the area to natural relief or create a compatible landform consistent with the surrounding natural relief and landforms. Natural drainage lines to be re-established where practicable. If the area is very compacted it may require preliminary ripping prior to topsoil, deep rip and seed treatment.	2023
Disturbed area - Low	Laydown yards Unsealed roads and access tracks	Scatter any dead vegetation or rocks over the rehabilitated surface to increase habitat diversity and reduce wind and water erosion. Natural drainage lines to be re-established where practicable. Where top soil has not been removed and compaction is limited to two wheel tracks the area will be left to rehabilitate naturally. Other tracks should be ripped. On slopes, rip parallel to contours.	2023

28.3 Waste dump design and rehabilitation

Waste dumps located on mine sites that are operated by Rio Tinto are designed and rehabilitated in accordance with internal Landform Design Guidelines[21]. This document provides guidance on:

- the objectives of waste dump design, which is to achieve dumps that are:
  - safe;
  - stable;
  - aesthetically compatible with the surrounding landscape;
  - vegetated;
  - non-polluting;
  - compatible with the agreed post-mining land use; and
  - progressively rehabilitated;
- selection of appropriate locations for the siting of waste dumps;
- appropriate shapes and designs of waste dumps;
- appropriate surface treatments; and
- links to other relevant internal and external guidance material.

These Guidelines are updated on a regular basis to incorporate learnings from research, studies and rehabilitation implementation projects. The most significant recent update occurred in 2012 to provide designs for waste dumps based on the specific waste types present. This was the result of several years of materials testing and landform evolution modelling studies of wastes typically found in the Pilbara including those at West Angelas, with design recommendations based on the assumption that an average erosion rate of 5/ha/year (with a maximum of 10/ha/year) will be acceptable. Further studies have since been undertaken on additional waste types, and this resulted in another update in 2014.

It should be noted that erosion modelling is conducted on the conservative assumption that slopes are not vegetated. However, soil will be ripped into the final surface (where available) and seed applied as standard practice, with the aim of achieving a functional ecosystem that has habitat value.

28.3.1 Deposit A Waste Dumps

Deposit A, the oldest of the mined deposits at West Angelas, is flanked by the North and South Waste Dumps, as shown in Figure 21. The dumps commenced in 2002 and 2003 respectively, but neither has yet reached capacity and both are still active. Waste is also used to progressively backfill the western portion of the pit which has been mined to completion.

Figure 21: Location of Deposit A North and South Dumps

[21] Rio Tinto Iron Ore (WA), *Landform Design Guidelines,* July 2014, RTIO-HSE-0015708

Both of the dumps contain a high proportion of materials that are classified as highly erodible (approximately 36% detritals, 18% Wittenoom dolomite in both dumps). This means that either very conservative rehabilitation design parameters will be required, or the waste dump will need to be wrapped with competent material prior to rehabilitation.

The current rehabilitation strategy proposed for both dumps is to reshape them to a stable angle rather than to attempt wrapping. Studies indicate that the following final landform specifications would be appropriate for waste dumps with significant proportions of detrital and dolomite material on the surface:

- 20 degree slopes;
- 5 metre lift heights; and
- 10 metre berms.

A significant amount of waste dump reshaping will be required in order to achieve such a design. The following is currently proposed:

- tipping of new dump faces with standard 20 metre lifts, but with 40 metre berms (which is significantly wider than normal);
- removal of material from existing final faces to achieve similar specifications; and
- reshaping of faces (using a standard cut and fill approach) to achieve the final design parameters above.

28.3.2 Deposit E East, West and South Waste Dumps

Construction of Deposit E waste dumps commenced in 2012, with locations presented in Figure 22.

Figure 22: Location of Deposit E Waste Dumps

Waste characterization based on block model data suggests that all three dumps will contain significant proportions of highly erodible detrital and Wittenoom dolomite wastes (ranging from 64% in the west dump to 79% in the south dump).

Unlike the Deposit A dumps, those at Deposit E are planned to be wrapped with hydrated material, which is categorized as having low erodibility. A stockpile of hydrated material, which comprises approximately 10-12% of the total waste volume, is planned for construction to the south-east of the pit.

Studies indicate that the following final landform specifications would be appropriate for waste dumps with low erodibility hydrated material on the surface:

- 20 degree slopes;
- 20 metre lift heights; and
- 15 metre berms.

The dumps will be constructed so as to achieve these final landform specifications with minimal reshaping during rehabilitation.

28.3.3 Deposit B East and West Waste Dumps and Long Term Low Grade Stockpile

Clearing for construction of Deposit B waste dumps commenced in 2012, with locations presented in Figure 23.

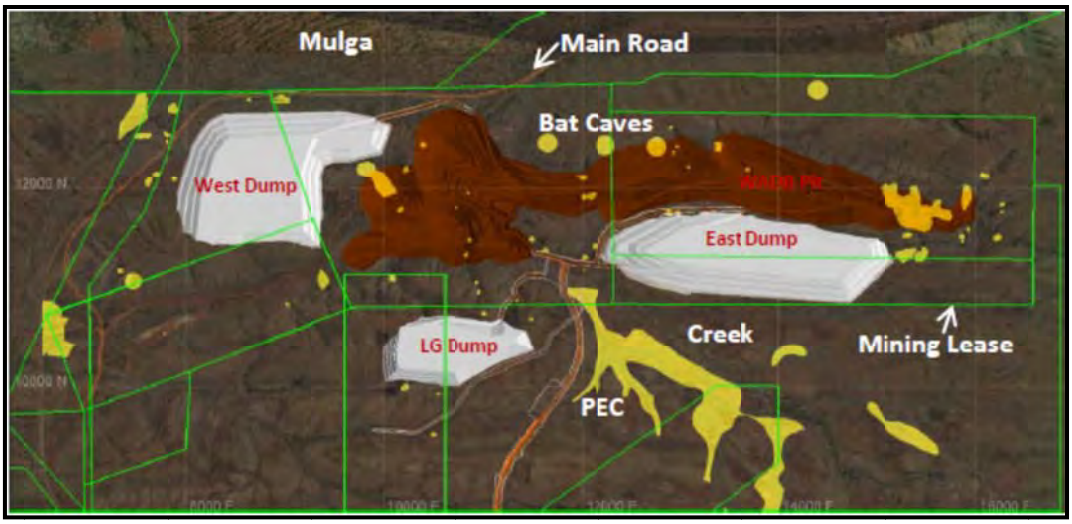

Figure 23: Location of Deposit B Waste Dumps

Waste characterization based on block model data suggests that there will be a significantly lower proportion of highly erodible wastes (detrital and Wittenoom dolomite material) presenting from Deposit B than there is from Deposits A and E. Notwithstanding this, approximately 37% of the waste material from Deposit B is still expected to be highly erodible, and management will be required to ensure the waste dumps are stable.

Given the relatively low proportion of highly erodible material, selective dumping during construction is proposed to ensure that it does not present in significant quantities on the surface of the dump, which would be largely composed of competent wastes.

Studies indicate that the following final landform specifications would be appropriate for waste dumps with low erodibility materials on the surface:

- 20 degree slopes;
- 20 metre lift heights; and
- 20 metre berms.

The dumps will be constructed so as to achieve these final landform specifications with minimal reshaping during rehabilitation.

The long term low grade stockpile will be constructed and managed as if it were a waste dump. It will be comprised predominantly of low erodibility material (hydrated low grade ore), and the same design specifications as other Deposit B waste dumps will be applied.

28.3.4 Waste dumps associated with future mining areas

Proposed designs and rehabilitation implementation strategies for waste dumps associated with future mining areas, including Deposit F and Deposit A West, will be presented in future updates of the closure plan.

Unexpected and/or temporary closure

29. Care and maintenance

In the event of temporary closure, measures will be undertaken to transfer the site from operations into a care and maintenance regime and relevant authorities notified. A Care and Maintenance Plan will be developed prior to the care and maintenance period which demonstrates how on-going environmental obligations associated with the site will continue to be met during the period of care and maintenance. Social obligations and responsibilities will also be addressed in this plan.

30. Unexpected closure

Whilst Rio Tinto considers the risk of unexpected closure to be minimal, there are numerous factors that could force early closure of one or several sites. Even if some level of contraction were to occur, it is reasonable to assume that Rio Tinto would continue to operate in the Pilbara and that it could continue to manage closure of its sites. It should be noted that the iron ore group is one group within the global Rio Tinto group of companies, which further mitigates this risk.

In the event of unplanned or sudden closure, Rio Tinto iron ore will notify all relevant authorities including the DMP. The existing closure plan for the site would then be revised and a Decommissioning Plan prepared and submitted to the DMP and other relevant authorities within three months of notification of closure. The Decommissioning Plan will include undertaking detailed consultation with stakeholders. Once the plan is approved by the relevant authorities, work will commence on closure implementation activities.

Closure monitoring and maintenance

31. Closure monitoring programs

31.1 Monitoring phases

An extensive environmental monitoring program is underway at West Angelas to track the performance of the operation, identify potential environmental impacts and to better understand the environment surrounding the mine in order to avoid or minimise future environmental impacts. This includes:

- Baseline monitoring, which is conducted as operations expand into new mining areas; and
- Operational monitoring, which occurs throughout the life of the mine, in line with regulatory requirements and the Rio Tinto operational standards.

Results from the operational environmental monitoring program that are relevant to closure are summarised in the *Collection and analysis of closure data* Sections 10 to 14.

A phased approach to closure monitoring, consistent with other Rio Tinto iron ore sites, is proposed for West Angelas:

- Pre-closure monitoring: occurs as the site approaches closure to establish post-mining baseline conditions (where required). Aspects that may need to be collected to establish the post-mining conditions include water levels outside the active mine area, riparian vegetation condition, and potentially terrestrial fauna;
- Decommissioning monitoring: conducted during the period of active site decommissioning and rehabilitation. This monitoring plan will be developed as part of the Decommissioning Plan, to ensure the activities do not adversely impact the environment; and
- Post-closure monitoring: conducted on a scheduled basis until the completion criteria have been met. This monitoring plan will be developed as part of the Decommissioning Plan.

The monitoring aspects expected to be undertaken at each phase of monitoring are listed in Table 26. It is expected that the monitoring programs will be sufficiently flexible to enable adjustments to be made if results indicate that more or less monitoring is warranted at any particular phase.

Table 26: Indicative closure monitoring schedule

Monitoring aspect	Phase		
	Pre closure	Decommissioning	Post closure
Erosion #	✓	✓	✓
Vegetation (rehabilitation) #	✓	✓	✓
Weeds #	✓	✓	✓
Fauna #	✓	✓	✓
Ecology function	✓		✓
Contaminated sites assessment	✓	✓	
Water quality	✓	✓	✓
Hydrology and hydrogeology	✓		
Heritage	✓	✓	

These monitoring activities also part of the Rio Tinto Iron Ore Rehabilitation Monitoring Procedure.

31.2 Rehabilitation monitoring

Rehabilitation monitoring tracks the progress and evaluates successional development of rehabilitation areas. This information is used to assess progress towards long term rehabilitation objectives and to improve rehabilitation techniques.

The Rio Tinto Iron Ore Rehabilitation Monitoring Procedure details the monitoring methodology for recording and assessing vegetation development, fauna re-colonisation / habitat development and erosion. The procedure also ensures monitoring is carried out in a safe, efficient manner across all Rio Tinto Iron Ore Pilbara operations.

Habitat characteristics are recorded by quadrat at intervals along transects at established in rehabilitation and associated reference sites. Qualitative assessment of erosion, soil surface, perennial vegetation cover, species richness, weeds and general condition is also recorded.

The current monitoring programme includes:
- number of plants by species;
- percentage cover by species;
- bare areas in quadrat;
- percentage of perennial cover;
- percentage of spinifex cover;
- percentage of grass cover (excluding spinifex);
- percentage of native perennial shrub cover (0.5m to 2m);
- percentage of litter cover;
- percentage of tree cover >2m;
- presence of annuals; and
- presence of weeds, and species.

Transects are also reviewed as a whole to record:
- number of logs (>10cm diameter and >30cm long);
- number of rocks (>15cm diameter);
- presence of scat;
- presence of ants,;
- general animal sighting (including tracks, burrows and nests);
- flowering and fruiting species;
- extent of grazing; and
- if burnt since last monitoring.

Monitoring of rehabilitation and reference sites is scheduled annually for the first three years after establishment, biennially from years five to nine and (approximately) triennially thereafter, until the completion criteria is achieved.

Analysis of the trends observed at rehabilitation sites over time and in comparison to reference sites is being studied to develop an understanding of rehabilitation quality and successional processes in our rehabilitation.

31.3 Erosion monitoring

The Rio Tinto procedure for erosion monitoring is detailed in the Rehabilitation Monitoring Procedure.

Monitoring involves the examination of transects for the number of rills and gullies, recording their width and depth. These measurements are compared over time to determine if the landform has stabilised; for example erosion rates are within the accepted completion criteria range or rill and gully geometry is similar to the surrounding landscape. If a landform fails to stabilise, further management / intervention will be applied.

31.4 Weed monitoring

During the pre-closure and decommissioning phases, weed management activities will be undertaken in accordance with the weed management program. This program includes targeted weed inspections and controls undertaken annually and following significant rainfall events. Weed hygiene activities will also be employed for vehicle and earthmoving machines to minimise the distribution of weeds.

During the post-closure phase weed monitoring will be undertaken as part of the rehabilitation monitoring activities.

Management of information and data

The retention and accessibility of multi-disciplinary mine records, is vital to successful mine closure and rehabilitation. This section provides an overview of the information management systems used by Rio Tinto iron ore, in order to manage closure related data.

32. Data and information management

32.1 Iron Ore Document Management System (IODMS)

Rio Tinto iron ore operates a comprehensive document management system, with electronic records of all key information and data. The document system, known as Iron Ore Document Management System (IODMS) is linked to other business units within the Rio Tinto group of companies, and processes are in place to ensure that the data contained within this system is appropriately backed up and protected. Each document stored within this system is given a unique document number which identifies the document and enables it to be accessed. This system will continue to operate following site closure, and all relevant data will be retained accordingly.

An audit will be conducted prior to closure to ascertain whether there is any additional information stored in hard copy form at the site. Such data will be scanned and entered into IODMS to ensure that it is appropriately retained post-closure.

Hard copies of confidential information stored at the site (such as employee records) will be destroyed at the time of closure.

32.2 Closure knowledge base

The closure knowledge database is a new knowledge management process designed to bring closure related research and monitoring outcomes together into one searchable location.

The closure knowledge database uses a single entry form to capture the key characteristics of all new ongoing and completed closure related studies. The same form is used to inform the closure team that work has commenced, to provide progress updates and to report on the outcomes of the work.

Key characteristics provided include where the report is stored and where the research can be applied. This information is then managed by the Closure team within a secure database.

Reports generated from the database will be used to track research projects, communicate closure obligations and automate compilation of information used in our closure planning.

32.3 EnviroSys

EnviroSys is a desktop application, with a web based interface, that manages environmental and hydrogeological parameters collected in the field and their logical context. The tool is used to store, monitor and analyse those parameters and report trends on data collections.

Data collected includes:

- groundwater – biological, chemical, field, levels, production;
- marine water – biological, chemical, field;
- soil chemistry;
- surface water – biological, chemical, field, levels, production;
- tonnes and moisture;

- water meters; and
- weather (rainfall, temperatures etc.).

EnviroSys is used across all WA Rio Tinto iron ore sites. Its application is necessary to support the building of closure knowledge bases, as well as ensure compliance with internal Rio Tinto standards and operating licenses pertaining to data management.

32.4 Legal and other requirements system

The Legal and Other Requirements System (LAORS) is used by Rio Tinto iron ore to manage the following:

- Approval and Legislation Reports which provide a high level snapshot of approvals and legislation and is used to check the status and expiry dates of approvals.
- Approval and Legislative Requirements Reports which lists
  - accountabilities for specific conditions within approvals and clauses within legislation;
  - required actions to comply with approvals and or legislation; and
  - due dates for specific requirements.
- Statutory Position Appointed Persons reports which list individuals appointed to a statutory position.
- Statutory Position Accountabilities Reports which identify clauses of legislation that the statutory position is accountable for.

A LAORS register detailing key closure obligations applicable to West Angelas is provided in Appendix A.

This page has been left intentionally blank

Appendix A – Register of key closure obligations

This page has been left intentionally blank

HERBERT
SMITH
FREEHILLS

Advice

General closure obligations

10 September 2013

QV.1 Building 250 St Georges Terrace Perth WA 6000 Australia
GPO Box U1942 Perth WA 6845 Australia
Telephone +61 8 9211 7777 Facsimile +61 8 9211 7878
www.herbertsmithfreehills.com DX 104 Perth

HERBERT SMITH FREEHILLS

Contents

Table of contents

HERBERT SMITH FREEHILLS

Contents

HERBERT SMITH FREEHILLS

Contents

General closure obligations

Scope

This document outlines the general obligations relating to mine closure that arise under legislation and common law (**General Obligations**).

It is intended that this document be read in conjunction with any review of the specific closure requirements that apply to each particular Rio Tinto Iron Ore (**RTIO**) operation (ie under State agreements, approvals, licences and other commitments).

Key issues

The main sources of General Obligations relating to the closure of RTIO's sites arise from:

- *Guidelines for Preparing Mine Closure Plans*, published jointly by the Department of Mines and Petroleum (**DMP**) and the Environmental Protection Authority (**EPA**) (the **Guidelines**);
- environmental licensing and pollution control provisions under Part V of the *Environmental Protection Act 1986* (WA);
- obligations and approvals under the State Agreements to which RTIO is a party;
- obligations and approvals under the *Environmental Protection (Controlled Waste) Regulations 2004* (WA);
- obligations and offences under the *Environmental Protection (Unauthorised Discharges) Regulations 2004* (WA);
- obligations and offences under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth);
- obligations arising under the *Contaminated Sites Act 2003* (WA);
- requirements imposed by the *Mining Act 1978* (WA) (**Mining Act**) and the *Mining Regulations 1981* (WA);
- obligations imposed by the *Mines Safety and Inspection Act 1994* (WA) and *Mines Safety and Inspection Regulations 1995* (WA);
- offences created under the *Criminal Code Compilation Act 1913* (WA);
- standards set by ISO 14001:2004; and

- common law liability arising from:
  - nuisance;
  - negligence;
  - breach of statutory duty; and
  - standards of reasonableness and the relevance of guidelines and codes of practice.
- agreements arising from negotiations with Traditional Owners; and
- obligations arising from joint venture arrangements.

This review also comments on:

- the Rio Tinto Closure Standard (V4.0 2012); and
- future legal developments that may affect closure standards.

Recommendations

We note that this document relates only to the General Obligations as at 10 September 2013. Environmental law is a rapidly developing area of law. This advice should be reviewed and updated every 5 years initially, with more frequent reviews occurring closer to the time of closure for a particular RTIO site.

We also note that this document relates only to a long term plan for site closure.

We recommend that RTIO consider planning for a forced, rapid closure scenario to ensure legal risks in that instance are appropriately managed.

Further, we recommend that RTIO review the specific obligations and closure plans in respect of each particular RTIO operation.

This document does not cover RTIO's contractual relations with contractors and other third parties. If it does not already do so, RTIO should have a process for dealing with those relations in a closure scenario.

Tony van Merwyk
Partner
Herbert Smith Freehills

+61 8 9211 7660
+61 407 467 660
tony.vanmerwyk@hsf.com

Michael Voros
Special Counsel
Herbert Smith Freehills

+61 8 9211 7519
+61 409 437 497
michael.voros@hsf.com

Detailed advice

1 General commentary – managing different types of legal risk

In considering the General Obligations for closure outlined in this document, it is important to be aware of the nature of the obligation imposed on RTIO.

The process of identifying the nature of the obligation imposed on RTIO will enable RTIO to:

- eliminate the legal risks that can be eliminated; and
- properly manage the legal risks that cannot be eliminated,

when planning for closure (eg take practical steps to relinquish or minimise particular legal risks to the extent they can be).

1.1 Risk categorisation under the Environmental Protection Act

RTIO's most serious potential environmental liabilities arise under the *Environmental Protection Act 1986* (WA) (**EP Act**) and associated regulations. These liabilities also include a range of potential offences (see discussion in parts 3 and 5 of this document).

Offences under the EP Act can relevantly be categorised on the basis of whether they apply to:

(a) the occupier of the relevant premises;

(b) 'any person'; or

(c) the holder of a licence, works approval or other authorisation.

1.2 'Occupiers' and 'holders of a licence, works approval or other authorisation'

In relation to category (a) and (c) risks, there are some basic steps that RTIO can take to eliminate (or at least reduce) its risk exposure.

For offences which apply to the occupier of the relevant premises, only the occupier may be prosecuted. Section 3 of the EP Act provides that 'occupier', in relation to:

(a) any premises: means a person who is in occupation or control of those premises, whether or not that person is the owner of those premises; or

(b) premises different parts of which are occupied by different persons: means, in relation to any such part, a person who is in occupation or control of that part, whether or not that person is the owner of that part.

Examples of occupier offences include the duty on occupiers to take certain measures under section 51 of the EP Act (see discussion in part 4.10 of this document). In relation to this category of liability, it is possible for RTIO to take steps to eliminate (or at least reduce) its potential liability by ceasing to occupy the premises.

Similarly, in relation to the holder of a works approval, licence or other authorisation, it is possible for RTIO to take steps to eliminate (or at least reduce) its potential liability by relinquishing the relevant authorisation.

Acts as occupier or the holder of an authority are crystallised on expiry of occupation or the authority and there is no risk following that expiry that these offences can be committed. However, a risk remains that a prosecution will be instituted for an offence caused by acts prior to the expiry, subject to the relevant limitation periods (considered in part 4.2 below).

1.3 'Any person' offences

By comparison, in relation to 'any person' liabilities RTIO cannot simply relinquish its risk exposure.

These liabilities attach to the person (which includes a company), and do not extinguish upon ceasing to occupy a premises or the relinquishment of the authorisation.

1.4 Application of risk categorisation to this report

To assist RTIO in the identification and management of different legal risks, we have categorised each of the different liabilities under the identified legislation as:

- extinguishable liability (eg upon ceasing to occupy the premises or upon relinquishment of the licence etc); or
- ongoing liability (ie in the case of 'personal' offences).

2 Extent of RTIO liability

The extent of RTIO's legal liability under legislation or common law will often rest on what constitutes an acceptable standard of performance. Legally, the determination of what is acceptable is influenced by current industry and community standards. Such standards vary with the advent of new methods and technology ('best practice') and with changing views of justice or loss shifting. This is particularly so for environmental issues where the community shows increasing levels of concern about pollution and contaminated land.

In the case of legal liability for mine closure, a key issue will be whether in closing its operations RTIO has taken reasonable steps to safeguard against causing environmental impact. In determining what is reasonable in the circumstances of a particular case, where required to do so courts will take into account the state of knowledge for a range of matters such as technology and standards of performance in management at the time the operation was closed.

A closure plan must be able to adapt to shifting industry and community standards. The extent to which RTIO complies with relevant guidelines and codes of practice, prepared by regulators or the mining industry, will be relevant in determining legal liability where it is necessary to judge an acceptable standard of performance. While compliance with such standards is likely to be a key factor in establishing whether RTIO's closure practices are acceptable, the courts have made it clear that such standards should not be considered an authoritative guide for determining liability. Nevertheless, adherence to guidelines and codes of practice is important in establishing the defence of due diligence or refuting an allegation of negligence.

Completion criteria developed by RTIO in consultation with key stakeholders will form the basis on which mine closure performance is measured and reported to government, and will determine when a site is assessed as suitable for relinquishment.

We are instructed that RTIO prepares indicative criteria at the project approval stage, with the intent that these will evolve over the life of mine and be finalised as the site

approaches closure. RTIO endeavours to finalise and agree completion criteria with stakeholders when preparing decommissioning plans (that is, 5 years before scheduled closure).

The Guidelines state that:

- Development of completion criteria should commence either during the project approval stage for new projects, or as early as possible for existing projects, and will be reviewed and refined throughout the development and operation of the project.
- Indicative completion criteria may be acceptable at the project approval stage, provided that they are capable of objective verification and based on the best available data at the time. As the project progresses and more information becomes available, more comprehensive and detailed completion criteria should be developed.

The closer a project is to completion the more certain the regulator will expect the completion criteria to be. There is no clear obligation imposed under the legislation of the Guidelines. However, it will be increasingly difficult for RTIO to explain unknowns or gaps in completion criteria as a project approaches the point of decommissioning. The section below provides further details on the obligations under the Guidelines.

3 Guidelines for Preparing Mine Closure Plans

3.1 Background

From 1 July 2011, all new RTIO mining proposals, in respect of new or existing mine sites, submitted to the DMP under the Mining Act, are required to include a Mine Closure Plan (**MCP**) which is to:

- be in the form required by the guidelines approved by the Director General of Mines for the purposes of the Mining Act; and
- contain information of the kind required by these guidelines about the decommissioning of each proposed mine, and the rehabilitation of the land, in respect of which a mining lease is sought or granted, as the case requires.

Further to this, the DMP has stated that it will require all existing RTIO mining proposals to prepare a MCP in this form by 30 June 2014.

Following the publication of the June 2011 Guidelines, a frequently asked questions document entitled 'Administration of Mine Closure Plans' (**FAQ Document**) was released by the DMP. The purpose of the Guidelines is to ensure that a planning process is in place so mines can be closed, decommissioned and rehabilitated in an ecologically sustainable manner, consistent with agreed post-mining outcomes and without unacceptable liability resting with the State.

Although described as Guidelines, section 70O of the Mining Act defines 'mine closure plan' to mean a document that-

(a) is in the form required by the guidelines; and

(b) contains information of the kind required by the guidelines.

In this regard, the Guidelines establish minimum industry standards for closure and are more akin to a standard.

3.2 Applicability and time-frame

MCPs are required for all new RTIO mining proposals submitted to the DMP under the Mining Act.

For all RTIO mining proposals that are not subject to the Mining Act (ie pre-1899 title or minerals-to-owner tenure, Hampton locations or State Agreement Act projects), RTIO may be required to submit an MCP to the EPA as part of the Part IV Environmental Impact Assessment process.

The vast majority of mining proposals submitted by RTIO are submitted under State Agreements with very few mining proposals being submitted to the DMP under the Mining Act. Therefore, RTIO is usually only required to submit mining proposals to the DMP for ancillary support infrastructure where that infrastructure sits on Mining Act tenure and there is a condition on that tenure requiring the submission of a mining proposal to DMP. The DMP has verbally indicated that it will not require full closure plans for such infrastructure, and to date has considered the brief closure strategies submitted by RTIO with these proposals to be sufficient. However this position has no legislative basis and more comprehensive closure plans may be required in the future once priority sites have approved closure plans in place.

RTIO should note that the DMP has stated that the Guidelines will apply to projects under specific extractive licenses (including RTIO's State Agreements). However, in our view there is no legislative authority for this.

DMP has stated that existing mining operations that have a proposal or Notice of Intent approved by the DMP prior to 1 July 2011 will be required to submit a MCP to the DMP by 30 June 2014. Also, existing mining operations will be required to submit a new MCP if they significantly alter the nature of the operations.

The DMP is in the process of sending letters to all existing mining project operators specifying individual deadlines for the completion of MCPs and imposing tenement conditions to this effect. The DMP has stated that it will require MCPs to be submitted to DMP for all existing sites by 30 June 2014. Projects will be prioritised depending on prior closure planning, the lifespan of the mine, rehabilitation liability and the level of public interest.

MCPs submitted with mining proposals should be approved within 30 business days (the current timeframe for approval of mining proposals). However, DMP has stated that it plans to trial 60 business day approval timeframes for new MCPs.

If DMP considers that a MCP does not meet the standards specified in the Guidelines the FAQ Document states that the tenement holder will be given two formal opportunities to address any deficiencies and if, in the opinion of the Assessing Officer, the MCP remains deficient, then they will make a recommendation to the Regional Minerals Manager to reject the MCP.

3.3 Preparation of MCPs

Planning for mine closure should be fully integrated in the life of mine planning, and should start as early as possible and continue through to final closure and relinquishment. For new projects, closure planning should start in the project feasibility stage (before project approvals).

RTIO's MCPs must be site-specific. Generic 'off-the-shelf' closure plans will not be accepted by the DMP or the EPA.

3.4 Structure of MCPs

RTIO's MCPs must identify post-mining land use options and set out site-specific closure objectives that are consistent with those land use options. A MCP must also include completion criteria, to provide the basis on which successful rehabilitation and mine closure is determined. According to the Guidelines, the structure of RTIO's MCPs should be as follows, unless an alternative format has been agreed to in writing by the DMP or EPA:

- Cover Page;
- Checklist;
- Table of Contents;
- Scope and Purpose;
- Project Summary;
- Identification of Closure Obligations and Commitments;
- Collection and Analysis of Closure Data;
- Stakeholder Consultation;
- Post-mining Land Use(s) and Closure Objectives;
- Identification and Management of Closure Issues;
- Development of Completion Criteria;
- Financial Provisioning for Closure;
- Closure Implementation;
- Closure Monitoring and Maintenance; and
- Management of Information and Data.

3.5 Risk-based principle

RTIO's MCPs must be prepared in accordance with a risk-based approach to mine closure. This means that the level of detail required by the DMP and EPA will increase as environmental risk increases.

A risk-based approach to RTIO's MCP preparation will require a consideration of material characterisation, data on the local environmental and climatic conditions, and consideration of potential impacts through contaminant pathways and environmental receptors.

Characterisation of materials needs to be carried out prior to project approval to a sufficient level of detail to develop a workable MCP. For existing operations, this work should start as soon as possible. Characterisation of materials should include the identification of materials with potential to adversely affect the environment.

3.6 Adaptive management principle

RTIO's MCPs must also be prepared in accordance with principles of adaptive management. This is important in case of temporary or sudden mine closure. MCPs must demonstrate that appropriate systems for monitoring, maintenance and record keeping are in place.

3.7 Consultation in preparation of MCPs

Consultation must take place between RTIO and stakeholders. This must include acknowledging and responding to stakeholder's concerns.

Post-mining land uses should be identified and agreed upon through consultation before approval of new projects. This should take into account the operational life span of the project, opportunities to improve management outcomes of the wider environmental setting and landscape, as well as possibilities for multiple land uses.

For existing mining projects, post-mining land uses should be agreed as soon as practicable.

3.8 Change and review of MCPs

Any substantial change to RTIO's MCPs regulated under the Mining Act will require a new Mining Proposal to be submitted to DMP for approval. The Mining Proposal will be subject to the same approval requirements as those for a new mining operation or project. If the new Mining Proposal constitutes changes to a proposal approved under Part IV of the EP Act, the changes must also be approved in accordance with processes and procedures under that Act.

RTIO's MCPs regulated under the Mining Act will be required to be reviewed every three years, or any other time period stipulated by the DMP. In respect of MCPs prepared for the purposes of Part IV of the EPA, requirements for review and the associating time period may be stipulated in the conditions attached to the approval. Where the conditions do not stipulate a requirement for review RTIO is under no obligation to review the MCP.

RTIO's MCPs will be available for public scrutiny once approval has been given by the DMP.

3.9 Mining bonds

At this stage, cost estimates conducted for the purpose of demonstrating financial provisioning for MCPs are not intended to be applied in the calculation of mining securities. However, we note that mining securities are not required for State Agreement sites, and bonded sites are proposed to transition to the Mining Rehabilitation Fund scheme by July 2014.

The financial provisioning requirements in MCPs are for tenement holders to demonstrate that they will have funds available in the future to address their financial obligations for mine rehabilitation.

3.10 Legal Obligations Register

One of the implications of MCPs is the preparation of Legal Obligations Registers. Relevant legal obligations need to be identified and a Register created in a suitable form.

4 Environmental Protection Act

4.1 Background

Outlined below are the obligations for closure which arise under the EP Act.

Part IV of the EP Act relates to the environmental assessment of proposals and subsequent approval by the Minister for the Environment (**Minister**). The Minister may place certain conditions on an approval that may affect closure operations. The main offences under Part IV relate to failing to comply with a Part IV approval (sections 47 and 48).

Part V of the EP Act provides requirements for environmental licensing and pollution control. The failure to properly implement a closure plan may result in offences being committed against these provisions. The main potential offences relate to the pollution control offences created by sections 49, 50, 50A, 50B, 51, 51C, 58, 65 and 73 of the EP Act.

4.2 Limitation periods

A prosecution for a Tier 1 offence (e.g. pollution and environmental harm offences, and breach of Ministerial Statement conditions) may be brought at any time.

Prosecutions for other offences under the EP Act can only be brought within 24 months of either that date on which:

- the alleged offence was committed; or
- the day on which evidence of the alleged offence first came to the attention of a person authorised to institute the prosecution.

The effect of the second limb is that the risk of prosecution continues until 24 months of when the relevant authority becomes aware.

4.3 Section 47 – Ministerial approval

Ministerial Statements, which approve the implementation of proposals and which set out the commitments to be fulfilled by the proponent in implementing a proposal, invariably contain conditions which impart obligations on proponents. In the case of current mining proposals, many conditions will impart obligations on proponents which continue to run until closure of the mine. Section 47 of the EP Act provides that it is an offence not to comply with ministerial conditions and a maximum penalty of $250,000 applies to a corporation, with a daily penalty of $50,000.

As discussed above, proponents may be required to submit and comply with a MCP under a condition of a Ministerial Statement. If this is the case, a mining company that breaches an obligation contained in such a MCP would commit an offence under s 47 of the EP Act.

Risk categorisation = extinguishable liability. RTIO's potential liability will be largely relinquished upon expiry of the Ministerial Approval.

4.4 Section 48 – Control of Implementation of proposal

If RTIO fails to comply with a Ministerial Condition or procedure or does not fully comply with its monitoring obligations, and the Minister issues an order requiring RTIO to:

1 stop the implementation of its proposal for a period not exceeding 24 hours; and

2 take certain steps for the purpose of complying with a Condition or procedure of an implementation proposal, or for preventing, controlling or abating any Pollution or Environmental Harm caused by the non-compliance with the Condition or procedure,

then it is an offence for RTIO to fail to comply with such order.

The offence carries a maximum penalty of $325,000 for a corporation, with a daily penalty of $65,000.

Risk categorisation = ongoing liability.

4.5 Section 49 – Causing pollution

Section 49 provides for offences by any 'person who causes pollution or allows pollution to be caused,' with or without intention or criminal negligence.

'Pollution' means direct or indirect alteration to the environment:

(a) to its detriment or degradation;

(b) to the detriment of an environmental value; or

(c) of a prescribed kind,

that involves an emission.

'Emission' means:

(a) discharge of waste;

(b) emission of noise, odour or electromagnetic radiation; or

(c) transmission of electromagnetic radiation.

The offence of pollution is a Tier 1 offence which may attract penalties of up to $1,000,000 for companies with a daily penalty of up to $200,000 or $500,000 or five years imprisonment or both for individuals (including directors, officers and employees of a company) with a daily penalty of up to $100,000.

The penalty for this offence is greater if it occurs with intent or criminal negligence.

Risk categorisation = ongoing liability. RTIO's potential liability will continue after closure.

4.6 Section 49 – Unreasonable emissions

Section 49 provides for offences by any person who with or without intention or criminal negligence:

(a) emits an unreasonable emission from any premises; or

(b) causes an unreasonable emission to be emitted from any premises.

'Unreasonable emission' means an emission or transmission of noise, odour or electromagnetic radiation which unreasonably interferes with the health, welfare, convenience, comfort or amenity of any person.

A reference in the EP Act to the discharge, emission or transmission of anything (whether accompanied by the expression 'into the environment' or not):

(a) is a reference to discharge, emission or transmission onto or into land, water, the atmosphere or living things; and

(b) in relation to discharge, emission or transmission from premises, includes a reference to discharge, emission or transmission onto or into land, water, the atmosphere or living things on, in, under, above or part of the premises.

This offence is either a Tier 1 or Tier 2 offence which may attract penalties of up to $250,000 for companies with a daily penalty of up to $50,000; or $125,000 for individuals (including directors. officers and employees of a company) with a daily penalty of up to $25,000.

The penalty for this offence is greater if it occurs with intent or criminal negligence.

Risk categorisation = ongoing liability. RTIO's potential liability will continue after closure.

4.7 Section 49A

It is an offence to discharge or abandon any solid or liquid waste either:

(a) in water to which the public has access; or

(b) any other place.

The offence is a Tier 2 offence which attracts penalties of up to $125,000 for companies or $62,500 for individuals.

Risk categorisation = ongoing liability. RTIO's potential liability will continue after closure.

4.8 Sections 50A and 50 B - Environmental harm

It is an offence to either cause or allow to be caused material environmental harm or serious environmental harm.

Environmental harm includes an alteration of the environment to the detriment or potential detriment of an environmental value. An environmental value may relate to either ecosystem health, or to a beneficial use.

'Material environmental harm' means environmental harm that -

(a) is neither trivial nor negligible; or

(b) results in actual or potential loss, property damage or damage cost of an amount, or amounts in aggregate, exceeding the threshold amount.

'Serious environmental harm' means environmental harm that -

(a) is irreversible, of a high impact or on a wide scale;

(b) is significant or in an area of high conservation value or special significance; or

(c) results in actual or potential loss, property damage or damage costs of an amount, or amounts in aggregate, exceeding five times the threshold amount.

The threshold amounts prescribed for material environmental harm and serious environmental harm are $20,000 and $100,000 respectively.

The threshold amount does not have to be exceeded in any case to constitute either material or serious environmental harm. For example, where no monetary loss arises, material environmental harm may still occur where the harm is neither trivial nor negligible.

The damage costs referred to in the definitions in relation to the threshold amounts include not only those costs for controlling or abating the discharge but also any costs involved in making good the environment. It is likely there will be many scenarios where the damage costs will either exceed, or have the potential to exceed, the threshold amount of $20,000 thereby creating an offence of material environmental harm. (Note that actual or potential loss may be measured for the threshold amount).

The penalty for environmental harm is greatest if it occurs with intent or criminal negligence. Serious environmental harm is a Tier 1 offence with a penalty of up to $1,000,000 for companies and $500,000 for individuals and up to 5 years imprisonment. The penalty for material environmental harm is up to $500,000 for companies and $250,000 and up to 3 years imprisonment for an individual.

Risk categorisation = ongoing liability. RTIO's potential liability will continue after closure.

4.9 Section 50 - Discharge of waste likely to cause pollution

Section 50 provides for the offence by any person who, intentionally or with criminal negligence, causes or allows waste to be placed in any position which is likely to result in pollution.

This is a Tier 1 offence which may attract penalties of up to $1,000,000 for companies with a daily penalty of up to $200,000 or $500,000 for individuals (including directors, officers and employees of a company) with a daily penalty of up to $100,000.

Risk categorisation = ongoing liability. RTIO's potential liability will continue after closure.

4.10 Section 51 – Occupiers of premises to take certain measures

Section 51 provides for the offence by an occupier of any premises who does not take all reasonable and practical measures to prevent or minimise emissions from those premises which do not comply with the prescribed standard.

This offence is a Tier 2 offence with a maximum penalty of $25,000 for an individual or a body corporate and a maximum daily penalty of $5,000.

Risk categorisation = extinguishable liability. RTIO's potential liability will be largely relinquished upon ceasing to occupy the relevant sites.

4.11 Section 51C – Unauthorised clearing

It is an offence to cause or allow clearing of native vegetation otherwise than in accordance with a clearing permit unless it is an exempt matter under Schedule 6 of the EP Act or the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (WA) (**Clearing Regulations**) (provided that it is not done in an environmentally sensitive area). Environmentally sensitive areas are declared in the Environmental Protection *(Environmentally Sensitive Areas) Notice 2005* (WA) by the Minister under Section 51B of the EP Act.

This offence is a Tier 1 offence with penalties up to $500,000 for a corporation with a daily penalty of up to $100,000 and $250,000 for an individual with a daily penalty of up to $50,000.

The exemptions listed in Schedule 6 of the EP Act are too numerous to mention. However, of relevance to RTIO is where the clearing is done in accordance with either a Part IV approval or in accordance with a works approval or licence. The Clearing Regulations provide further exemptions.

The CEO of the Department of Environment Regulation (**DER**) is able to apply for a clearing injunction before the Supreme Court to stop clearing that is not authorised. The Court is given a broad discretion to grant an injunction whether or not it is proved that a person intends to engage in any improper conduct (section 51S).

The EP Act provides that an occupier of a property will be deemed to have caused the clearing and the owner of the property will be deemed to have allowed the clearing in relation to the offence of unauthorised clearing unless the owner or occupier proves otherwise (section 51R).

A vegetation conservation notice may now be imposed by the CEO to require any damage caused by unauthorised clearing to be remedied or to re-establish vegetation to the state it was in prior to clearing (section 70).

Risk categorisation = ongoing liability. RTIO's potential liability for remediation of damage caused pre- or post-closure will continue.

4.12 Section 58 – Breach of environmental licence

Environmental licences are issued under Part V of the EP Act for all prescribed premises. Sites of relevance include processing/refinery operations, landfill sites and sewage facilities. Conditions of an environmental licence are generally aimed at the prevention and monitoring of waste discharges from premises and the breaching of any condition. Section 58 makes it an offence to breach a condition of an environmental licence. This is a strict liability offence, and is a Tier 2 offence with a maximum penalty of $125,000 for a body corporate and a maximum daily penalty of $25,000.

Risk categorisation = extinguishable liability. RTIO's potential liability will be relinquished upon expiry of the relevant licences and the expiry of the 2 year limitation period for breaches of licence that occurred prior to expiry.

4.13 Section 65 – Environmental protection notice (EPN)

EPNs are issued under Section 65 of the EP Act where there is or is likely to be an emission from any premises into the environment and the emission has caused or is likely to cause pollution or environmental harm. An EPN can be served on the 'owner' or the 'occupier' of the premises and only relates to current or future emissions.

An EPN may require a person to do one or more of the following:

(a) investigate the extent and nature of:

- the emissions and their consequences;
- the pollution and its consequences; or
- the environmental harm and its consequences;

(b) prepare and implement a plan for the prevention, control and abatement of the emission, pollution or environmental harm;

(c) take such measures as the CEO considers necessary to:

- prevent, control or abate the emission, pollution or environmental harm;
- comply with the standard;

(d) ensure that the amount or concentration of waste, noise, odour or electromagnetic radiation emitted from the premises, when measured at a point specified in the environmental protection notice, does not exceed the limit specified in the notice; or

(e) monitor the effectiveness or report to the CEO on any actions taken under the above.

The recipient of an EPN is liable for the carrying out of those specified measures. It is an offence not to comply with the conditions of an EPN. The offence is a Tier 2 offence with a maximum penalty of $125,000 for a body corporate and a maximum daily penalty of $25,000. It is a Tier 1 offence to intentionally or with criminal negligence not comply with an EPN for which a maximum penalty of $500,000 for a body corporate and a maximum daily penalty of $100,000 applies.

Risk categorisation = ongoing liability. RTIO's potential liability will continue after closure.

4.14 Defence provisions

Section 74 of the EP Act provides a reasonable precautions type defence to various offences. A properly prepared and implemented closure plan will be a component of demonstrating this defence.

Section 74A provides a specific defence for causing pollution, or for causing serious environmental harm or material environmental harm. The person charged must prove that the pollution or harm occurred in the implementation of a proposal in accordance with an implementation agreement or decision (an approval under Part IV of the EP Act) or in accordance with other nominated authorisations or exemptions under the EP Act (including a works approval or licence).

Section 74B provides a specific defence for serious or material environmental harm. Again, the defence requires some form of authorisation or approval or exemption under another written law or one of a number of specified soil and land related approvals.

4.15 Section 99T – Section 99ZA – Additional Court powers

Where a person is convicted of any offence under the EP Act, the Courts are empowered to craft innovative penalty orders which include payment for damage to property, rehabilitation, repayment of any economic benefit gained as a result of an offence and a requirement to publicise the offence in addition to the imposition of a penalty.

4.16 Section 118 - Liability of directors and others

A director, or a person who is concerned in the management of the company, will be deemed liable for an offence committed by the company (and may be prosecuted for that offence) unless that person can establish one of three defences under the Act. Those defences may broadly be described as:

- no knowledge or reasonable expectation of knowledge of the commission of the offence;
- that, if in a position of influence, the person had used all due diligence and reasonable precautions to prevent the offence from occurring; or
- the body corporate had a defence to the charge (e.g. authorised discharge).

They may also be charged for an offence of the body corporate without the company being charged, although the prosecution will have to make out its case against the company before the court for the charge against the director to stand.

The removal of the limitation period for Tier 1 offences described in detail below means that directors and managers may continue to be potentially liable for an offence committed by the company in perpetuity.

Risk categorisation = ongoing liability. The potential liability for RTIO's directors and other officers will continue after closure.

4.17 Third party action

Section 73B provides for a third party cause of action in tort against the company for damages for failure to comply with an EPN, a vegetation conservation notice or a prevention notice.

The damage must be caused to property not owned or occupied by RTIO. If the damage would not have been caused if the notice had been complied with, then, by reason of

RTIO's failure to comply, the owner or occupier of the damaged property has a right of action in tort against the person in respect of that damage.

Risk categorisation = ongoing liability. RTIO's potential liability will continue after closure, although is likely to be limited upon extinguishment of the relevant notice. Note that this provision does not expressly apply to closure notices. However, the common law rights for a third party to commence action remain 'post closure' (see part 21 below).

4.18 Financial assurances

Under Part VA, a proponent may be required to provide a financial assurance (akin to a bond) as a condition of a project approval issued under the EP Act. This is separate to a Mining Act performance bond (see part 7 below). The key risk here is that separate 'bonds' may apply to a project and be enforced by separate regulators under the EP Act as well as the Mining Act. As the EP Act applies to sites operated under a State Agreement Act, financial assurances can be imposed to cover such operations. These financial assurances apply as well as any royalty or other monetary obligations RTIO has under any State Agreement Act.

Financial assurances may be imposed under implementation conditions or conditions of an authorisation (such as an environmental licence, works approval or clearing permit). They may also be imposed by the CEO by written notice in relation to a closure notice, environmental protection notice, vegetation conservation notice or a prevention notice.

The CEO has the discretion to impose (with the Minister's consent) the financial assurance on a reasonable estimate of the total likely costs and expenses involved in addressing any financial matters the subject of the notice. If the financial assurance is insufficient, the CEO may recover additional costs. We note that the financial assurance only lapses on notice by the CEO. There may be situations where a closure notice or environmental protection notice is complete yet the CEO has not closed out the financial assurance. If a financial assurance requirement is imposed on the operation, RTIO's systems should acknowledge that the CEO's notice is required to obtain a return of the money that is the subject of the financial assurance.

Risk categorisation = ongoing liability. Although financial assurances may be imposed upon any authorisation, and therefore the risk of ongoing liability is minimised once the authorisation is relinquished, the potential for financial assurances to be imposed on closure notices means this is an ongoing liability risk for RTIO.

4.19 Emissions onto premises

The DER may regulate and enforce impacts (or potential impacts) of emissions within or outside the boundary of the premises. This applies to licensing emissions contained within the premises, notices, directions and prosecutions.

An emission contained on site may be the subject of regulatory action by the DER where there has been an impact (or potential impact) on an employee or other person or the wider site environment.

4.20 Other notices

Apart from EPNs (see para 4.13 above), the other notices available to the DER, include:

- closure notices (section 68A);
- ministerial stop order (section 69);
- vegetation conservation notices (section 70);

- environmental protection directions (section 71); and
- prevention notices (section 73A).

(a) Closure notices

The DER has the power to issue closure notices for operations nearing the cessation of activities. A closure notice may require a company to prepare a closure management plan, carry out investigations and require on-going monitoring. Independent audits of actions taken under a closure plan can also be required. The key risk here is increased scrutiny of closure operations from a regulator other than the DMP.

A closure notice may be the subject of a financial assurance as described in part 4.18 above.

The CEO may impose a closure notice if he considers on reasonable grounds that, as a result of anything that has been done, or has happened at a relevant premises before the expiry or revocation of an authorisation, ongoing investigation, monitoring or management is or will be required at the premises following the expiry or revocation.

The closure notice may be issued either during or after the lapsing of the relevant authorisation.

(b) Stop orders

The Minister may impose an order on a person to stop a process or activity if she considers that a person who is bound by an environmental protection notice has not complied with the notice, and the non-compliance has, is, or is about to cause conditions seriously detrimental to the environment or dangerous to human life or health.

(c) Vegetation conservation notices

Vegetation conservation notices may be imposed if the CEO suspects that unlawful clearing is likely to take place on any land, or has or is taking place on any land. Such a notice can require the person bound by the notice to repair any damage caused by the clearing and re-establish the vegetation to the state it was in prior to the clearing.

(d) Environmental protection directions

The CEO has the power to direct that the carrying on of any specific industry, trade or activity be prohibited or be subject to specific restrictions if he is satisfied that pollution, material environmental harm or serious environmental harm is occurring or is likely to occur.

(e) Prevention notices

If it is suspected that:

- any waste has been or is being discharged from any premises otherwise than in accordance with a works approval, licence or requirement contained in a closure notice or an environmental protection notice;
- a condition of pollution is likely to arise or has arisen; or
- a person has done, is doing, or is likely to do, an act in contravention of the 'environmental harm' provisions (see part 4.8 above),

then a notice may be given to that person to remove, dispense or otherwise deal with the waste being discharged or prevent the condition of pollution or environmental harm from arising or control or abate that condition.

4.21 Other Environmental Protection Act issues

Numerous Environmental Protection policies (**Policies**) have been made under Part III of the EP Act. These Policies have the force of law as though they are enacted as part of the EP Act. No Policies currently apply to RTIO operations in the Pilbara, however relevant Policies may be gazetted in the future.

5 Environmental Protection Regulations

5.1 Controlled waste

The Environmental Protection (Controlled Waste) Regulations 2004 (**CW Regulations**) regulate the storage and transport of controlled wastes in WA.

A controlled waste is one that is listed by the CW Regulations. Examples of listed controlled wastes that are likely to be relevant to closure planning include:

- battery components such as acid, lead and cadmium;
- containers or drums that are contaminated with residues of a controlled waste;
- waste mineral oils that are unfit for their intended use;
- soils contaminated with a controlled waste; and
- tyres.

The CW Regulations require that licences be obtained:

- by carriers who transport or cause to be transported for gain or reward on a road a controlled waste;
- by a subcontractor of a carrier to transport on a road a controlled waste;
- by a person who is employed or engaged by a carrier to drive a vehicle of the carrier to transport a controlled waste on a road; and
- for vehicles or tanks used by carriers to transport a controlled waste.

The CW Regulations also impose direct obligations on the waste holder or generator to ensure compliance by subcontractors. Alternatively, RTIO may be liable for aiding and abetting a breach by subcontractors. Breaches by a subcontractor may also have reputational risks for RTIO.

The maximum penalty for a company for breaching the CW Regulations is a fine of $25,000. Risk categorisation = extinguishable liability. RTIO's potential liability will be largely extinguished upon expiry of the relevant licences and ceasing to store and transport controlled waste.

5.2 Unauthorised discharges

The *Environmental Protection (Unauthorised Discharges) Regulations 2004* (WA) provide for an offence for causing or allowing the discharge of materials listed in schedule 1 into the environment. This regulation operates in addition to the emission based offences

under the EP Act. No offence is committed if the discharge was authorised under another written law.

These regulations are likely to capture incidents which are of insufficient environmental impact to constitute emission based offences under the EP Act.

Examples of materials listed in Schedule 1 include:

- acid with a pH less than 4;
- alkali with a pH more than 10;
- compounds or solutions of cyanide, chromium, cadmium, lead, arsenic, mercury, nickel, zinc or copper;
- petrol, diesel or other hydrocarbon; and
- sewage.

The maximum penalty for a company is $25,000.

Risk categorisation = ongoing liability. RTIO's potential liability will continue after closure.

6 Environment Protection and Biodiversity Conservation Act

The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (**EPBC Act**) contains the Commonwealth regime for environmental impact assessment. The existing operations of RTIO will not require approval under this legislation if the action is a lawful continuation of the use that was occurring or approved before the EPBC Act came into operation (16 July 2000). All other actions that will have or are likely to have a significant effect on a matter of national environmental significance will require assessment. The matters of national environmental significance are identified as:

- listed threatened species and ecological communities;
- migratory species protected under international agreements;
- Ramsar wetlands;
- Commonwealth marine areas;
- World Heritage properties;
- National Heritage places; and
- nuclear actions, including uranium mining.

Assessment or approval is given according to three procedures:

1 an approval by the Commonwealth Minister for the Environment (Ministerial Approval);

2 by approval from another Commonwealth decision maker under a management plan accredited by the Commonwealth Environment Minister for the purposes of Ministerial declaration (Ministerial Declaration); or

3 by State approval made in accordance with a management plan accredited by the Commonwealth Environment Minister for the purposes of a bilateral agreement. An assessment is triggered by referral from the proponent, a Commonwealth or State agency, or called in by the Commonwealth Minister for the Environment.

7 Contaminated Sites Act

The *Contaminated Sites Act 2003* (**CS Act**) and the associated *Contaminated Sites Regulations 2006* (WA) came into effect on 1 December 2006. This Act provides for the identification, recording, management and remediation of contaminated sites.

RTIO should note in its closure plans that the CS Act will have implications for closure liability for RTIO. All identified areas of known and/or potential contamination should be recorded as they will need to be dealt with for closure.

In accordance with the definition of 'contaminated' in section 4 of the CS Act, a site will be considered to be contaminated where the following two elements are satisfied:

(a) there is a substance in or on the land, water or site at above background concentrations; and

(b) the substance presents, or has the potential to present a risk of harm to human health, the environment or any environmental value.

The term 'contaminated' was intentionally defined broadly, so as to support the objects of the CS Act, which are to protect human health, the environment and environmental values by providing for the identification, recording, management and remediation of all contaminated sites in the State. In the Second Reading Speech of the *Contaminated Sites Bill 2002* (WA) the Minister for Environment and Heritage, Dr Judith Edwards, stated that the Bill was intended to address issues including the lack of information around contaminated sites. Dr Edwards went on to state:

> *One might ask: what is a contaminated site? It is important that the definition be broad enough to capture all forms of contamination that pose a problem, but not so broad as to lead to unnecessary bureaucracy where there is no risk. Therefore, the Bill uses a definition of "contaminated" in clause 4 that is risk based. It is not sufficient that a substance is present above a trigger level, there must also be some credible pathway by which it could pose a risk to human health or the environment.*

The DER Fact Sheet, *Mine Sites and the Contaminated Sites Act 2003* states that the duty to report is deliberately broad, to ensure that all contaminated sites are identified and recorded and that there are no exceptions for mining operations. The DER also states that companies ought to take a 'low risk' approach as to what is considered to be a contaminated site.

RTIO is required to report any sites that it knows or reasonably suspects are contaminated in accordance with the CS Act. However, in our experience, the DER has been willing to accept non-reporting of sites that do not require remediation although they may technically be 'contaminated' under the CS Act. Relying on the regulator's guidance in this respect should be carefully considered, Although, in these circumstances, the likelihood of prosecution for failure to report is low unless there is third party interest in the issue.

In particular, acid mine drainage may trigger a reporting requirement. The DER's stated policy is that the presence of naturally occurring acid sulphate soils in an undisturbed state will not make a site contaminated. However, where disturbance has resulted in concentrations of contaminants and/or a level of acidity within soils, sediments and waters that are above background concentrations and present, or have the potential to present, a risk of harm to human health, the environment or any environmental value the site will be 'contaminated'.

Once reported, the sites will be placed on a publicly available database and then dealt with according to the provisions of the CS Act. Of relevance to closure is that:

- a memorial may be placed on the title restricting the use, development and sale of the site;
- various notices may be issued under the EP Act or the CS Act relating to investigation and clean up;
- remediation obligations may be imposed on RTIO; and
- financial assurances may be required from RTIO to meet the closure requirements.

It is important to note that the hierarchy of responsibility under the CS Act means that RTIO may be liable for contamination on sites that it currently owns/occupies **and** sites that it has owned/occupied in the past. RTIO will also be responsible for sites that it has never owner or occupied, but which it has contaminated due to practices on its land that have caused contamination on other land.

Section 29 of the CS Act provides that the State will only be liable to remediate a contaminated site if no other person is responsible for remediation (ie the person who caused or contributed to the contamination, the owner of the contaminated site or a source site or the owner or occupier of a contaminated site who has changed the use of the land) or if the person responsible for remediation for the site cannot be identified or cannot be made to assume responsibility after reasonable attempts have been made to do so. In the mining context this would represent a very small number of sites.

Risk categorisation = ongoing liability. RTIO's potential liability will continue after closure.

8 Conservation and Land Management Act

The *Conservation and Land Management Act 1984* (WA) requires RTIO to ensure that it does not, in relation to any CALM land, amongst other things:

- unlawfully alter, obliterate, deface, pull up, remove, or destroy any boundary mark, or any stamp, mark, sign, licence, permit or order used or issued by the CEO of the DER or any authorised officer;
- unlawfully cut, break, throw down or in any way destroy or damage any building, fence, or gate, in or enclosing any land; or
- fail or refuse to comply with any lawful direction of an authorised officer (s107).

These obligations apply during the mine closure process, until RTIO has vacated the land. These obligations apply to the 'land based' aspects of the sites. The maximum penalty for a company for failing to comply with these provisions is $50,000.

Risk categorisation = extinguishable liability. RTIO's potential liability will largely be relinquished upon ceasing to occupy the premises.

9 State agreements

All of RTIO's mining, port and rail operations and a significant proportion of supporting infrastructure are situated on State Agreement tenure and operated in accordance with State Agreement provisions rather than the Mining Act. As such, RTIO must identify and comply with any relevant closure obligations in those agreements. Some of these

agreements have express closure obligations, or closure obligations may arise through commitments made in required environmental management programmes or development proposals submitted pursuant to those State Agreements. Where this occurs those obligations have been identified in the relevant State Agreement section below.

Each State agreement is different and should be included in the review of the specific closure obligations applicable to particular RTIO mining operations.

RTIO is currently a signatory to the following State agreements:

- *Iron Ore (Channar Joint Venture) Agreement Act 1987;*
- *Iron Ore (Hamersley Range) Agreement Act 1963;*
- *Iron Ore (Hamersley Range) Agreement Act 1968 (Paraburdoo);*
- *Iron Ore (Hope Downs) Agreement Act 1992;*
- *Iron Ore (Mount Bruce) Agreement Act 1972;*
- *Iron Ore (Robe River) Agreement Act 1964;*
- *Iron Ore (Rhodes Ridge) Agreement Authorisation Act 1972;* and
- *Iron Ore (Yandicoogina) Agreement Act 1996*,

a summary of the obligations relevant to mine closure in these agreements is below.

The provisions of a State Agreement entered into after the enactment of the EP Act do not exclude the operation of the EP Act, and do not have the effect of replacing or reducing the general obligations arising under that Act. The RTIO State Agreements have been amended to expressly provide for this. So for example, an approval under the EP Act, such as a Ministerial Statement issued pursuant to Part IV of the EP Act may still require RTIO to submit an MCP even if not required by the terms of the Agreement.

Generally, the approval provisions contained in the Mining Act do not apply to State Agreement operations, however this will depend on the nature or conditions of the mineral lease or other tenure granted pursuant to the State Agreement.

9.1 Iron Ore (Channar Joint Venture) Agreement Act 1987

Clause 7 provides that RTIO must have, by 30 June 1988, submitted to the Minister to the fullest extent reasonably practicable, its detailed proposals with respect to the mining, transport and shipment of iron ore. Those proposals are required to include an environmental management programme as to measures to be taken under the Agreement, for the protection and management of the environment.

Clause 9(7) requires RTIO to implement the approved proposals (as well as any Additional Proposals under clause 10) in accordance with their terms. This could include any closure, rehabilitation or other commitments made in those proposals.

Clause 11 specifies that, in relation to the matters referred to in paragraph (i) of subclause (3) of Clause 7 (ie the environmental management programme) RTIO shall carry out continuous monitoring programme to ascertain the effectiveness of the measures it is taking pursuant to its approved proposals for rehabilitation and protection and management of the environment. RTIO is also required to submit a detailed report to the Minister from time to time.

Furthermore, if RTIO, as a result of this monitoring or otherwise discovers any new information which in order to more effectively rehabilitate the Channar site may necessitate any changes or additions to any approved proposals or require matters not addressed in approved proposals to be addressed, RTIO must inform the Minister. This notification must include a detailed report of the information. The Minister may then

require further detailed proposals to be submitted by RTIO. If so, RTIO must then submit such proposals to the Minister within 2 months.

Clause 40 provides that, at the cessation or termination of the Agreement, all buildings, erections and other improvements erected on any land occupied by the Joint Venturers under the mining lease or any other lease, licence, easement, grant or other title made under the Agreement will become the property of the State. If prior to this date the Joint Venturers wish to remove any of their fixed or moveable plant and equipment they may do so, provided they grant the State the right or option within three months to purchase it at a fair value, except where the plant or equipment is on land to be included in Mineral Lease 4SA or otherwise leased or granted by the State to Hamersley pursuant to the provisions of the Agreement dated 30 July 1963 approved by the *Iron Ore (Hamersley Range) Agreement Act 1963*.

Clause 41 provides that:

> Nothing in this Agreement shall be construed to exempt the Joint Venturers from compliance with any requirement in connection with the protection of the environment arising out of or incidental to their activities hereunder that may be made by the State or by any State agency or instrumentality or any local or other authority or statutory body of the State pursuant to any Act from time to time in force.

Risk categorisation = extinguishable liability. RTIO's potential liability will be largely relinquished upon cessation or determination of this Agreement.

9.2 Iron Ore (Hamersley Range) Agreement Act 1963 and Iron Ore (Hamersley Range) Agreement Act Amendment Act 1968 (Paraburdoo)

The Interpretation clause provides that:

> Nothing in this Agreement shall be construed to exempt the Company from:
>
> (a) compliance with any requirement in connection with the protection of the environment arising out of or incidental to its activities under this Agreement that may be made by or under the EP Act;
>
> (b) to exempt the State or the Company from compliance with or to require the State or the Company to do anything contrary to any laws relating to native title or any lawful obligation or requirement imposed on the State or the Company as the case may be pursuant to any laws relating to native title; or
>
> (c) the AH Act.

As a result, RTIO must comply with the closure obligations contained in, or arising from approvals granted under the EP Act, any native title legislation and the AH Act.

Clause 10I(2) provides that RTIO must have, by 1 October 1990, submitted detailed proposals to the Minister with respect to the mining of iron ore from the Brockman No.2 Detritals deposit (including for transportation of the ore). This must include an environmental management programme as to measures to be taken, in respect of the Company's activities at the Brockman No.2 Detritals Deposit, for rehabilitation and the protection and management of the environment. Clause 10I(10) provides that if RTIO wishes to significantly modify, expand or otherwise vary the Brockman No. 2 Detritals Deposit, beyond those specified in approved proposals, then it is required to submit a further proposal, which is required to include details of a further environmental management programme, including further details of rehabilitation. Clause 10I(11) specifies that RTIO shall carry out continuous monitoring programme to ascertain the

effectiveness of the measures it is taking pursuant to rehabilitation proposals. . Clause 10I(11) also provides that RTIO must submit annual brief reports to the relevant Minister and three-yearly comprehensive reports on possible further implementation measures arising as a result of the monitoring conducted.

Clause 10G provides that should RTIO wish to significantly modify its operations in connection with the provision of services for the Channar Agreement, or enter into an agreement for the mining of iron ore from the mining lease granted under the Channar Agreement,(other than the Brockman No.2 Detritals Deposit), RTIO must submit a proposal to the Minister. This proposal must include environmental management measures, and any other matters as the Minister may require, such as a closure or rehabilitation plan.

Clause 11(e) provides that, at the determination of any lease license or easement granted under the Agreement, the improvements and things erected on the relevant land and provided for in connection therewith must remain or will become the property of the State. However if prior to this date RTIO wishes to remove locomotives, rolling stock, plant, equipment and/or removable buildings it may do so, provided it notifies the State and grants the State the right or option within three months to purchase it at a fair value.

Risk categorisation = extinguishable liability. RTIO's potential liability will be largely relinquished upon cessation or determination of this Agreement.

9.3 Iron Ore (Hope Downs) Agreement Act 1992

Clause 2A provides that:

> Nothing in this Agreement shall be construed:
>
> (a) to exempt the Company from compliance with any requirement in connection with the protection of the environment arising out of or incidental to its activities under this Agreement that may be made by or under the EP Act; or
>
> (b) to exempt the State or the Company from compliance with or to require the State or the Company to do anything contrary to any laws relating to native title or any lawful obligation or requirement imposed on the State or the Company as the case may be pursuant to any laws relating to native title; or
>
> (c) to exempt the Company from compliance with the provisions of the AH Act.

As a result, RTIO must comply with the closure obligations contained in the EP Act, AH Act and any native title legislation.

Clause 3 of the Act provides that the State must give RTIO access to the Crown Land at Hope Downs subject to the adequate protection of the environment and flora and fauna.

Clause 7 provides that RTIO must have by 30 June 1998, submitted to the Minister to the fullest extent reasonably practicable, its detailed proposals with respect to the mining, transport and shipment of iron ore. Those proposals are required to include an environmental management programme as to the measures to be taken under the Agreement, for the protection and management of the environment.

Clause 8(6) requires RTIO to implement the approved proposals (as well as any Additional Proposals under clause 10) in accordance with their terms. This could include any closure, rehabilitation or other commitments made in those proposals.

Clause 15 specifies that, in relation to the matters referred to in paragraph (m) of subclause (1) of Clause 7 (ie the environmental management programme) RTIO should

carry out continuous monitoring programme to ascertain the effectiveness of the measures it is taking pursuant to its approved proposals for rehabilitation, protection and management of the environment.

Clause 15 also provides that RTIO must submit annual brief reports to the relevant Minister and three-yearly comprehensive reports on possible further implementation measures arising as a result of the monitoring conducted.

Clause 15(4) further specifies that on or the date occurring 2 years after the East Angelas Deposit is included in the Hope Downs mining lease, RTIO must have submitted to the Minister, to the fullest extent reasonably practicable, its detailed proposals with respect to the mining, transport and shipment of iron ore. Those proposals are required to include an environmental management programme as to the measures to be taken under the Agreement, for the protection and management of the environment.

Clause 38 provides that, upon the cessation or termination of the Agreement, all buildings, erections and other improvements erected on any land occupied by the Company under the mining lease or any other lease, licence, easement, grant or other title made under the Agreement will become the property of the State. If prior to this date the Company wishes to remove any of their fixed or moveable plant and equipment they may do so, provided they grant the State the right or option within three months to purchase it at a fair value.

Risk categorisation = extinguishable liability. RTIO's potential liability will be largely relinquished upon cessation or determination of this Agreement.

9.4 Iron Ore (Mount Bruce) Agreement Act 1972

Clause 23 provides that, at the cessation or determination of any lease license or easement granted under the Agreement, the improvements and things other than plant, equipment and removable buildings erected on the relevant land and provided for in connection therewith must remain or will become the property of the State. However if prior to this date RTIO wishes to remove locomotives, rolling stock, plant, equipment and/or removable buildings it may do so, provided it grants the State the right or option within three months to purchase it at a fair value.

Clause 30 provides that:

> Nothing in this Agreement shall be construed:
>
> (a) to exempt the Company from compliance with any requirement in connection with the protection of the environment arising out of or incidental to its activities under this Agreement that may be made by or under the EP Act; or
>
> (b) to exempt the State or the Company from compliance with or to require the State or the Company to do anything contrary to any laws relating to native title or any lawful obligation or requirement imposed on the State or the Company as the case may be pursuant to any laws relating to native title; or
>
> (c) to exempt the Company from compliance with the provisions of the AH Act.

As a result, RTIO must comply with the closure obligations contained in the EP Act and any conditions which are attached to approvals obtained under that Act, the AH Act and any native title legislation.

Risk categorisation = extinguishable liability. RTIO's potential liability will be largely relinquished upon cessation or determination of this Agreement.

9.5 Iron Ore (Robe River) Agreement Act 1964

The Interpretation clause provides that:

> Nothing in the Act operates:
>
> (a) to exempt the Company from compliance with any requirement in connection with the protection of the environment arising out of or incidental to its activities under this Agreement that may be made by or under the EP Act; or
>
> (b) to exempt the State or the Company from compliance with or to require the State or the Company to do anything contrary to any laws relating to native title or any lawful obligation or requirement imposed on the State or the Company as the case may be pursuant to any laws relating to native title; or
>
> (c) to exempt the Company from compliance with the provisions of the *AH Act*.

As a result, RTIO must comply with the closure obligations contained in the EP Act, the AH Act and any native title legislation.

Clause 5(2) provides that RTIO must as soon as practicable after giving notice pursuant to cluse 5(1), submitted to the Minister to the fullest extent reasonably practicable, its detailed proposals with respect to the mining, transport and shipment of iron ore. Those proposals are required to include an environmental management programme as to the measures to be taken under the Agreement, for the protection and management of the environment.

Clause 7A provides that if RTIO proposes to significantly expand its operations under that Agreement, it must provide details in relation to the protection and management of the environment

Clause 7AC(1) provides that RTIO should carry out continuous monitoring programme to ascertain the effectiveness of the measures they are taking pursuant to rehabilitation proposals.

Clause 7AC(2) provides that RTIO must submit annual brief reports to the relevant Minister and three-yearly comprehensive reports on possible further implementation measures arising as a result of the monitoring conducted.

Clause 10(e) provides that, at the cessation or determination of any lease license or easement granted under the Agreement, the improvements and things erected on the relevant land and provided for in connection therewith must remain or will become the property of the State. However if prior to this date RTIO wishes to remove locomotives, rolling stock, plant and /or equipment it may do so, provided it grants the State the right or option within three months to purchase it at a fair value.

Risk categorisation = extinguishable liability. RTIO's potential liability will be largely relinquished upon cessation or determination of this Agreement.

9.6 Iron Ore (Yandicoogina) Agreement Act 1996

The Interpretation clause provides that:

> (2) Nothing in this Agreement shall be construed to exempt the State or the Company from compliance with, or to require the State or the Company to do anything contrary to, any law relating to native title or any lawful obligation or requirement imposed on the State or the Company, as the case may be, pursuant to any law relating to native title.

(3) Nothing in this Agreement shall be construed to exempt the Company from compliance with any requirement in connection with the protection of the environment arising out of or incidental to its activities under this Agreement that may be made pursuant to the EP Act.

(4) Nothing in this Agreement shall be construed to exempt the Company from compliance with the provisions of the AH Act.

As a result, RTIO must comply with the closure obligations contained in the EP Act and any conditions which are attached to approvals obtained under the Act, the AH Act and any native title legislation.

Clause 6 provides that RTIO must have by 31 December 1997, submitted to the Minister to the fullest extent reasonably practicable, its detailed proposals with respect to the mining, transport and shipment of iron ore. Those proposals are required to include an environmental management programme as to the measures to be taken under the Agreement, for the protection and management of the environment.

Clause 7(7) requires RTIO to implement the approved proposals in accordance with their terms. This could include any closure, rehabilitation or other commitments made in those proposals. Clause 9(1) states that if RTIO wishes to significantly modify, expand or otherwise vary its activities RTIO must submit an additional proposal to the Minister. Clause 9(2) provides that the requirements of clause 7(7) will apply to any additional proposals. That is, additional proposals must also be implemented in accordance with their terms.

Clause 13 specifies that, in relation to the matters referred to in paragraph (l) of subclause (1) of Clause 6 (ie the environmental management programme) RTIO shall carry out a continuous monitoring programme to ascertain the effectiveness of the measures it is taking pursuant to its approved proposals for rehabilitation, protection and management of the environment,

Clause 13 also provides that RTIO must submit annual brief reports to the relevant Minister and three-yearly comprehensive reports on possible further implementation measures arising as a result of the monitoring conducted.

Clause 39 provides that, upon the cessation or termination of the Agreement, all buildings, erections and other improvements erected on any land occupied by the Company under the mining lease or any other lease, licence, easement or other title made under the Agreement will become the property of the State. If prior to this date the Company wishes to remove any of their fixed or moveable plant and equipment they may do so, provided they grant the State the right or option within three months to purchase it at a fair value.

Risk categorisation = extinguishable liability. RTIO's potential liability will be largely relinquished upon cessation or determination of this Agreement.

9.7 Iron Ore (Rhodes Ridge) Agreement Authorisation Act 1972

Clause 5.02 provides that the Joint Venturers must, before the fifth anniversary of the commencement date of the Agreement or such later date as the Minister may approve, submit to the Minister detailed proposals which include appropriate plans and (where reasonably required by the Minister) appropriate specifications in respect of mining iron ore and the future development of mining areas and detailed particulars as to the measures proposed to be taken for the protection of the environment (which may include closure and rehabilitation measures).

Clause 7.01 provides that if the Joint Venturers wish to expand their activities beyond those specified in any approved proposal they must submit detailed proposals to the

Minister which includes measures proposed to be taken for the protection of the environment (which may include closure and rehabilitation measures).

Clause 10(e) provides that, at the cessation or determination of any lease, licence or easement granted under the Agreement, the improvements and things erected on the relevant land and provided for in connection therewith must remain or will become the property of the State. However if prior to this date RTIO wishes to remove locomotives, rolling stock, plant and /or equipment it may do so, provided it grants the State the right or option within three months to purchase it at a fair value.

Risk categorisation = extinguishable liability. RTIO's potential liability will be largely relinquished upon cessation or determination of this Agreement.

10 Mining Act

The *Mining Act 1978* (WA) (**Mining Act**) and the *Mining Regulations 1981* (WA) (**Mining Regulations**) contain specific requirements for the management of mining leases. Mining Act leases may give rise to the requirements outlined below.

The definition of 'mining proposal' in the Mining Act now includes a MCP. This will apply to all new mining proposals. With respect to existing projects, tenement conditions may be imposed requiring the submission of a MCP. For the majority of RTIO projects which operate on State Agreement tenure, the requirement to submit an MCP pursuant to the Mining Act is not applicable.

In addition to the requirement to submit an MCP, closure may be regulated as a condition of a mining lease imposed at the time approval to mine is granted, or under section 84 of the Mining Act which allows the Minister to impose, at any time, reasonable conditions for the purpose of preventing, reducing, or making good injury to the land.

Further, Regulation 28 of the Mining Regulations states that it is a condition of every mining lease that all holes, pits, trenches and other disturbances to the surface of the land made while mining which, in the opinion of a person holding or acting in the office of Environmental Officer in the Environmental Division of the DMP (**Environmental Officer**) are likely to endanger the safety of any person or animal will be filled in or otherwise made safe to the satisfaction of an Environmental Officer.

Prior to the commencement of mining, it is a common requirement placed on miners to provide a financial security or performance bond to cover the conditions attaching to the mining lease and the relevant provisions of the Mining Act and Mining Regulations including the decommissioning and rehabilitation of mine sites. The bonds are required for the life of the project and are only retired when the lessee submits an audit of compliance with the mine lease conditions that is acceptable to the Minster/DMP (ss 84A and 126).

A breach of the Mining Act or Mining Regulations could expose RTIO to criminal prosecution and may give rise to a cause of action for breach of statutory duty at common law (see part 21 for further details).

Risk categorisation = extinguishable liability. RTIO's liability will largely cease upon sign-off on rehabilitation conditions under the provisions of the applicable tenement and return of the bond under the relevant tenement. This may not occur for some time post closure.

11 Parks and Reserves Act

The *Parks and Reserves Act 1895* (WA) allows local Boards (appointed under the Act) to make and enforce by-laws for a range of matters, including prohibiting damage or injury to and destruction of trees, shrubs, plants and flowers on the land. The scope of powers and obligations under the Act do not impose obligations on RTIO beyond those already imposed under other legislation, such as the EP Act and Mining Act.

RTIO should confirm whether the relevant Boards have made any applicable by-laws under this Act.

Risk categorisation = extinguishable liability. It is likely that any relevant provisions will cease upon relinquishment of land tenure and therefore RTIO is unlikely to have any ongoing liability.

12 Rights in Water and Irrigation Act

Licensing is required under the *Rights in Water and Irrigation Act 1914* (WA) (**RIWI Act**) for the use of all:

- surface water, except where otherwise provided as riparian rights or other domestic and ordinary usage rights;
- artesian underground water; and
- non-artesian underground water, within proclaimed ground water areas.

The licence may be made subject to conditions and will specify the extent to which water may be diverted, taken or used.

A licence may be granted or renewed for a fixed period or indefinite duration. Licences remain in force until terminated (cl 13 Schedule 1), suspended or cancelled (cl 25 Schedule 1) or surrendered (cl 27 Schedule 1).

The licensee may transfer the licence or water entitlements under the licence to a person eligible to hold a licence. This does not apply where relevant by-laws prohibit transfer of licences of that kind. A transfer of a licence or water entitlement cannot be made without the approval of the Minister (cl 31 Schedule 1). A decision of the Minister not to approve the transfer may be reviewed by the State Administrative Tribunal (s 26GG). RTIO should review its water licences and determine whether any of them will be tradeable upon closure of the sites.

RTIO may enter into an agreement with another person (**the third party**) relating to the taking of water under the licence by the third party for a limited period of time. RTIO should review all of its water licences to identify any agreements or obligations it has with third parties.

It is an offence to obstruct, destroy or interfere with any watercourse, race or drain flowing through or over private land, or any dam or reservoir, or the bed of any disused watercourse, race or drain on the land without being authorised to do so under the RIWI Act or any other legislation (s 17). It is also an offence to obstruct, destroy or interfere with any watercourse flowing through or over or any wetland situated on Crown land (s 25). Prosecutions for this offence may only be commenced within 2 years of when the offence was committed (ss 17(5) & 25(3)). If RTIO were to be convicted of such an offence arising during the site closure process, the Minister may require RTIO to carry out remedial works at its own cost (ss 17(6) & 25(4)).

Risk categorisation = ongoing liability. If RTIO was convicted of an offence then there is potential for the Minister to require RTIO to carry out remedial works for interference to watercourses or wetlands. If that is the case, RTIO's potential liability will continue after closure.

13 Wildlife Conservation Act

RTIO must ensure that it does not harm, destroy or take flora and fauna that is protected under the *Wildlife Conservation Act 1950* (WA). This obligation continues until RTIO has vacated the site.

Risk categorisation = extinguishable liability. RTIO's potential liability will be largely extinguished upon ceasing to occupy the premises.

14 Indigenous Issues

14.1 Indigenous Agreements

All participation agreements and any other agreements which RTIO has entered into with native title parties in relation to its operations should be reviewed to identify any obligations held by RTIO in relation to closure of those operations. Such obligations, if any, may relate to matters such as interests in land, or transfer of interests in certain infrastructure. While some of these native title claims may have been determined, the precise terms of the agreement between RTIO and the native title party will need to be reviewed in order to confirm whether the agreement will continue to apply.

As part of the review of the participation agreements, consideration should be given to the various "Regional Standards" which form part of the Regional Framework Deed. The standards require RTIO to undertake ongoing and regular consultation with each group (including consultation on closure issues). In particular the Environment and Life of Mine Planning standards should be considered, as both are relevant to closure.

Risk categorisation = ongoing liability. .

14.2 Aboriginal Heritage

(a) State Aboriginal Heritage protection legislation

The *Aboriginal Heritage Act 1972* (WA) (**AH Act**) provides that is an offence to alter an Aboriginal site in any way in the absence of Ministerial consent under section18 of the Act (**Section 18 Consent**), or the permission of the Registrar under section 16 of the Act (**Section 16 Permit**).

A person who, having consent or authorisation under section 18 and section 16 of the Act, is in breach of any condition to which the giving of the consent or authorisation was made subject, commits an offence (s 55). The maximum penalties under the Act range from $20,000 to $100,000, depending on whether it is an individual or body corporate, and whether it is the first or a subsequent offence. There is a daily penalty of $400 for an individual and $1,000 for a body corporate (s 57).

(b) Commonwealth Aboriginal Heritage protection legislation

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Cth) (**Cth Act**) applies to 'significant Aboriginal areas' following a declaration by the Commonwealth Minister under the Act in relation to a specific area. A declaration has the effect of prohibiting injury to, or the desecration of, the particular area, object or class of objects specified in the declaration, wherever it is situated. It is an offence to engage in conduct which contravenes the terms of such a declaration.

(c) The EPBC Act

As referred to in part 6 above, heritage matters, including indigenous heritage, may be matters of national environmental significance under the EPBC Act.

(d) Risk categorisation

Activities associated with the closure of operations should be assessed in terms of potential impact on Aboriginal Heritage, and to the extent that impact upon Aboriginal sites, if any, cannot be avoided then relevant consents should be obtained.

Risk categorisation = ongoing liability. Depending on the sites and consents applicable, RTIO may have ongoing liability post closure.

14.3 Native Title

The *Native Title Act 1993* (Cth) (**NTA**) provides that future acts can be invalid to the extent that they affect native title. If activities associated with closure involve the grant of any land tenure or interests, or any other act, which could affect native title, then it will be necessary to comply with the future act provisions of the NTA.

Risk categorisation = potential ongoing liability. Depending on whether native title claims exist and how they have been progressed, RTIO may have ongoing liability post closure.

14.4 Aboriginal Reserve Lands

Under the *Aboriginal Affairs Planning Authority Act 1972* (WA) (**AAPAA**), land which is reserved for the use and benefit of Aboriginal people may be proclaimed by the Governor as Reserved land to which Part III of the AAPAA applies. The AAPAA provides that it is an offence to enter or remain on land which has been so proclaimed without holding an entry permit issued by the Minister under the AAPAA regulations. If activities associated with closure involve entering or remaining on Aboriginal Reserve lands the then the relevant permits should be obtained.

Risk categorisation = potential ongoing liability depending on whether Aboriginal Reserve lands are impacted.

15 Mines Safety and Inspection Act

15.1 General

The following obligations may apply to all sites.

Occupational safety and health in mining operations is regulated by the *Mines Safety and Inspection Act 1994* (**MSI Act**) and the *Mines Safety and Inspection Regulations 1995* (**MSI Regulations**). RTIO must comply with the provisions of the MSI Act.

15.2 Duties in relation to operations

In relation to the operations for decommissioning or closure, the usual duties under the MSI Act will apply. These include the general duties of care which fall on RTIO as principal employer, employer, deemed employer, person in control of a workplace, etc. As a minimum, RTIO must undertake a hazard assessment of any relevant operations and put in place measures to minimise any identified risks.

15.3 Regulatory requirements for closure

The MSI Act and MSI Regulations also create specific obligations for the abandonment or suspension of mining operations. RTIO must notify the District Inspector for the relevant region in writing in the following circumstances:

- before mining operations are abandoned – section 42(1)(c); and
- before mining operations are suspended – section 42(1)(d).

The notification should be accompanied by evidence which satisfies the District Inspector that the requirements under the Act for the abandonment or suspension of mining operations have been fulfilled. Each notification must include the following details:

- the name and location of the mine – regulation 3.12(a);
- the number of the lease, tenement or other interest – regulation 3.12(b);
- the name and address of the principal employer – regulation 3.12(c);
- what mining operations are to be affected, and whether they are to be commenced, recommenced, abandoned or suspended – regulation 3.12(d); and
- the date on which the mining operations are to be commenced, recommenced, abandoned or suspended – regulation 3.12(e).

On receiving a notification, the District Inspector will inspect the mine and verify the evidence provided with the notice and make a record accordingly. Notification of the suspension of mining operations must also include the following information amongst other matters:

- the reason for the suspension and the planned duration of the suspension – regulation 3.14(a);
- whether the closure is total – regulation 3.14(b);
- the measures that have been taken to prevent unauthorised access or entry to the mine – regulation 3.14(d); and
- an accurate plan or plans of the mining operations to the time of suspension with the plan/s going to the State mining engineer before the mining operations are abandoned or suspended – regulation 3.14(f).

Notification of the abandonment of mining operations at a mine must also include the following information amongst other matters:

- details of precautions taken to ensure that all plant and equipment have been removed or secured and left in a safe condition – regulation 3.16(d);
- details of precautions taken to remove or properly dispose of all hazardous substances at the mine – regulation 3.16(e); and
- an accurate plan or plans of the mining operations to the time of abandonment with the plan/s going to the State mining engineer before the mining operations are abandoned or suspended – regulation 3.16(f).

If mining operations are abandoned or suspended RTIO must keep all record books and log books kept under the MSI Act in respect of the mine for a period for 6 years from the time of abandonment or suspension and take steps to ensure they are kept safe for that period if RTIO appears likely to go into liquidation or receivership (section 89(3) MSI Act).

A breach of the MSI Act or MSI Regulations could expose RTIO to criminal prosecution under the MSI Act and may give rise to a cause of action for breach of statutory duty at common law (see part 21.3 of this review for further details).

Risk categorisation = ongoing liability. RTIO's potential liability will continue after closure with respect to ensuring compliance with plans associated with closure.

16 Occupiers Liability Act

The following obligations may apply to all sites in relation to closure (as well as day to day operations).

At common law an occupier of land may owe a duty of care to visitors or the public who access the land. The *Occupiers Liability Act 1985* (WA) (**Occupiers Liability Act**) prescribes the standard of care where an occupier of land can be liable for loss, injury or damage suffered by people visiting the land as a result of dangers arising on the land.

As RTIO owes a duty of care to a person on its mine tenements, section 5(4) of the Occupiers Liability Act provides that consideration must be given to the following factors in determining how to discharge the duty:

(a) the gravity and likelihood of the probable injury;

(b) the circumstances of entry on the premises;

(c) the nature of the premises;

(d) the knowledge which the occupier of the premises has or ought to have of the likelihood of persons or property being on the premises;

(e) the age of the person entering the premises;

(f) the ability of the person entering the premises to appreciate the danger; and

(g) the burden on the occupier of eliminating the danger or protecting the person from entering the premises from danger as compared to the risk of danger to the person.

The Occupiers Liability Act does not expose RTIO to any specific liability, however, it does apply to establish the standard of care that will have to be met in the event that a negligence claim is brought against RTIO.

As a minimum, a risk assessment should be undertaken to determine what steps need to be taken to control relevant hazards. It is important to be aware that the liability extends to cases of an occupier creating dangers, and also failing to remove or warn of relevant dangers. We can provide further advice on this process if required.

Risk categorisation = extinguishable liability. RTIO's potential liability will be largely relinquished upon ceasing to occupy the premises.

17 Criminal Code Compilation Act

The Criminal Code is the Schedule to the *Criminal Code Act 1913*, which is Appendix B to the *Criminal Code Act Compilation Act 1913* (WA) (**Code**).

Section 304 of the Code makes it an offence if a person does an unlawful act or omits to do any act that it is the person's duty to do, as a result of:

(a) bodily harm is caused to any person; or

(b) the life, health or safety of any person is or is likely to be endangered.

The person is guilty of a crime and is liable to imprisonment for 5 years (or a summary conviction of $24,000 or imprisonment for 2 years). A maximum conviction of 20 years applies if the act or omission is committed with intent.

Risk categorisation = ongoing liability. RTIO's potential liability will continue after closure to the extent it remains responsible for certain activities on the premises.

18 Relevant workforce legislation

RTIO will need to comply with the relevant workplace relations legislation as well as employment contracts and industrial instruments in place at the time of closure.

The key issues will arise in relation to any terminations of employment which arise from cessation of mining operations and closure of sites.

RTIO will have obligations to seek to redeploy employees to other operations if possible. Issues may arise under employment contracts and industrial instruments as to who can be redeployed and on what terms.

In the event of redundancies, RTIO will need to comply with relevant legislative and industrial requirements. The *Workplace Relations Act* 1996 (Cth) contains requirements in relation to termination of employment and specifically in relation to terminations arising for genuine operational reasons (ie redundancies). There may also be some requirements arising under State industrial laws.

For example, there may be requirements to inform employees of proposed significant changes to operations and to inform relevant government departments (and possibly relevant unions) of proposed redundancies.

Failure to provide appropriate notice of termination or payment in lieu, payment of accrued leave entitlements, and severance payments may also lead to unfair or unlawful termination claims. It will also be important to ensure that any process for selection for redundancy versus redeployment does not include any prohibited grounds.

19 Agreements, Licences, Permits, Approvals and other tenure

Closure obligations may also be specified in agreements (including joint venture agreements), licences, permits and approvals. Each agreement, licence, permit or approval is likely to be different and should be included in the review of the specific closure obligations applicable to particular RTIO operations.

RTIO has land subject to tenure arrangements other than under State Agreements or the Mining Act. That tenure should be reviewed on a case by case basis to identify and understand any closure obligations that might arise from the tenure arrangements.

20 International Standards – ISO 14001:2004

International Standard 14001:2004 (**the Standard**):

- specifies the requirements for an environmental management system (**EMS**) to allow an organisation to develop and implement policies and objectives which take into account legal and other requirements to which it subscribes; and
- provides information about significant environmental aspects.

The Standard does not state specific environmental performance criteria itself and only applies to environmental aspects that the organisation identifies as those which it can control and influence. The revised ISO 14001:2004 does not make fundamental changes to ISO 14001:1996 but clarifies the purpose of the standard and increases alignment with the ISO 9001 Quality Management Systems standard. The revised ISO 14001:2004 places emphasis on compliance.

The Standard requires organisations to:

- establish, document, implement, maintain and continually improve their EMS and to determine how it will fulfil these requirements;
- implement and maintain procedures to identify the environmental aspects of its activities, products and services that it can control and influence;
- determine those aspects that have or can have significant impact on the environment;
- identify and have access to the applicable legal requirements and other requirements to which the organisation subscribes, and to determine how these requirements apply to its environmental aspects; and
- establish, implement and maintain documented environmental objectives and targets.

The revised ISO 14001:2004 requires organisations to comply with certain processes of implementation and operation of environmental management systems (including resources, roles, responsibility and authority; competence, training and awareness; communication; documentation; control of documents; operational control and emergency preparedness and response).

Further, an organisation must:

- establish, implement and maintain a procedure to monitor and measure, on a regular basis, the key characteristics of its operations that can have a significant environmental impact;
- periodically evaluate compliance with applicable legal requirements and other requirements;
- deal with actual and potential nonconformity and for taking corrective and preventative action;
- keep records as necessary to demonstrate conformity to its environmental management system and to the Standard;

- ensure that internal audits of the environmental management system are conducted; and
- (top management) review the environmental management system.

Effectively, ISO 14001:2004 provides procedures and compliance mechanisms with regards to:

- environmental aspects, objectives, targets and programmes;
- resources, roles, responsibility and authority;
- competence, training and awareness;
- communication;
- non-conformity, corrective and preventative action;
- internal audit; and
- management review.

International standards do not impose legally binding obligations on RTIO. However, compliance with these standards assists in providing evidence of compliance with best practice standards and on that basis, compliance with such standards may assist in a defence to a common law action (see part 21 below). Further, compliance with standards is also likely to assist in establishing that RTIO took all reasonable precautions and exercised due diligence to prevent the commissioning of certain offences under the EP Act (relevant to defences under the EP Act, see part 4.14 above) and other Acts.

21 Common Law Liability

Nuisance, negligence and breach of statutory duty are the three main common law actions which may be taken against RTIO in relation to its environmental or health and safety performance in closing a site. A summary of those actions is provided below.

21.1 Nuisance

Nuisance is based on the infringement of another person's rights to the enjoyment of their property or a public amenity. Liability is decided by whether the alleged nuisance is reasonable in the circumstances of the case. This usually depends on the nature of the locality, the extent of the nuisance and the actual or potential harm caused.

An affected person may take an action in nuisance where the environmental effects of site closure practices have caused or are causing material damage to the use of their property or a public amenity. If an action is taken, RTIO will have to establish that its closure practices were reasonable in the circumstances. It will be able to better do so by reference to a properly implemented closure plan.

21.2 Negligence

Every person owes a duty of care to avoid causing harm to others or their property. Liability is decided on the basis of whether the standard of care attaching to that duty was breached and whether material damage resulted. For example, RTIO owes a duty of care to those persons for whom it is reasonably foreseeable could be harmed by the environmental effects, if any, caused by a closed site.

If a person entered a closed site and suffered harm due to unsafe conditions, RTIO may be liable for harm suffered by that person. To avoid liability for negligence, RTIO must be able to demonstrate that it took reasonable precautionary action to alleviate the risk of harm to others.

21.3 Breach of statutory duty

RTIO's obligations under legislation may also give rise to a statutory duty for which it will be liable if not fulfilled. Liability for breach of statutory duty is distinct from liability for negligence and RTIO may be liable for breach of statutory duty even though it may not be liable for negligence.

The types of statutory duty that courts have held to be actionable by private individuals include the duty not to cause a significant environmental impact and not to compromise industrial safety.

Generally, where a statutory provision prescribes a specific precaution for environmental protection or human safety and a duty of care exists under the general law of negligence, the duty will give rise to a private right of action under the statutory provision. In all cases, questions arise as to whether the statutory duty confers on individuals a private cause of action, whether that duty was breached and whether the duty is in fact owed to the plaintiff (i.e. the particular person bringing the action).

21.4 Summary of common law liability issues

A breach of relevant legislation (eg EP Act, Mining Act, MSI Act or associated regulations under these acts):

- may be evidence of a failure to comply with the duties under the MSI Act;
- may create a duty of care for the purposes of the Occupiers Liability Act;
- may be evidence of negligence or nuisance for the purposes of a common law action in negligence or nuisance; and/ or
- may give rise to a cause of action for breach of statutory duty at common law.

22 Rio Tinto Closure Standard (Version 4, 2012)

This closure standard was created by Rio Tinto to provide a standard to ensure that Rio Tinto managed activities are left in a condition which minimises adverse impacts on the human and natural environment. As such, it does not create legally binding obligations. However, it does set the standard that Rio Tinto aims for when decommissioning and rehabilitating its sites. Internal standards are effectively an undertaking to conduct a process in a certain manner and will provide evidence of the systems within an organisation. They can assist to establish the reasonable precautions defences under the EP Act, but also to assist avoiding potential incidents arising in the first place.

As the standard is applicable to all Rio Tinto managed activities, RTIO should ensure that it is familiar with the closure standard and follows the process for planning and implementing its closure strategy for each particular operation.

Importantly, the planning process has a number of steps including:

- developing and maintaining a knowledge base of the environment in which the operation is being developed and/or operates;

- developing and maintaining a closure strategy that promotes a consolidated multi-disciplinary approach to closure and post-closure obligations. The multi-disciplinary approach includes seeking legal advice where necessary and integrating the full range of social, environmental and economic implications that flow from closure;
- developing and maintaining a closure management plan to describe the operation's 'vision' for closure and associated preferred closure option. At a minimum, performance projections and targets must be set to cover:
  - rehabilitation;
  - bio-diversity;
  - socio-economics;
  - communications; and
  - employee relations.

Identifying and managing the legal requirements for closure are part of this planning process.

The closure standard also requires that the content of the knowledge base is periodically reviewed and updated. RTIO should ensure that it has a system in place for regularly reviewing and updating its knowledge base, including seeking additional legal advice prior to decommissioning sites. The closure plan must be fully updated at least every 5 years. This includes a review of and update of the legal position. The update process must be conducted by a multi-disciplinary team and consider future trends and possible changes in standards or expectations.

We also note that the standard directs RTIO to ensure that there are formal agreements between itself and any purchaser in the case of divestment. In this case the purchaser must agree to fulfil a minimum set of closure requirements and will close the site to an agreed set of closure standards. RTIO should also ensure that agreements regarding closure are made with the relevant government agencies and other stakeholders, as outlined in the Rio Tinto closure standards.

The closure standard lists a number of other relevant documents. We have not been provided with any of these documents and have not included them in our review. Please contact us should you wish us to review these documents and incorporate them into our advice.

23 Future law

We identify below other relevant legislative and policy changes or proposals that may become relevant to closure. Please advise if you require further advice in relation to these items.

23.1 Environmental offsets

An environmental offset is any environmentally beneficial activity undertaken to counterbalance an adverse environmental impact. Environmental offsets enable development to occur, but not at the total expense of the environment.

(a) Commonwealth

DSEWPC has released a draft *Environmental Offsets Policy* (**Policy**). The Policy provides guidance on the determination of suitable offsets during the Part

9 assessment stage of the Commonwealth environmental impact assessment process. The Policy will not be considered at the referral stage. Rather, it is proposed offsets will be used when a proposal is likely to have a significant impact on a matter of NES and despite all reasonable measures been taken to avoid or mitigate the impact, the residual impact from the proposal is still likely to have a significant impact.

The Policy proposes the use of both direct and indirect offsets, the former of these relates to those offsets that amount to on the ground protection, while the later refers to a range of measures including increased knowledge and understanding. Importantly, the Policy also outlines in detail:

- factors to be taken into account when assessing whether an offset is necessary; and
- factors to be taken into account when assessing if a proposed offset is a suitable offset.

It is likely that RTIO proposals will be subject to offset considerations when being evaluated under the impact assessment process.

(b) Western Australia

EPA Position Statement No 9 expresses the need for environmental offsets to have a long-lasting benefit. However, the requirements and guidance set out are uncertain in terms of cost and timeframe. The State Government's position on offsets is very general in its terms and its application is very project specific.

Where relevant, future expansion plans requiring EP Act Part IV approval may have a condition imposed relating to offsets. Offsets will likely have a life beyond operations. That is, depending on the nature of the offset, liability for ongoing maintenance of the offset may remain with RTIO post relinquishment of mining tenements and therefore impact on closure.

23.2 Closure standards

We note that the MOU between the DoIR and EPA in relation to the referral of onshore mineral exploration and mining development proposals requires referral documents to specify closure standards in accordance with the ANZMEC/MCA Strategic Framework for Mine Closure. In particular, that mine closure issues should be considered before mining commences and that mine planning and mine closure are integrated.

Future approvals will therefore entrench closure requirements (and standards) at least to the extent required by the evolving closure standards.

23.3 Proposed changes to the EPBC Act

The Federal Government has recently published a document entitled, *Reforming national environmental law: An overview*. The publication indicates several possible amendments to the EPBC Act, the two most significant are:

- introducing Regional Environmental Plans and Strategic Assessments to allow broad classes of actions to bypass the Commonwealth Impact Assessment process; and
- introducing 'ecosystems of national significance' and 'vulnerable ecological communities' as matters of national environmental significance.

These changes are expected to be tabled in Parliament in 2012.

23.4 Water Act

It is likely that many of the obligations contained in the *Rights in Water and Irrigation Act 1914* will soon be incorporated into the proposed *Water Services Bill 2011*. However, it is unlikely that any of RTIO's positive obligations will change as a result of the new legislation.

24 Regulators

24.1 General statutory obligations

(a) Western Australia

(1) The Environmental Protection Authority and the Office of the EPA are responsible for setting offsets and auditing closure conditions approvals under Part IV of the EP Act.

(2) The Department of Environment and Conservation is responsible for administering the:

- *Environmental Protection Act 1986;*
- *Environmental Protection (Controlled Waste) Regulations 2004;*
- *Environmental Protection (Unauthorised Discharges) Regulations 2004;*
- *Contaminated Sites Act 2003;*
- *Conservation and Land Management Act 1984;* and
- *Wildlife Conservation Act 1950.*

In addition, the Department of Environment and Conservation also administers all licences, approvals, notices and permits granted under the *Environmental Protection Act 1986.*

(3) The Department of Mines and Petroleum is responsible for administering the:

- *Mining Act 1978;* and
- *Mines Safety and Inspection Act 1995.*

(4) The Department of the Attorney General is responsible for administering the:

- *Occupiers' Liability Act 1985;*
- *Criminal Code Compilation Act 1913;*
- *Aboriginal Affairs Planning Authority Act 1972;* and
- AH Act.

(5) The Department of Regional Development and Lands is responsible for administering the *Parks and Reserves Act 1895.*

(6) The Department of Water is responsible for administering the *Rights in Water and Irrigation Act 1914.*

(7) The Department of State Development is responsible for administering State Agreements.

(b) Commonwealth

(1) The Department of Sustainability, Environment, Water, Population and Communities is responsible for administering the:

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

(2) The Department of the Attorney General is responsible for the administration of the *Native Title Act 1993*.

24.2 Mine Closure Plans

From 1 July 2011, the EPA will generally not assess mine closure as part of its environmental impact assessment of mining proposals under the Environmental *Protection Act 1986*, where they are subject to the *Mining Act 1978*. The EPA will only assess mine closure in these circumstances if it considers there are particular issues which pose a high environmental risk or where the proponent request parallel assessment. The EPA will consult with DMP before making any such decision.

For mining projects not subject to the *Mining Act 1978* (such as pre- 1899 title or minerals-to-owner tenure, Hampton locations or State Agreement Act projects) the EPA will normally assess mine closure as part of its EIA process. This is likely to be the case for most of RTIO's major Pilbara operations. As a matter of course the EPA will consult with DMP on these assessments.

Where the EPA does assess mine closure, it is likely an approval condition will be applied requiring preparation of a MCP. In this circumstance, it is stated in the Guidelines that compliance monitoring of this approval condition may be delegated to the DMP. However, legally the DMP has no jurisdiction to enforce Part IV approval conditions.

As such the principle regulator for MCPs is the DMP but the Guidelines state that the approval processes for MCPs will often require advice or endorsement from other environmental regulators.

Tony van Merwyk
Partner
Herbert Smith Freehills

+61 8 9211 7660
+61 407 467 660
tony.vanmerwyk@hsf.com

Michael Voros
Special Counsel
Herbert Smith Freehills

+61 8 9211 7519
+61 409 437 497
michael.voros@hsf.com

LAORS Approval / Agreement and

Type: Approval / Agreement, Site Name: West Angelas, Project Name: All, Discipline: All, Approval Type: All, Regulatory Body: All, Status: All, Closure Obligation: Yes, Enviroment Reporting Requirement: No, Included Historic: No, Phase Regulatory: All, Phase RTIO: All, Document Details: No

Site Name	Project Name	Type	Expiry Date	Title	Reference No	Requirement	Approval Type	Regulatory Body	Resp Person	Deleg / App Person	Phase Regul.	Phase RTIO	Status	Cl Obl	Env Rep Req	Enviro Report Type	First Report Due Date	Rep Freq
West Angelas	West Angelas Operations	Approval	28/05/2016	DEC Licence L7774/2000/6	Tyre Storage and Disposal - 12	The licensee shall ensure that the following criteria is met when tyres are stored and buried at the premises: - the quantity of used tyres stored at the premises shall not exceed 100 at any one time - the tyres are buried as soon as practicable after placement in the waste dumps - a minimum depth of 100mm of soil cover is maintained over the buried tyres following disposal - batches of tyres are separated from each other by at least 100 mm of soil with each batch consisting of not more that 1000 whole tyres or 40 cubic metres of tyre pieces - tyres are buried with a minimum cover to tyre ratio of 4 to 1. That is 4m3 of soil or rubble cover to 1m3 of tyre waste - tyres are buried under a final cover of not less than 2 metres of soil	EP Act Part V	Department of Environment Regulation (DER)	Manager Mining	Development Superintendent	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	AACR AER	30/04/2013	Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Purpose - 1.1	This Plan will be extensively updated and developed at least six months prior to the decommissioning of the West Angelas Project.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Objectives - 1.3	The objectives of the Decommissioning and Rehabilitation Management Plan are: - To ensure that progressive rehabilitation of disturbed areas renders them safe and stable and encourages the re-establishment of self-sustaining vegetation, and - To ensure that rehabilitation of all disturbed areas is to a suitable standard.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Robe's HSE Management System - 2.2	Further details of Robe's HSE Management System and RQMS are contained in the West Angelas Project Environmental Management Program.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Legislative Requirements - Robe's ERMP Commitments - 2.4.2	Robe made the following commitment relevant to this Plan in the West Angelas ERMP: An Environmental Management Plan would be prepared which would include, but not be limited to consideration of: - Rehabilitation and revegetation of disturbed areas. This Plan has been prepared to meet this commitment.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Objectives - 3.1	The objectives for the construction phase are as follows: - To ensure that disturbance of areas not actually mined or required for infrastructure is minimised, - To ensure that vegetative material is removed and stockpiled correctly, and - To ensure that seed bearing topsoil is removed and stockpiled correctly.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual

West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Rehabilitation Areas - West Angelas Minesite - 3.2.1	Progressive rehabilitation will occur throughout the life of the West Angelas Project with final rehabilitation occurring after decommissioning. Cleared or disturbed areas to be rehabilitated include, but are not limited to: - exploration gridlines, - drill pads, - access roads, - lay down areas, - bore locations, and - other cleared areas.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Rehabilitation Areas - West Angelas Railway - 3.2.2	Progressive rehabilitation of cleared areas associated with the railway will also occur throughout the life of the project, though primarily in the Post Construction phase. Final rehabilitation will occur after decommissioning. Areas to be rehabilitated include but are not limited to: - Borrow pits, - Construction camp sites, - Bore locations, and - Disused access roads and tracks.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Management Actions - Minimisation Of Areas Disturbed - 3.3.1	(1) Disturbance of areas not actually mined or required for infrastructure will be minimised. Limits of clearing will be demarcated in the field.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Management Actions - Vegetation Stockpiling - 3.3.1	(2) Cleared vegetation will be stockpiled for respreading either directly or at a later date to minimise erosion and aid in rehabilitation.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Management Actions - Vegetation Stockpiling - 3.3.1	(3) Cleared vegetation will not be burnt as this will destroy seed, organic and biological content that is beneficial for successful rehabilitation.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Management Actions - Vegetation Stockpiling - 3.3.1	(4) Vegetative material will be stockpiled longitudinally along the sides of the cleared area and left in neat windrows for rehabilitation.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual

West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Management Actions- Topsoil Stockpiling - 3.3.3	(5) The top 100 mm part of the soil profile, called seed bearing topsoil, (can range from loams to rocky material) will be removed using a dozer or front end loader. Using a grader for this operation tends to pulverise the soil structure, due to the many passes required to move the material and reduces its potential for successful rehabilitation.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Management Actions- Topsoil Stockpiling - 3.3.3	(6) Topsoil will not be stored in large heaps. Once soils are disturbed, biological and composting processes are activated which slowly destroy both the seed bank and biological content. Low mounds of no more than 1.5 metres high will be used. Topsoil stockpile locations will be recorded and signposted to prevent them from being used for other purposes or disturbed by other activities.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Management Actions- Topsoil Stockpiling - 3.3.3	(7) Stockpiles of topsoil will be used as soon as possible. Where it is known that the material will be stockpiled for long periods, i.e.. a number of years, the surface profile will be roughly spread and ripped to contour, promoting germination. This will encourage plant establishment and the setting of seed to maintain the seed bank.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Management Actions- Topsoil Stockpiling - 3.3.3	(8) Topsoil will be stored where it will not be affected during construction activities, and away from areas of surface water flow.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Management Actions- Topsoil Stockpiling - 3.3.3	(9) In pursuing best practice techniques, soils will not be stripped when they are wet and waterlogged where possible, as this can lead to compaction and loss of soil structure.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Management Actions- Topsoil Stockpiling - 3.3.3	(10) The risk of topsoil stockpiles becoming a source of airborne dust will be minimised though an initial application of water where practicable. This will reduce dust during the establishment of the stockpile, as well as encouraging the growth of vegetation and the formation of a crust which retards future dusting.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Performance Indicators - 3.4	Robe's performance will be reviewed against the following indicators: - Minimisation of vegetation cleared, - Correct storage of topsoil, and - Correct storage of vegetation overburden	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Monitoring - 3.5	The progress of all management actions will be monitored using the Robe Action Management System (RAMS), and - An environmental officer will inspect all cleared areas to ensure that topsoil and vegetation overburden are being stockpiled as per the guidelines in this plan.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual

West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Timing-Minimisation Of Areas Disturbed - 3.6.1	Clearing of areas not directly used for mining will be kept to a minimum at all times throughout the life of the West Angelas Project.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Timing-Vegetation Stockpiling - 3.6.2	Clearing of vegetation and stockpiling of the vegetative material will occur during the construction phase.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Timing-Topsoil Stockpiling - 3.6.3	Topsoil stockpiling will occur throughout the construction phase. Earthworks will be carried out when the soil is dry enough to move. Earthworks will not be attempted when the soil is wet and waterlogged.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Construction Responsibility - 3.7	Robe's management will utilise the Robe Action Management System (RAMS) to delegate responsibilities to line management and track progress of management actions.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Objectives - 4.1	The objectives for the post–construction phase are as follows: - Prevent evaporation of groundwater brought to the surface by capillary rise in the soil cover, - Minimise the long term visual impact by reshaping the land so it is compatible with the adjacent landscapes, and - Encourage the re-establishment of self-sustaining ecosystems	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Areas to be Rehabilitated - 4.2	Refer to section 4.2.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Management Actions - Progressive Rehabilitation - 4.3.1	(11) Disturbed areas will be progressively rehabilitated as soon as practicable at the end of ground disturbing activities.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			

															MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Management Actions - Batters and Slopes - 4.3.2	(12) Waste dump or steep slopes will be battered until they are characteristic of the natural slope of the area. Batter slopes will be formed to comply with DME guidelines (DME, 1996) with slopes of no greater than 200. This will promote stabilisation and water harvesting to ensure vegetation establishment. Where possible waste dumps will be constructed to have a rounded footprint and shape blended into existing hill slopes and the landscape generally. Borrow pit slopes will be battered to a maximum slope of 1 in 3.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Management Actions - Batters and Slopes - 4.3.2	(13) Windrows will be used along the toe and along the crest of all slopes to prevent water entering onto slopes and causing erosion down the face. Bottom windrows will help hold any erosion that may occur on the slope face."	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Management Actions - Back-Filling of Mine Pits - 4.3.3	(14) Mine pits will be back-filled so the groundwater table is below the surface. Groundwater loss through capillary action and subsequent evaporation will then be negligible following completion of mining.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Management Actions - Topsoil Application - 4.3.4	(15) The recovery and use of seed bearing material or topsoil is one of the most important elements for successful rehabilitation. All vegetation overburden and where possible the top 100 mm of soil will be re-spread over disturbed surfaces to act as a mulch, seed trap and store, as protection from erosion and to inhibit access.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Management Actions - Topsoil Application - 4.3.4	(16) Where practical topsoil will be used immediately for rehabilitation purposes to achieve optimum results.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Management Actions - Ripping - 4.3.5	(17) Ripping via the use of a triple tyne will be used where practicable in areas that have a hardened or compacted soil surface (such as heavily used access tracks) to break compaction. This will foster water retention, water management and create seed trapping niches.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual

West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Management Actions - Ripping - 4.3.5	(18) All ripping will be carried out using a triple tyne bulldozer or other suitable equipment to a depth of no more than 500 mm (Robe, 1997). Ripping will be along the contour with 1 m between rip lines to prevent water movement down slopes and ensure effective water penetration for plant use.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Management Actions - Ripping - 4.3.5	(19) Ripped ground will not be driven over. Ripping will start at the furthest point and finish at the exit point, and be left as rough as possible. This roughness helps to discourage people from driving into pits and damaging rehabilitation establishment.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Management Actions - Seeding - 4.3.6	(20) Seed will be collected from as many local native species as possible to provide a blend of up to 40 different species, ranging from tree species down to ground covers. Emphasis will be placed on spinifex (climax species) and nitrogen fixing legume species (wattles).	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Management Actions - Seeding - 4.3.6	(21) All seeding will be undertaken in a manner so as to reduce the number of seeds lost to deep burial. Current practices are seeding by hand. Should future developed technology improve this process, the use of such technology will be considered. The rate of seed applied will depend on the amount of topsoil applied. Rates will generally be between 5 and 10 kg/ha.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Management Actions - Weed Control - 4.3.7	(22) If weeds are found to be present in areas being rehabilitated, weed control will be undertaken in a manner which is consistent with the Weed Management Plan.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Management Actions - Fire Protection - 4.3.8	(23) Wildfires can significantly effect rehabilitation efforts. Robe will review existing fire control/suppression plans to ensure they are adequate. Fire control measures such as developing fire breaks and low fuel load areas will be developed.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Management Actions - Signage - 4.3.9	(24) Appropriate signage will be erected to advise where ever rehabilitation is in progress and that personnel are not permitted to enter the area. Access, if granted, will only be permitted by foot.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual

West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Management Actions - Development of Completion Criteria - 4.3.10	(25) The rehabilitation programme will be based on post-mining land use objectives established by baseline study and consultation during the pre-mining and early operational phases of the project. At the conclusion of the project Robe together with representatives of relevant decision making authorities will determine whether the land use objectives have been met or will be met without further management intervention. Objective completion criteria will be established to facilitate the release of Robe from the environmental obligations. The nature of the completion criteria will depend on the type of end-use which has been selected and the environmental factors in the project area. Completion criteria may be as diverse as engineering specifications for structures, water quality standards for runoff or leachate, erosion/sedimentation rates, the return of specific plants, animals or biotic communities or the establishment of a self-perpetuating and resilient vegetative cover. Completion criteria to be developed will be site and location specific.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Performance Indicators - 4.4	Robe's performance will be reviewed against the following indicators: - Progressive rehabilitation of suitable areas, -Waste dump sides and steep slopes will be to a maximum batter of 200 - Borrow pit slopes will be battered to a maximum slope of 1 in 3. - Re-use of all vegetation overburden and 100 mm of topsoil, - Ripping to a depth of no more than 500 mm, - Degree of weed infestation, - Development of fire breaks and low fuel load areas,- Signs placed at appropriate locations, and - Development of completion criteria	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Monitoring - 4.5	A program to monitor the success of rehabilitation and the fulfilment of completion criteria will be developed in consultation with relevant government agencies prior to construction. - The progress of all management actions will be monitored using the Robe Action Management System (RAMS). - Monitoring will be undertaken systematically at regular intervals such as the first year after rehabilitation and again in years 2, 5 and 10. In addition, annual visual and photographic assessments will be made. - Standard sampling techniques will be adopted, including the establishment of photographic records. Transects will be used to quantify the establishment of vegetation, while in some areas, profile gauges and/or erosional transects will be used to measure rates of erosion in susceptible areas. The results of monitoring in rehabilitated areas will be compared with those recorded in control sites.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Timing - Progressive Rehabilitation - 4.6.1	Progressive rehabilitation will be carried out as soon as practical (after ground disturbing activities have finished) during all phases of the project.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Timing - Batters and Slopes - 4.6.2	Battering of steep slopes will be carried out as soon as practical.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Timing - Back-Filling of Mine Pits - 4.6.3	Back-filling of mine pits will occur as soon as practical	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			

																MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Timing - Topsoil Application - 4.6.4	Earthworks will be carried out when the soil is dry enough to move. Earthworks will not be attempted when the soil is wet and waterlogged.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Timing - Ripping - 4.6.5	Earthworks will not be undertaken during wet or boggy conditions.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Timing - Seeding - 4.6.6	Where possible provenance seed will be used for rehabilitation works. The area for collecting provenance seeds for rehabilitation will be confined to the Hamersley Range between Tom Price and Paraburdoo in the west and Newman in the east. Seed will not be sourced from desert regions to the east of Newman. Where provenance seed is limited CALM will be consulted regarding suitability of alternative sources of seed. Seeding of rehabilitation areas will be carried out as soon as practicable following the completion of earthworks. Where practicable, all works will be completed prior to the commencement of summer rains.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Timing - Weed Control - 4.6.7	Refer to the Weed Management Plan.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Timing - Fire Protection - 4.6.8	Fire control techniques will be enforced at all times during the life of the West Angelas Project.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Timing - Signage - 4.6.9	Appropriate signage will be erected as soon as rehabilitation works begin.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual

West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Timing - Development of Completion Criteria - 4.6.10	These will be defined during the operational phase before decommissioning.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Post Construction Responsibility - 4.7	Robe's management will utilise the Robe Action Management System (RAMS) to delegate responsibilities to line management and track progress of management actions.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Decommissioning - West Angelas Minesite - 5.1	Given the strategic value of the WAP and the presence of a number of other iron ore deposits Robe expects to retain ownership of this facility long after Deposits A and B are exhausted. When it is required a decommissioning plan for the minesite will be developed no later than six months before closure of the facility. The plan will be developed in consultation with relevant stakeholders.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Pre-Closure	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Decommissioning - West Angelas Railway - 5.2	Decommissioning of infrastructure areas required for the construction phase of the West Angelas Railway will be as follows: - Groundwater bores will not be totally decommissioned but capped and locked for potential future use; - Drill pads and access tracks will be rehabilitated; - Borrow pits will be progressively rehabilitated after they have finished being used; - After construction is complete, the quarry will be maintained in case there is a need for rail ballast for future maintenance activities. It will be decommissioned and rehabilitated at the end of the operational life of the mine or as determined in consultation with relevant government agencies. Where possible worked out areas of the quarry will be progressively rehabilitated; - Temporary access roads and tracks to borrow pits, camps and work sites will be rehabilitated. - Camps and their associated infrastructure will be decommissioned and the areas rehabilitated after they have finished being used. - The rail quarry access road and roads to radio communication towers will be maintained during the operational life of the mine and decommissioned and rehabilitated at the end of the operational life of the mine; - Should it be required appropriate procedures for breaching the rail formation, including the rail access road, following decommissioning will be developed in conjunction with the relevant stakeholders no later than six months before decommissioning. Six months prior to the decommissioning of the West Angelas Project, discussion will be held with the Department of Resources Development on the future use and strategic value of the railway line prior to the completion of a detailed decommissioning strategy.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Pre-Closure	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Decommissioning - Cape Lambert Port - 5.3	Under the Robe State Agreement Act, the Cape Lambert Port facilities will become the property of the State when they are no longer in use. If required, a decommissioning plan for Cape Lambert will be developed no later than one year before closure of the facility. The plan will be developed in consultation with stakeholders (Government, Cossack Pearls, community etc).	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Pre-Closure	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual

West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Decommissioning - Contaminated Sites - 5.4	Identification and remediation of contaminated areas, including provision of evidence of notification to relevant statutory authorities will be undertaken during the decommissioning phase	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Pre-Closure	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Auditing - Robe internal auditing - 6.1	Robe will conduct an annual compliance audit. The results will be reported on in the Annual and Triennial Report which is submitted to DRD. The action items generated by this audit will be managed within Robe's Action Management System (RAMS).	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Auditing - Review by Joint Venture Participants - 6.2	An informal review of Robe's operations will be undertaken by an external consultant as part of the process of generating North Limited's Public Environment, Safety and Health Annual Report. Robe's progress against previous action items will be measured and next years action items will be generated.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Auditing - Audits by Government Agencies - Compliance Auditing - 6.3.1	The Performance and Compliance reports will refer to Ministerial conditions as detailed in the DEP Audit Table for Ministers Statement 514.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Auditing - Audits by Government Agencies - 6.3	Management personnel from Department of Resources Development, Department of Conservation and Land Management, Department of Environmental Protection, Department of Minerals and Energy and Waters and Rivers Commission may audit the site on a three yearly basis in conjunction with the Triennial report review. Action items generated from this audit are managed within RAMS. In addition the DEP Audit branch will check compliance with conditions in the Ministerial statement under part IV of the Environmental Protection Act.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Reporting - Robe Internal reporting - 7.1	All employees and contractors will be required to report environmental near misses, incidents and hazards via their supervisor. The actions resulting from these reports will be managed through the existing Robe Action Management System (RAMS).	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C One off	01/01/1900	6 Year Annual Other
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Reporting - Environmental Reporting - 7.2	All environmental reporting required under this Plan will be detailed in the Annual and Triennial environmental reports required under the Robe State Agreement Act which are submitted to the Department of Resource Development.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P	01/01/1900	6 Year

																MSR C One off		Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Reporting - Environmental Reporting - 7.2	Additionally, Robe will provide relevant data and progress reports, which will be incorporated into North's Annual Environment, Safety and Health Annual Report	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Reporting - Reporting Government Agencies - 7.3	The performance of this Plan will be reported in future Annual and Triennial reports that will be submitted to the Department of Resource Development as required under the Robe State Agreement Act. Where appropriate, monitoring data will be summarised and/or submitted in full in an appendix. Any programme refinements will also be discussed in these reports.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Reporting - Reporting Government Agencies - Performance Review - 7.3.1	[MS-514] condition 14 further describes the review scope which is the objectives contained in EPA Bulletin 924, ERMP commitments and those arising from the fulfilment of conditions and procedures in the Minister's statement (dated 28 June 1999), EMS environmental management targets, EMP's and environmental performance indicators (refer to EPA (1999) for full description). The reporting of the required performance review will be contained in the applicable future Annual and Triennial reports as required under the Robe State Agreement Act.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Reporting - Reporting Government Agencies - Reporting of Non-Compliance Events - 7.3.2	Non-compliance or emergency events will be reported as per the requirements of relevant licences (eg. DEP and WRC). Robe will be responsible for ensuring the timely completion of the report and it's content and presentation are to the satisfaction of the DRD.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C One off	01/01/1900	6 Year Annual Other
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Reporting - Reporting Government Agencies - Reporting of Non-Compliance Events - 7.3.2	Significant hazards and/or incidents are reported to North Limited as the project manager and the Joint Venture Participants Group.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			
West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Management Programme Summary - 8	A table summarising the objectives, actions, timing and performance indicators is set out in this section.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual

West Angelas	West Angelas Operations	Approval		Decommissioning and Rehabilitation Management Plan	Appendix 1 - Summary of Management Actions Relating to Ministerial Conditions	Appendix 1 sets out a summary of the management actions and how these relate to the conditions of the Ministerial statement.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Drainage Diversion Management Plan	Decommissioning - Progressive Rehabilitation - 7.1	Whilst the drains are designed and constructed as permanent structures, progressive rehabilitation will be undertaken wherever possible. Post construction rehabilitation will be undertaken to establish local native plant cover over areas of works and sides of embankments. The rehabilitation will aim to stabilise the structure surface and minimise localised erosion. Any rehabilitation activity will be undertaken in a manner which is consistent with the Minesite Decommissioning and Rehabilitation Management Plan.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Drainage Diversion Management Plan	Decommissioning - Decommissioning Concept - 7.2	As the diversion channels are permanent structures they will remain in place after decommissioning. Any decommissioning activity will be undertaken in a manner which is consistent with the Minesite Decommissioning and Rehabilitation Management Plan.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Manager Water Operations and Closure	Closure Specialist	Pre-Closure	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Environmental Management Plan - Minesite	Construction Management Actions - Vegetation - 5.4.3	In recognition of the potential impacts it is proposed that: (8) Construction will be supervised to ensure it meets the design. (9) Limits of clearing will be demarcated in the field by flagging, signage or temporary fencing as appropriate. Vegetation clearing will be undertaken within the surveyed and pegged areas and limited to the minimum required. (10) A vegetation monitoring program will be established downstream of Deposit B (refer to WAP Drainage Diversion MP). (11) Topsoil and cleared vegetation will be cleared from all areas where infrastructure are located and stockpiled separately for later reuse (refer to Rehabilitation and Decommissioning Management Plan for details). (12) Vegetation clearing will be undertaken in compliance with Appendix 5.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environment Superintendent	SEA	Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Environmental Management Plan - Minesite	Construction Management Actions - Fauna - 5.4.4	In recognition of the potential impacts it is proposed that: (13) The Ghost Bat Management Plan will be implemented (refer to WAP Ghost Bat Management Plan). (14) Any disturbed areas available for rehabilitation will be rehabilitated prior to the commencement of the operation phase. (15) Pits will be fenced or bunded to deter access by larger animals such as kangaroos. (16) Drill hole capping will incorporate best practice methodology for permanent sealing below ground level as detailed in Robes Exploration Environmental Management System. Drill holes will be regularly monitored to ensure the cap remains in place.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environment Superintendent	SEA	Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Environmental Management Plan - Minesite	Post Construction Objectives - 6.1	The objectives of the Minesite Environmental Management Plan during the post construction phase are: (1)To operate the WAP in a manner which minimises erosion, sediment transport and turbidity, (2)To operate the WAP in a manner which minimises the adverse impacts on surface water quality and flows, (3)To operate the WAP in a manner which minimises the adverse impacts on groundwater quality and resource volume, (4)To operate the WAP in a manner which minimises the impact on vegetation (including Declared Rare and Priority Flora), (5)To operate WAP in a manner which minimises dust generation; (6)To operate the WAP in a manner which minimises the impact on fauna, (7)To implement appropriate and effective waste management; (8)To construct waste dumps in a manner which maximises harmony with the landscape, (9)To undertake all activities in a manner which is consistent with the other relevant Management Plans, and (10)To where possible, undertake progressive revegetation and rehabilitation.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environment Superintendent	SEA	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			

																MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Environmental Management Plan - Minesite	Post Construction Management Actions - Vegetation - 6.4.3	In recognition of the potential impacts it is proposed that: (5) Progressive rehabilitation of disturbed areas will be undertaken as soon as possible. (6) Topsoil will be used to rehabilitated disturbed areas as required (refer Decommissioning and Rehabilitation Management Plan Vegetation).(7) Topsoil stockpiles will be managed to maintain topsoil values (refer to WAP Decommissioning and Rehabilitation Management Plan for details).	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environment Superintendent	SEA	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Environmental Management Plan - Minesite	Post Construction Management Actions - Fauna - 6.4.4	In recognition of the potential impacts it is proposed that: (8) Where possible, future clearing will be restricted to existing disturbance corridors. (9) The Ghost Bat Management Plan will be implemented (refer to WAP Ghost Bat Management Plan). (10) Where possible, any disturbed areas available for rehabilitation will be rehabilitated prior to the decommissioning phase. (11) Pits will be fenced or bunded to deter access by larger animals such as kangaroos. (12) Drill holes will be regularly monitored to ensure the cap remains in place.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environment Superintendent	SEA	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Environmental Management Plan - Minesite	Post Construction Management Actions - Groundwater and Surface Water Quality - 6.4.5	Despite the negligible risk and impact of contamination the prevention of contaminants entering the environment is Robe's existing and preferred approach. In recognition of the potential impacts it is proposed that: (14) All surface water run-off collected by the mine pits will be discharged via settlement ponds. Where possible this water will be reused or if the volume exceeds requirements it will be discharged into natural channels (in accordance with the Pannawonica design). (15) When waste dumps are located near drainage channels, the dumps will be monitored and rock armoured if necessary to prevent scouring and erosion (Robe, 1992). (16) Waste dumps will be constructed in accordance with Department of Minerals and Energy guidelines (refer to WAP Minesite Rehabilitation and Decommissioning Plan). (17) All chemicals will be stored on site in accordance with Dangerous Goods Regulations. (18) Wastewater treatment plants will be installed to treat wastewater from workshops, toilet facilities and other potential pollution sources as required. (19) Visual inspections will be undertaken between October and April to ensure that the diversions are functioning as per design. (20) Water quality samples will be taken if potential contaminants are believed to have reached diversion channels and water sampling will be undertaken in a manner which ensures sample integrity. (21) Application of Robe's existing management measures at West Angelas to minimise the possibility of contaminants entering the environment during the operation. For example: (a) Equipment servicing will take place in workshops wherever possible, and (b) Field servicing will be undertaken in a manner which meets best practice field servicing guidelines. (22) In accordance with Robe's existing spill response procedures chemical (including hydrocarbon) spills will be cleaned up as soon as practicable and contaminated soil removed and appropriately disposed of to prevent off site transport. - All DEP and WRC licence monitoring and reporting requirements will be complied with, (23) An investigation will be undertaken to determine the required characteristics of the backfill layer to prevent capillary rise. The investigation will also consider the predicted settlement rates of the backfilled material. (24) Ensure that all employees and contractors comply with the sites environmental management requirement to manage chemicals in a manner which prevents them from contaminating the environment.(25) All employees and contractors will be required to attend an Health, Safety and Environmental induction, which includes a spill prevention and response section.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environment Superintendent	SEA	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			
																MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Environmental Management Plan - Minesite	Post Construction Management Actions - Dust - 6.4.7	In recognition of the potential impacts it is proposed that: (28) All activities will be undertaken to minimise where practical dust generation.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environment Superintendent	SEA	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P	01/01/1900	6 Year

																MSR C		Annual
West Angelas	West Angelas Operations	Approval		Environmental Management Plan - Minesite	Post Construction Management Actions - Weeds - 6.4.8	In recognition of the potential impacts it is proposed that: (29) All activities will be undertaken to minimise the spread of weeds (refer WAP Weed Management Plan).	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environment Superintendent	SEA	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Environmental Management Plan - Minesite	Post Construction Management Actions - Visual Amenity - 6.4.10	In recognition of the potential impacts it is proposed that: (32) Waste dumps will be constructed to have a rounded footprint and where possible, blend each dump into existing hill slopes. Construction will be in accordance with DME regulations.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environment Superintendent	SEA	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Environmental Management Plan - Minesite	Decommissioning - Progressive Rehabilitation - 7.1	Progressive rehabilitation will be undertaken wherever possible. Rehabilitation will be undertaken to minimise erosion potential and to re establish local native plant cover on all areas. Any rehabilitation activity will be undertaken in a manner which is consistent with the Minesite Decommissioning and Rehabilitation Management Plan.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Rehabilitation Specialist		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Environmental Management Plan - Minesite	Decommissioning - Decommissioning Concept - 7.1	Given the strategic value of the WAP and the presence of a number of other iron ore deposits Robe expects to retain ownership of this facility long after Deposits A and B are exhausted. When it is required a decommissioning plan for Cape Lambert will be developed no later than one year before closure of the facility. The plan will be developed in consultation with stakeholders (Government, pastoralists, community etc). Any decommissioning activity will be undertaken in a manner which is consistent with the Minesite Decommissioning and Rehabilitation Management Plan.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Closure Specialist		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Environmental Management Plan - Minesite	Appendix 5 - Vegetation Clearance Procedures	Appendix 5 details the vegetation clearing procedures to apply pursuant to section 5 of this plan, including in table A2.1 a spill clean up and reporting guideline, including the following rehabilitation requirements: - During any earthworks: • Clearing of slopes leading to watercourses will be delayed until construction at the crossing is imminent, therefore minimising erosion and sedimentation risks.• Any cleared vegetation should be stockpiled for re-spreading either directly or at a later date to minimise erosion and aid in rehabilitation. • Do not burn cleared vegetation. - For earthworks where excavations are required, eg. infrastructure, borrow pits: • After vegetation has been cleared the top 100mm profile of soil should be removed and stockpiled separately from the vegetation. • Do not store top soil in large heaps. Once soils are disturbed, biological and composting processes are activated which slowly destroy both the seed bank and biological content. Low mounds of no more than 1.5 metres high are recommended. • Plan to use stockpiles of top soil as soon as possible. Where it is known that the material will be stockpiled for long periods, i.e.. a number of years, the surface profile can be roughly spread and ripped to contour, promoting germination. This will encourage plant establishment and the setting of seed to enrich the seed bank.• Store top soil and cleared vegetation where it will not be affected during construction activities, and away from areas of surface water flow.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environment Superintendent	SEA	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual

West Angelas	West Angelas Operations	Approval	22/06/2030	General Purpose Lease 47/1235	1	Survey	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager	Technical Services Superintendent	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	22/06/2030	General Purpose Lease 47/1235	11	All topsoil and vegetation being removed ahead of all mining operations and being stockpiled appropriately for later respreading or immediately respread as rehabilitation progresses.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	22/06/2030	General Purpose Lease 47/1235	12	At the completion of operations, all buildings and structures being removed from site or demolished and buried to the satisfaction of the Executive Director, Environment Division, DMP.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	22/06/2030	General Purpose Lease 47/1235	13	All rubbish and scrap is to be progressively disposed of in a suitable manner.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	22/06/2030	General Purpose Lease 47/1235	15	At the completion of operations or progressively where possible, all access roads and other disturbed areas being covered with topsoil, deep ripped and revegetated with local native grasses, shrubs and trees to the satisfaction of the Executive Director, Environment Division, DMP.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	22/06/2030	General Purpose Lease 47/1236	12	All topsoil and vegetation being removed ahead of all mining operations and being stockpiled appropriately for later respreading or immediately respread as rehabilitation progresses.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	22/06/2030	General Purpose Lease 47/1236	13	At the completion of operations, all buildings and structures being removed from site or demolished and buried to the satisfaction of the Executive Director, Environment Division, DMP.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	22/06/2030	General Purpose Lease 47/1236	14	All rubbish and scrap is to be progressively disposed of in a suitable manner.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	22/06/2030	General Purpose Lease 47/1236	15	The lessee taking all reasonable measures to prevent or minimise the generation of dust from all materials handling operations, stockpiles, open areas and transport activities.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	22/06/2030	General Purpose Lease 47/1236	16	At the completion of operations or progressively where possible, all access roads and other disturbed areas being covered with topsoil, deep ripped and revegetated with local native grasses, shrubs and trees to the satisfaction of the Executive Director, Environment Division, DMP.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off

West Angelas	West Angelas Operations	Approval		Greenhouse Gas Emission Management Plan	Construction Management Actions - Abatement Actions - 4.1.4.1	Robe will undertake the following management actions: (1) Robe's Greenhouse Challenge Coordinator will coordinate Robe's Greenhouse Challenge response. (2) Energy efficient design or equipment modifications (abatement actions) will be considered for implementation, subject to Robe approval procedures. (3) To ensure abatement actions are dynamic and not just reviewed annually, progress on existing actions and any new action will be recorded and monitored RAMS. (4) As part of the commitment to the Greenhouse Challenge necessary monitoring and reporting by site, type and action will be undertaken, and any supporting information will be retained.(5) Audits will be commissioned and observed by Robe's HSE department and be performed by a third party on a regular basis. (6) Calculation of Greenhouse Gas Emissions. (7) All staff and contractors will attend a HSE Induction that includes an Energy Efficiency and Greenhouse Challenge section. (8) Progressive rehabilitation will be undertaken where possible (refer to West Angelas Mine Site Management Plan and West Angelas Rehabilitation and Decommissioning Plan), and (9) Land clearing will be kept to a minimum (refer to West Angelas Rehabilitation and Decommissioning Plan).	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)		Energy Advisor	Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Greenhouse Gas Emission Management Plan	Construction Performance Indicators - 4.1.5	Construction efficiency is reported as total energy (MJ) used and CO2 (kg) emitted and recorded. Note given the low productivity of the West Angelas vegetation, CO2 emissions from vegetation clearing and CO2 sinks due to revegetation will not be included in the emission calculations.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)		Energy Advisor	Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Greenhouse Gas Emission Management Plan	Operation - Management Actions - Abatement Actions - 5.1.3.1	Robe will undertake the following management actions: (1) The Robe Greenhouse Challenge Coordinator will coordinate Robe's Greenhouse Challenge response. (2) Energy efficient design or equipment modifications (abatement actions) will be considered for implementation, subject Robe's approval process. (3) To ensure abatement actions are dynamic and not just reviewed annually, progress on existing action and any new action will be recorded in RAMS. (4) As part of the commitment to the Greenhouse Challenge necessary monitoring and reporting by site, type and action will be undertaken, and any supporting information will be retained, (5) Audits will be commissioned and observed by Robe's HSE department and be performed by a third party on a regular basis. (6) Greenhouse Gas Emissions will be calculated. (7) All staff and contractors will attend a HSE Induction that includes an Energy Efficiency and Greenhouse Challenge section. (8) Progressive rehabilitation will be undertaken where possible (refer to West Angelas Mine Site Management Plan and West Angelas Rehabilitation and Decommissioning Plan), and (9) Land clearing will be kept to a minimum (refer to West Angelas Rehabilitation and Decommissioning Plan).	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)		Energy Advisor	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Greenhouse Gas Emission Management Plan	Operation - Performance Indicators - 5.1.4	The efficiency of operation will be reported as energy (MJ) consumed per tonne of ore processed and CO2 (kg) emitted per tonne of ore processed. Note given the low productivity of the West Angelas vegetation, CO2 emissions from vegetation clearing and CO2 sinks due to revegetation will not be included in the emission calculations.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)		Energy Advisor	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Greenhouse Gas Emission Management Plan	Operation - Performance Indicators - 5.1.4	Annual disturbance (ha) and rehabilitation (ha) will be reported.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)		Energy Advisor	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			
West Angelas	West Angelas Operations	Approval		Greenhouse Gas Emission Management Plan	Operation - Performance Indicators - 5.1.4	The following data will be used to compile the energy consumption and greenhouse gas emission figures: - Diesel consumption, - Electricity consumption, - Explosive consumption, - Land clearing and rehabilitation data, - LPG consumption, - Natural Gas consumption, - Petrol consumption, - Production statistics as produced from monthly Stockpile Reconciliation, - Solid Wastes, and - Water.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)		Energy Advisor	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			

West Angelas	West Angelas Operations	Approval		Greenhouse Gas Emission Management Plan	Decommissioning - 6	As the decommissioning concept is yet to be developed, discussion can only be made at a broad level. Rehabilitation will be undertaken progressively. A decommissioning plan will be developed in consultation with all stakeholders (including government and community representatives).	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)		Energy Advisor	Pre-Closure	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Groundwater Extraction Management Plan	Decommissioning - Concept - 7.1	A detailed decommissioning plan will be prepared at least one year prior to the cessation of groundwater abstraction activities. The plan will be prepared in consultation with all stakeholders (including representatives of government agencies, the local pastoralist(s) and community groups).	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environmental Superintendent	SEA	Pre-Closure	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Groundwater Extraction Management Plan	Decommissioning - Concept - 7.1	The following concept is proposed in the interim for the groundwater extraction facilities : - All abstraction bores will be decommissioned to make them safe to humans and wildlife and free of erosion, - All equipment will be removed and all bores capped at or below ground level, - All access tracks (and other disturbed areas) not required by Robe for monitoring purposes or stakeholders will be progressively rehabilitated (refer Mine Site Rehabilitation and Decommissioning Plan), and - All mined pits will be backfilled with clean fill to above natural groundwater to minimise the deterioration of groundwater quality (refer Rehabilitation and Decommissioning Plan).	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environmental Superintendent	SEA	Pre-Closure	Operations	DO NOT USE - For Data Upload Only	Y	Y			
West Angelas	West Angelas Operations	Approval		Groundwater Extraction Management Plan	Decommissioning - Progressive Rehabilitation - 7.2	Rehabilitation of existing exploration tracks no longer required will take place once the operational phase begins or sooner if possible.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environmental Superintendent	SEA	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Marine Management Plan	Legislative Requirements - Robe's ERMP Commitments - 2.4.3	Robe made the following commitments relevant to this Plan in the West Angelas Project ERMP (ecologia,1998): - Turbidity from construction of the Cape Lambert stockpile extension will be kept below defined criteria (refer Appendix 1). - The proponent will prepare and implement a dredging management plan to ensure impacts on marine flora and fauna are minimised, and - Existing dredge spoil dumps will be utilised for spoil disposal. This Marine Management Plan has been prepared to meet those commitments. Robe will continue to ensure that this Plan, the Stockpile Construction Management Plan and the Dredging Management Plan all comply with all these commitments.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)			Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Marine Management Plan	Existing Management - Land Based Management Measures - Stockpile Expansion Drainage Design - 6.1.1.1	The requirements for the design to address the water runoff and discharge from land facilities was specified in the WAP Ministerial Conditions (refer Section 2.4.1). The proposed stockpile expansion drainage system is designed to capture any runoff and/or ocean spray and allow it to infiltrate through the sand foundation of the stockpile. The outermost stockpile row has been designed to be approximately 2 metres below the uppermost part of the seawall. This ensures that any iron ore dust contained in the runoff water is filtered by the sand foundation. The proposed new stockpile rows are also flanked by compacted earth, which are at least 4 metres above the foundation level. Implementation of these measures ensures no water runoff or discharge will effect the surrounding marine environment. The existing Robe procedures for spill prevention and response, which are implemented at Cape Lambert, will be continued during stockpile construction and operation phases.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)			Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Marine Management Plan	Decommissioning - 9	Under the Robe State Agreement Act, the Cape Lambert Port facilities will become the property of the State when they are no longer in use. If required a decommissioning plan for Cape Lambert will be developed no later than one year before closure of the facility. The plan will be developed in consultation with relevant stakeholders (Government, Cossack Pearls, community etc).	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)			Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			

																MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Mining Proposal 20934	Robe River Letter	The fibre optic cable (FOC) will be laid in a rift created by a single tyne attached to a Dozer. Once the FOC is put in place, it will be immediately backfilled and then the disturbed ground will be rolled using the roller which is towed by a Dozer.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Mining Proposal 20934	Land Clearing and Topsoil Management	There will be no disturbance of topsoil due to the nature in which the fibre optic cable (FOC) is to be laid. That is, the topsoil remains in situ and the face of the ripping tyne which installs the FOC is only some 0.1 m wide.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Mining Proposal 20934	Flora, Fauna and Weed Management	In the event that weeds are inadvertently introduced, eradication procedures will be undertaken prior to leaving site and in accordance with Company procedures.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Mining Proposal 20934	Rehabilitation	On the completion of the life of the West Angelas Mine Site, the rehabilitation of the fibre optic cable (FOC) corridor will be done as per Company standard and in accordance with Ministerial Statement 514. The primary goal of the rehabilitation is to re-establish a stable land form and a self sustaining system of native vegetation that is similar in diversity, density and cover to pre-disturbance condition and consistent with the on going land use objectives. It is understood that as the FOC is located at a depth of 1 meter below the ground level, it will most probably be left in situ at the time that the West Angelas Mine is rehabilitated.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Pre-Closure	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Mining Proposal 33113	5.5 Power Station Access Road	A sealed, all-weather permanent access road of approximately 1.5km from the existing main West Angelas mine access road to the West Angelas Power Station will be designed and constructed to accommodate all forecasted construction, operational and maintenance traffic to the power station.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Mining Proposal 33113	5.6 Temporary Construction Disturbance	Temporary construction disturbance will be required to facilitate the construction of the power station. Temporary disturbance will include laydown areas, storage and parking area, offices, construction access roads and topsoil stockpiles.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Mining Proposal 33113	5.7.3 Fibre Optic Cable	The trench for the fibre optic cable (FOC) will be backfilled and repaired immediately following the installation of the FOC in a continuous process. This will minimise any potential for fauna entrapment.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Mining Proposal 33113	5.7.5 Borrow	All borrow pits will be located, developed, operated and rehabilitated in accordance with the CEMP and the EMS Borrow Pit Specification and Management Procedure. A programme of work for geotechnical investigations for borrow was approved in May 2011 (REG ID 29988).	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Mining Proposal 33113	7 Environmental Management	Company and its contractors must comply within on any project and includes procedures on the following relevant areas: 1. Ground disturbance and land use management. 2. Soil management. 3. Flora and fauna management. 4. Weed management. 5. Heritage management. 6. Borrow pit management. 7. Air quality and dust management. 8. Water management and drainage. 9. Hydrocarbon management. 10. Noise and vibration management. 11. Greenhouse gas emissions management. 12. Demobilisation, rehabilitation and handover. 13. Waste management. Key aspects are summarised in MP 33113.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off

West Angelas	West Angelas Operations	Approval		Mining Proposal 33113	7.2 Flora and Vegetation Management	The Project will aim to minimise loss of native flora and vegetation communities including the actions as set out in Section 12.5 of the CEMP, which includes the requirement that progressive rehabilitation of any disturbed areas which are no longer required will be undertaken where practicable.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Mining Proposal 33113	7.3 Fauna Management	The Project will comply with the RTIO Wildlife Interaction Guide and Section 12.7 of the CEMP including the following management actions: - All voids i.e. test pits will be visually inspected prior to backfill; - All voids and trenches will be backfilled as soon as practicable once they are no longer required - Vehicle or equipment collisions with fauna will be reported to the Site Supervisor.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Mining Proposal 33113	7.5 Topsoil Management	Topsoil management will be carried out in accordance with EMS procedure, Soil Resource Management Procedure including the following actions: - Topsoil must be stripped to a depth of 200mm, or if less than 200mm is available due to geology, topography and/or safety then as much as possible; - Prior to collection of topsoil, any surface vegetation will be collected and stockpiled proximate to topsoil stockpiles; - Topsoil stockpiles are to be no more than 2 metres in height; - Topsoil stockpiles are to be located; - The location of stockpiles will be signposted as per the HSEQ MS Site Signage Templates; and - A current register of topsoil stockpiles will be maintained. Project specific topsoil management procedures are addressed in Section 12.4 of the CEMP.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Mining Proposal 33113	7.11 Borrow and Spill Management	Borrow and spoil associated with construction activities will be managed in accordance with a Geotechnical, Borrow Pit and Spoil Management procedure in Section 12.3 of the CEMP. Key environmental management actions for waste management include: - Drainage and erosion control structures will be developed around the areas to control the impact of substantial rainfall events. - All topsoil shall be removed from the borrow areas and stockpiled along the edge of the borrow area or at dedicated topsoil storage areas for subsequent use in rehabilitation. - Each borrow area will be rehabilitated to a free draining landform. - The removal of borrow material will be limited to inside the RTIO approval permit boundary and RTIO clearing permit boundary area. - Material considered to be at risk of Acid Sulphate Soils will be managed in accordance with the Acid Sulphate Management Plan where required.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Mining Proposal 33113	8i) Rehabilitation and Closure	General principles for decommissioning of infrastructure include: - Subject to stakeholder negotiation, above ground installations are removed and materials recycled or reused where practicable; - Infrastructure that is located more than 1 metre below the final surface level (e.g. footings, cables) remain in-situ following closure provided they are non-polluting; - Any infrastructure with the potential to be a source of contamination after closure is managed to prevent contamination from occurring.	Mining Act	Department of Mines & Petroleum (DMP)	Closure Specialist		Pre-Closure	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Mining Proposal 33113	8 ii) Rehabilitation and Closure	General principles for rehabilitation include: - Where applicable and appropriate, contaminated soils are removed and treated in a landfarm facility; - Rehabilitation is undertaken so as to make the land compatible with the agreed final land use; - Consideration is give to the surface water drainage impacts, and steps taken to ensure appropriate flows following closure; - Compacted soils are ripped in order to improve rehabilitation outcomes; - Rehabilitation is conducted with seeds collected from a provenance zone appropriate for each species; - Completion criteria are agreed with stakeholders as closure approaches; and - Post closure monitoring programmes are developed and implemented to demonstrate progress towards, and compliance with completion criteria.	Mining Act	Department of Mines & Petroleum (DMP)	Rehabilitation Specialist		Pre-Closure	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Mining Proposal 33113	8 iii) Rehabilitation and Closure	Rehabilitation of disturbed areas that not required for ongoing operation of the Project will be conducted progressively or after the completion of construction activities in accordance with the HSEQ MS Rehabilitation Handbook. This will include the borrow pits, temporary construction disturbance and any other disturbed areas that are no longer required. The natural landform and drainage patterns will be re-established, stockpiled topsoil and vegetation will be returned, and the area ripped or scarified (dependent on degree of compaction) on the contour.	Mining Act	Department of Mines & Petroleum (DMP)	Rehabilitation Specialist		Pre-Closure	Operations	DO NOT USE - For Data Upload Only	Y	N			

																One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Mining Proposal 33113	8 iv) Rehabilitation and Closure	The final Rehabilitation and Closure Plan for the West Angelas Project will address options for closure of the West Angelas power station, including decommissioning and rehabilitation if no longer required for other projects or land users in the area. If decommissioning is required, all infrastructure including fuel storage tanks, administration buildings, unloading/loading facilities and other associated infrastructure will be removed. Bituminised surfaces will be broken up and removed to an appropriate disposal site. Disturbed areas will be shaped to re-establish the natural landform and drainage patterns, stockpiled topsoil and vegetation will be returned, and then areas will be ripped or scarified (dependent on degree of compaction) on the contour. Rehabilitated areas will be monitored for erosion and vegetative regrowth.	Mining Act	Department of Mines & Petroleum (DMP)	Closure Specialist		Pre-Closure	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Mining Proposal 33113	8 v) Rehabilitation and Closure	RTIO maintains financial provisions for closure of its extensive global mining network in accordance with its corporate obligations. Cost estimates are prepared for each operation using standard unit-rate methodologies, and reviewed annually to ensure currency.	Mining Act	Department of Mines & Petroleum (DMP)	Closure Specialist		Pre-Closure	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Ministerial Statement 514	Decommissioning and Rehabilitation Management Plan Condition 13-1	At least six (6) months prior to decommissioning, the proponent shall prepare a Decommissioning and Rehabilitation Management Plan to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Department of Conservation and Land Management, the Department of Minerals and Energy and the Water and Rivers Commission. The objectives of this plan are: • to render the minesite areas safe and stable; and • to encourage the re-establishment of self-sustaining ecosystems. This Plan shall address: 1. removal or, if appropriate, retention of plant and infrastructure; 2. (final) rehabilitation of all disturbed areas to a standard suitable for agreed new land use/s; 3. groundwater levels in mine pits; and 4. identification and remediation of contaminated areas, including provision of evidence of notification to relevant statutory authorities.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Closure Specialist		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Ministerial Statement 514	Decommissioning and Rehabilitation Management Plan Condition 13-2	The proponent shall implement the Decommissioning and Rehabilitation Management Plan required by condition 13-1 until such time as the Minister for the Environment, on advice of the Environmental Protection Authority and the Department of Minerals and Energy, determines that decommissioning and rehabilitation are complete.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Closure Specialist		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Ministerial Statement 514	Decommissioning and Rehabilitation Management Plan Condition 13-3	The proponent shall make the Decommissioning and Rehabilitation Management Plan required by condition 13-1 publicly available, to the requirements of the Environmental Protection Authority.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Closure Specialist		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Ministerial Statement 514	Schedule 2 - Commitment 5	An Environmental Management Plan will be prepared and implemented and which would include but not be limited to consideration of: - cracking clay communities; - Mulga communities; - flora and fauna with special management needs; - rehabilitation; - drainage design along the railway; - fire and dust management; - implementation of relevant aspects of DME guidelines; -timing for implementation of commitments; - reporting.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environment Superintendent	SEA	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual

West Angelas	West Angelas Operations	Approval		Ministerial Statement 514	Schedule 2 - Commitment 5 - Objective	To ensure the environment is protected by consolidated environmental management requirements into one concise document.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environment Superintendent	SEA	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Ministerial Statement 514	Schedule 2 - Commitment 5 - Action	Plan to be prepared prior to construction on advice of DEP, where proponent to continue to update existing environmental management systems which would include, but not be limited to consideration of: - prevention of impacts to cracking clay communities in the minesite area by isolation from disturbance (e.g. using environmental exclusion zones) and preventing the incision of environmental weeds; - prevention of impacts to significant association of Mulga over Chenopodiaceous shrubs and hummock grasses (6adh25, site 892A), particularly by avoiding changes to surface hydrology; - management of flora and fauna species of conservation value which need special management; - rehabilitation and revegetation of disturbed areas with particular attention to incorporating species of conservation and scientific significance and locally collected seed; - drainage design along the railway at watercourse crossings and through sheet flow areas (i.e. mulga); - weed management including the minesite and railways; - fire management; - dust management, implementation of Department of Minerals and Energy guidelines for Mining in Arid Environments. Asbestos Management in Mining, and Environmental Management of Quarries; - measures to prevent contamination of groundwater and surface waters; - an overview of timing for implementation of commitments; and - reporting requirements, including those for the Greenhouse Challenge Programme.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environment Superintendent	SEA	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Ministerial Statement 514	Schedule 2 - Commitment 5 - Measurement / Compliance Criteria	Annual Performance and Compliance Report.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environment Superintendent	SEA	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval	15/06/2032	Miscellaneous Licence 47/409	6	All topsoil that may be removed ahead of pipe laying operations to be stockpiled for replacement in accordance with the directions of the Environmental Officer, Department of Mines and Petroleum.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	15/06/2032	Miscellaneous Licence 47/409	27	The area of the licence to be reduced as soon as practicable after construction, to a minimum for the safe maintenance and operation of the railway line and associated infrastructure.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	15/06/2032	Miscellaneous Licence 47/409	28	On completion of the life of mining operations in relation to this licence the holder shall: - remove all installations constructed pursuant to this licence -cover all wells and holes in the ground to such a degree of safety as shall be determined by the Environmental Officer, Department of Mines and Petroleum -on such areas cleared of natural growth by the holder or any of it agents, the holder shall plant trees and/or shrubs and/or any other plant as shall conform to the general pattern and type of growth in the area and as directed by the Environmental Officer, Department of Mines and Petroleum and properly maintain same until the Environmental Officer advises growth is self supporting; unless the Mining Registrar or Minister responsible for the Mining Act 1978 orders or consents otherwise.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off

West Angelas	West Angelas Operations	Approval	15/06/2032	Miscellaneous Licence 47/409	31	All topsoil and vegetation being removed ahead of all mining operations and being stockpiled appropriately for later respreading or immediately respread as rehabilitation progresses.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	16/04/2013	Miscellaneous Licence 47/41	10	On completion of the life of mining operations in relation to Miscellaneous Licence 47/41 the holder shall: -remove all installations constructed pursuant to this licence -cover all wells and holes in the ground to such a degree of safety as shall be determined by the Inspector -on such areas cleared of natural growth by the holder or any of it agents, the holder shall plant trees and/or shrubs and/or any other plant as shall conform to the general pattern and type of growth in the area and as directed by the Inspector and properly maintain same until the Inspector advises growth is self supporting; unless the Mining Registrar or Minister for Mines orders or consents otherwise.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	04/09/2021	Miscellaneous Licence 47/52	3	All surface holes drilled for the purpose of exploration are to be capped, filled or otherwise made safe immediately after completion.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	04/09/2021	Miscellaneous Licence 47/52	4	All disturbances to the surface of the land made as a result of exploration, including costeans, drill pads, grid lines and access tracks, being backfilled and rehabilitated to the satisfaction of the Environmental Officer, Department of Mines and Petroleum (DMP). Backfilling and rehabilitation being required no later than 6 months after excavation unless otherwise approved in writing by the Environmental Officer, DMP.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	04/09/2021	Miscellaneous Licence 47/52	5	All waste materials, rubbish, plastic sample bags, abandoned equipment and temporary buildings being removed from the mining tenement prior to or at the termination of the exploration program.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	04/09/2021	Miscellaneous Licence 47/52	6	Unless the written approval of the Environmental Officer, DMP is first obtained, the use of drilling rigs, scrapers, bulldozers, backhoes or other mechanised equipment for surface disturbance or the excavation or costeans is prohibited. Following approval, all topsoil being removed ahead of mining operations and separately stockpiled for replacement after backfilling and/or completion of operations.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	04/09/2021	Miscellaneous Licence 47/52	9	All topsoil and vegetation being removed ahead of all mining operations and being stockpiled appropriately for later respreading or immediately respread as rehabilitation progresses.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	04/09/2021	Miscellaneous Licence 47/53	4	All topsoil and vegetation being removed ahead of all mining operations and being stockpiled appropriately for later respreading or immediately respread as rehabilitation progresses.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N			
West Angelas	West Angelas Operations	Approval	04/09/2021	Miscellaneous Licence 47/53	5	At the completion of operations, all buildings and structures being removed from site or demolished and buried to the satisfaction of the Director, Environment Division, DMP.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N			
West Angelas	West Angelas Operations	Approval	04/09/2021	Miscellaneous Licence 47/53	6	All rubbish and scrap is to be progressively disposed of in a suitable manner.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N			

West Angelas	West Angelas Operations	Approval	04/09/2021	Miscellaneous Licence 47/54	2	All topsoil that may be removed ahead of pipe laying operations to be stockpiled for replacement in accordance with the directions of the Environmental Officer, Department of Mines and Petroleum.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	04/09/2021	Miscellaneous Licence 47/54	9	On completion of the life of mining operations in relation to this licence the holder shall: - remove all installations constructed pursuant to this licence -on such areas cleared of natural growth by the holder or any of it agents, the holder shall plant trees and/or shrubs and/or any other plant as shall conform to the general pattern and type of growth in the area and as directed by the Inspector and properly maintain same until the Inspector advises regrowth is self supporting; unless the Minister for Mines orders or consents otherwise.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	15/04/2020	Miscellaneous Licence 52/75	2	All topsoil that may be removed ahead of pipe laying operations to be stockpiled for replacement in accordance with the directions of the Inspector.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	15/04/2020	Miscellaneous Licence 52/75	9	On completion of the life of mining operations in relation to this licence the holder shall: - remove all installations constructed pursuant to this licence -on such areas cleared of natural growth by the holder or any of it agents, the holder shall plant trees and/or shrubs and/or any other plant as shall conform to the general pattern and type of growth in the area and as directed by the Inspector and properly maintain same until the Inspector advises regrowth is self supporting; unless the Minister for Mines orders or consents otherwise.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	15/04/2020	Miscellaneous Licence 52/75	19	All topsoil and vegetation being removed ahead of all mining operations and being stockpiled appropriately for later respreading or immediately respread as rehabilitation progresses.	Mining Act	Department of Mines & Petroleum (DMP)	Registered Manager		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Operations Weed Management Plan	Pre-Construction Management Actions - Hygiene Procedure - 4.4.3	Development of hygiene procedures which will apply to exploration and to all phases of project development and operation. The hygiene procedures will encompass and include: (8) All earthmoving and mobile construction equipment will be washed down and cleaned of all vegetative, soil and rock material, and an inspection certificate provided, before mobilisations to any of the three weed management priority areas (Weed management priority areas as for Section 4.4.1), to minimise the risk of introducing and spreading weeds. (9) A wash down area will be established at the West Angelas Minesite, with all drainage being directed to into a substantial sump (1 metre deep) to trap and contain any seed washed of vehicles and equipment. This sump and wash down area will be surrounded by a 1 metre high windrow to further contain any wash down seed. At locations distant from the West Angelas Minesite mobile washdown facilities will be provided for use in areas of known weed infestation. All vehicles used in infested areas will be cleaned prior to movement to non-infested areas. (10) Any equipment or vehicle considered to have been working in a weed risk area will be cleaned down at this wash down before being remobilised to other areas of the project. (11) Weed Risk areas will be imposed encompassing known infestations to limit vehicular access thereby reducing the potential for dispersal of seed and contaminated soil during the flowering season. During the growth and flowering season after good rains risk of seed dispersal is highest. At other times dispersal of Ruby Dock may only occur through transportation of root stocks.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environmental Superintendent	SEA	Pre-Construction	Study & Design	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Operations Weed Management Plan	Operation - Monitoring - Systematic Monitoring - 6.6.1	Refer to Section 4.6.1	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environmental Superintendent	SEA	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y			

															MSR P MSR C One off	01/01/1900	6 Year Annual	
West Angelas	West Angelas Operations	Approval		Operations Weed Management Plan	Operation - Monitoring - Adhoc Infestation Reporting - 6.6.2	Refer to Section 4.6.2	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environmental Superintendent	SEA	Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C One off	01/01/1900	6 Year Annual Other
West Angelas	West Angelas Operations	Approval		Operations Weed Management Plan	Decommissioning - 7	Any rehabilitation or decommissioning activity of weed infested areas will be undertaken in a manner which is consistent with the Minesite Decommissioning and Rehabilitation Plan.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Environmental Superintendent	SEA	Pre-Closure	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C One off	01/01/1900	6 Year Annual Other
West Angelas	West Angelas Operations	Approval	30/06/2012	Programme of Work approval for exploration on G47/1235 and G47/1236 Registration ID: 29988	Cover letter	To securely plug and backfill to surface all drill holes and remove all sample bags within 6 months of drilling.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	30/06/2012	Programme of Work approval for exploration on G47/1235 and G47/1236 Registration ID: 29988	Environmental Management and Methods of Minimising Disturbance	Vegetation stockpiled separately for use in rehabilitation when constructing drill pads. - Topsoil and vegetation stockpiled separately for use in rehabilitation when constructing sumps and/or costeans.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	30/06/2012	Programme of Work approval for exploration on G47/1235 and G47/1236 Registration ID: 29988	Rehabilitation Practices and Timing	Drill holes plugged immediately. -Drill holes securely plugged below ground at minimum depth of 400mm within 6 months of drilling (if not using concrete, conical plugs). -Excavations (e.g. sumps, costeans etc.) backfilled and respread with topsoil and cleared vegetation.-Ripping of compacted areas on the contour. - Blocking access to tracks. - Drill sample piles rehabilitated or buried. -Sample bags removed within 6 months of drilling. - All rubbish removed from site (including any hydrocarbon spills).	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	15/05/2013	Programme of Work approval for exploration on L 47/409 and L 52/75. Registration ID: 34687	Cover letter	To securely plug and backfill to surface all drill holes and remove all sample bags within 6 months of drilling.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	15/05/2013	Programme of Work approval for exploration on L 47/409 and L 52/75. Registration ID: 34687	Environmental Management and Methods of Minimising Disturbance	Vegetation stockpiled separately for use in rehabilitation when constructing drill pads. - Topsoil and vegetation stockpiled separately for use in rehabilitation when constructing sumps and/or costeans.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off

West Angelas	West Angelas Operations	Approval	15/05/2013	Programme of Work approval for exploration on L 47/409 and L 52/75. Registration ID: 34687	Rehabilitation Practices and Timing	Drill holes plugged immediately. -Drill holes securely plugged below ground at minimum depth of 400mm within 6 months of drilling (if not using concrete, conical plugs). - Excavations (e.g. sumps, costeans etc.) backfilled and respread with topsoil and cleared vegetation. - Ripping of compacted areas on the contour. - Blocking access to tracks. - Drill sample piles rehabilitated or buried. • Sample bags removed within 6 months of drilling. • All rubbish removed from site (including any hydrocarbon spills).	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	30/05/2012	Programme of Work approval for exploration on L 47/52 Registration ID: 34829	Cover Letter	To securely plug and backfill to surface all drill holes and remove all sample bags within 6 months of drilling.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	30/05/2012	Programme of Work approval for exploration on L 47/52 Registration ID: 34829	Recommended further conditions for Miscellaneous Licence 47/52 Condition 9	All topsoil and vegetation being removed ahead of all mining operations and being stockpiled appropriately for later respreading or immediately respread as rehabilitation progresses.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	30/05/2012	Programme of Work approval for exploration on L 47/52 Registration ID: 34829	Environmental Management and Methods	Vegetation stockpiled separately for use in rehabilitation when constructing drill pads. -Topsoil and vegetation stockpiled separately for use in rehabilitation when constructing sumps and/or costeans.	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval	30/05/2012	Programme of Work approval for exploration on L 47/52 Registration ID: 34829	Rehabilitation Practices and Timing	Excavations (e.g. sumps, costeans etc.) backfilled and respread with topsoil and cleared vegetation. -Ripping of compacted areas on the contour. -Blocking access to tracks. -All rubbish removed from site (including any hydrocarbon spills).	Mining Act	Department of Mines & Petroleum (DMP)	Specialist EP	EP Advisor	Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	N	One off	01/01/1900	One off
West Angelas	West Angelas Operations	Approval		Rail Route Environmental Management Plan	Objectives - 1.3	The Rail Route Management Plan has the following overall objectives: - Design and construct the railway to minimise the area of disturbance and associated impacts of vegetation clearance on flora, fauna and soil stability, - In particular, minimise the impact of vegetation clearance on declared rare & priority flora and vegetation communities of significant conservation value, - Design, construct and operate the railway to minimise the impact on natural surface drainage systems, - Design, construct and operate the railway to prevent or minimise the impact on the quality of surface water and groundwater, - Design and construct the railway to minimise disturbance to landforms, - Construct and operate the railway to minimise the risk of fire and protect personnel and Company assets, - Construct and operate the railway to minimise dust generation, - Design, construct and operate the railway to minimise greenhouse gas emissions, - Design and construct the railway to minimise potential visual impacts, and - Design and construct to avoid disturbance to Aboriginal ethnographic and archaeological sites unless approval has been given under Section 18 of the Aboriginal Heritage Act (1972).	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Utilities		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual

West Angelas	West Angelas Operations	Approval		Rail Route Environmental Management Plan	Pre-Construction Existing Environment Landform - 4.2.8	Construction of the railway will result in changes to the existing landforms. These changes will manifest themselves in the form of cut and fill. The total bulk fill required is 6.5 million cubic metres of which 3.3 million cubic metres comes from cuttings. Particular gradients are necessary for heavy haul railways. These gradient requirements in very flat country can be achieved through minimal use of cuts, but in undulating terrain, cuts cannot be avoided. Steeper grades that reduce the depths of cuts are possible but with a resultant increase in greenhouse gas emissions over the life of the railway. The West Angelas Project has attempted to balance requirements for cut and fill throughout the length of the railway, depending on the nature of the terrain. Also to minimise drainage impacts, the rail formation has been designed to be high enough so that drainage structures of a sufficient size can be placed over the natural ground level.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Utilities		Pre-Construction	Study & Design	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Rail Route Environmental Management Plan	Construction Management Actions - Vegetation Communities - 5.4.1	Progressive rehabilitation of disturbed areas will be undertaken with topsoil as per the guidelines in Appendix 9 and Robes Mine Rehabilitation Training Course, Operators Manual 1997.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Utilities		Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Rail Route Environmental Management Plan	Construction Management Actions - Fauna - 5.4.4	Vegetation that is cleared will either be stockpiled for later use or used directly on disturbed areas to be rehabilitated. This vegetation will provide habitat shelter and food for fauna.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Utilities		Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	Y			
West Angelas	West Angelas Operations	Approval		Rail Route Environmental Management Plan	Construction Management Actions - Fauna - 5.4.4	Progressive rehabilitation of disturbed areas will be undertaken to restore fauna habitats.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Utilities		Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	Y			
West Angelas	West Angelas Operations	Approval		Rail Route Environmental Management Plan	Construction Management Actions - Surface Water Hydrology - Erosion control of other disturbed areas - 5.4.5	Rehabilitation of disturbed areas will aim to re-establish natural drainage patterns.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Utilities		Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Rail Route Environmental Management Plan	Construction Management Actions - Visual Amenity - 5.4.18	To reduce visual impacts the following measures will be undertaken when constructing the rail line and its associated infrastructure and earthworks: - Progressive rehabilitation of the Project area to limit length of visual impact.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Utilities		Construction	Implementation (Construction)	DO NOT USE - For Data Upload Only	Y	Y			
West Angelas	West Angelas Operations	Approval		Rail Route Environmental Management Plan	Operation - Potential Impacts - Quarry - 6.3.4	After construction is complete the quarry will not be decommissioned but left in a safe condition so that rail ballast may still be obtained for possible future maintenance activities. - If surface drainage and erosion control structures around the quarry site are not maintained then erosion can occur, causing the loss of soils and reducing the potential for rehabilitation success.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Utilities		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P	01/01/1900	6 Year

																MSR C		Annual
West Angelas	West Angelas Operations	Approval		Rail Route Environmental Management Plan	Decommissioning - Objectives - 7.1	To ensure that rehabilitation of areas renders them safe and stable and encourages the re-establishment of self-sustaining vegetation.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Utilities		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Rail Route Environmental Management Plan	Decommissioning - Concept - 7.2	Decommissioning and rehabilitation of the infrastructure required for the constructional phase will follow the progressive rehabilitation and monitoring requirements documented within the Decommissioning and Rehabilitation Plan. In particular: - Groundwater bores will not be totally decommissioned but capped and locked for potential future use. - Drill pads and access tracks will be rehabilitated. - Borrow pits will be progressively rehabilitated after they have finished being used. - After construction is complete, the quarry will be maintained in case there is a need for rail ballast for future maintenance activities. It will be decommissioned and rehabilitated at the end of the operational life of the Mine. - Access roads and tracks to borrow pits, camps and work sites will be rehabilitated. The rail line access road, quarry access road and roads to radio communication towers will be maintained during the operational life of the Mine. - Camps and their associated infrastructure will be decommissioned and rehabilitated after they have finished being used. Six months prior to the decommissioning of the West Angelas Project, discussion will be held with the Department of Resources Development on the future use and strategic value of the railway line prior to the completion of a detailed decommissioning strategy.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Utilities		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Rail Route Environmental Management Plan	Appendix 4: Vegetation Clearance Procedures	Appendix 4 details the vegetation clearing procedures to apply pursuant to section 4 and 5 of this plan, including the following rehabilitation requirements: - Any cleared vegetation should be stockpiled for re-spreading either directly or at a later date to minimise erosion and aid in rehabilitation. - After vegetation has been cleared the top 100mm profile of soil should be removed and stockpiled separately from the vegetation. - Do not store top soil in large heaps. Once soils are disturbed, biological and composting processes are activated which slowly destroy both the seed bank and biological content. Low mounds of no more than 1.5 metres high are recommended. - Plan to use stockpiles of top soil as soon as possible. Where it is known that the material will be stockpiled for long periods, i.e.. a number of years, the surface profile can be roughly spread and ripped to contour, promoting germination. This will encourage plant establishment and the setting of seed to enrich the seed bank. - Store top soil and cleared vegetation where it will not be affected during construction activities, and away from areas of surface water flow. - Soils should not be stripped when they are wet as this can lead to compaction and loss of soil structure. - The risk of topsoil stockpiles becoming a source of airborne dust should be minimised though an initial application of water where practicable. This should reduce dust during the establishment of the stockpile, as well as encouraging the growth of vegetation and the formation of a crust which retards dust generation.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Utilities		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Rail Route Environmental Management Plan	Appendix 6: Hydrocarbons & Chemical Spill Response Procedures For Minor Spills	Appendix 6 details the procedures to apply when managing minor spills of hydrocarbons and chemicals, pursuant to section 5 of this plan, including the following closure and reporting requirements: - Excavate and remove any soils contaminated with hydrocarbons to an allocated bioremediation site in accordance with EPA Guidelines for Oil Farming of Oily Wastes. Disposal of oily wastes from this site will comply with the requirements of the DEP Division of Waste Management. - All spills should be reported to Supervisor and incident reports completed. - In light of any actions taken, record any necessary changes to procedures.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Utilities		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual

West Angelas	West Angelas Operations	Approval		Rail Route Environmental Management Plan	Appendix 7: Vehicle Access Track Procedures	Appendix 6 details the procedures to apply when managing minor spills of hydrocarbons and chemicals, pursuant to sections 4 and 5 of this plan, including the following closure requirements: - Where provision of a new track is unavoidable, it will be constructed in a manner best designed to : - minimise long term visual impact; - minimise land clearance and hence disturbance to soil, vegetation and fauna habitats i.e.. the more direct the track the less clearing required avoid unnecessary interference or blockage to natural drainage lines; support the intended use of and traffic volume; tracks flanking the base of the hills generally avoid the more heavily wooded creek bed areas. - Clearing should only be carried out if access cannot be obtained via existing tracks, fence lines, firebreaks or off road driving, and only after relevant authorities and landholders have been notified and approval received where necessary. - Clearing of tracks and grid lines for vehicle access is to be carried out with a bulldozer equipped with a scrub rake. The rake is kept above ground level during clearing so as to preserve root stock material and reduce soil surface damage. - Avoid creating windrows which may leave permanent scars on the land and have the potential to block or channel water flow along tracks and cause severe erosion problems. - Any water course crossed by a track should be excavated to the base of the watercourse, not filled in, to prevent erosion of the road during high rainfall events. - Incidental areas disturbed during track construction should be rehabilitated promptly following construction.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Utilities		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Rail Route Environmental Management Plan	Appendix 8: Drill Pad Procedures	Appendix 6 details the procedures to apply when managing minor spills of hydrocarbons and chemicals, pursuant to sections 5 of this plan, including the following closure requirements: - Earthworks where needed should be done by a bulldozer equipped with a scrub blade (rake) to remove vegetation and place in a stockpile to the side, preferably on the uphill side of the drill pad. - If the drill pad is located on steep and rugged terrain, a bulldozer equipped with a blade will be required. Top soil should be stored on the uphill side of the pad. - All top soil disturbed during the construction of a drill pad should be pushed to one side and stockpiled for future rehabilitation. - All drill holes are to be plugged with a cement drill hole plug immediately after drilling of the hole is complete. No holes are to be left uncovered. - Any oil spillage (eg. hydraulic oil, grease) should be collected and removed from drill pad sites. This will involve the collecting of oil/grease into bags or buckets.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Utilities		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Rail Route Environmental Management Plan	Appendix 9: Guidelines for Borrow Pit Development and Rehabilitation for The Pilbara Region	Appendix 9 details the borrow pit guidelines that apply pursuant to section 5 of this plan, including the expected environmental impacts of borrow pits and detailed rehabilitation and closure requirements	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Utilities		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual
West Angelas	West Angelas Operations	Approval		Rail Route Environmental Management Plan	Management Programme Summary - 10	A table summarising the objectives, actions, timing and performance indicators is set out in this section.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Utilities		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual

LAORS Approval / Agreement and

Type: Approval / Agreement, Site Name: West Angelas, Project Name: All, Discipline: All, Approval Type: All, Regulatory Body: All, Status: All, Closure Obligation: Yes, Enviroment Reporting Requirement: No, Included Historic: No, Phase Regulatory: All, Phase RTIO: All, Document Details: No

West Angelas	West Angelas Operations	Approval		Rail Route Environmental Management Plan	Appendix 10-Summary of Management Actions Relating to Ministerial Conditions	Appendix 10 sets out a summary of the management actions and how these relate to the conditions of the Ministerial statement.	EP Act Part IV (Ministerial)	Environmental Protection Authority (EPA)	Utilities		Productive Mining	Operations	DO NOT USE - For Data Upload Only	Y	Y	MSR P MSR C	01/01/1900	6 Year Annual

Appendix B – Closure knowledge database

This page has been left intentionally blank

Rio Tinto West Angelas closure knowledge database

The closure knowledge database is a summary of the technical reports that directly or indirectly contribute to the development of the closure plan. These documents do not form part of the report and are for indicative purposes only.

The knowledge and understanding of closure issues and management strategies evolve and improved over time, coincident with the development of the mining operation. As a result, some components of some reports and studies may be superseded by new research or studies. While the closure plan addresses the current state of understanding and strategy for closure, the closure knowledge database captures the historical development of closure knowledge, and demonstrates how experience and knowledge developed at other Rio Tinto sites has been considered during the development of the closure plan and across the life of the operation. Accordingly, some information presented in the closure knowledge database may be obsolete.

Technical reports supporting the closure of the operation will be presented as part of the last plan produced prior to the implementation of closure (the Decommissioning Plan).

CONFIDENTIAL

Geochemical characterisation

Acid Generating Potential, Selected Core Samples Mt Newman Member BIF, West Angeles Deposit A Open Pit — **1988**

A preliminary assessment of the potential for the generation of acid drainage was undertaken on banded iron formation samples from West Angeles Deposit A open pit.

Internal reference: RTIO-PDE-0030854

Only one of the five samples was determine to have acid generating potential. Three of the samples tested contained reactive carbonates.

Review of Waste Rock Geochemistry a.General Overview of Acid Base Accounting — **2006**

This report contains a general overview of acid base accounting and a summary of the geochemical test work that has been previously completed for various sites and lithologies.

Internal reference: RTIO-PDE-0021130

There are large discrepancies in the total sulfur concentration measured using XRF and LECO machines. The XRF machine underestimates the sulfur concentration at values greater than 2%. Materials with total sulfur concentrations less than 0.1% can contain low capacity PAF material, however, it is considered only to be low additional acid and metalliferous risk if the boundary for inert material and potentially acid forming material is shifted from 0.02%S to 0.1%S. A paste pH result of less than 7 should be sent to the black shale dump and a paste pH result of greater than 7 can be sent to an inert material waste dump.

Geochemical Characterisation of Paraburdoo Lens 2, Tom Price North Deposit Dales Gorge and West Angelas Samples — **2008**

A geochemical assessment was undertaken on samples from Paraburdoo, Dales Gorge and West Angelas to determine acid generating potential, oxidation rates and leachable contaminants.

Internal reference: RTIO-PDE-0034616

Seven of eight West Angelas (Deposit A) samples studied were classified as potentially acid forming. In samples of banded iron formation and/or shale lithologies from the three mine sites C, S, As, Au, Bi, Mo, Sb, Se, Sn were enriched. Only Mo and Se were readily leachable.

Mineralogical Analysis of Potentially Acid Forming Materials — **2008**

Quantitative mineralogy (QEM-Scan) for samples of rock collected from Tom Price, Channar, West Angelas, Brockman, Paraburdoo, East Extension, Western Turner Syncline and Hope Downs 1 North was undertaken. Comparisons were made between two methodologies use to characterise potentially acid forming materials; acid base accounting and mineralogical analysis.

Internal reference: RTIO-PDE-0053725

All samples contained elevated total sulfur concentrations and the lithologies were either shale, banded iron formation or dolomite. Pyrite was the dominant mineral contributing to acidity and the dominant sulfate secondary mineralisation consisted of alunite and jarosite.

Determination of ARD potential of Rio Tinto Iron Ore (WA) Waste Rock Samples — **2008**

This report investigates the use of mineralogy to predict acid and metalliferous drainage potential. Analysis of numerous rocks was undertaken using QEM-SCAN.

Internal reference: RTIO-PDE-0051613

Areas of waste rock which have underdone oxidation can be identified where sulfur-bearing minerals vary between samples in the form of pyrite, alunite and jarosite. The variability of gangue mineral phases suggest that some areas of composite waste rock pile may provide some neutralising potential while other areas will have no neutralising potential. Variable textural and mineralogical controls on sulfide mineral occurrence result in decreased accessibility of pyrite to oxidising fluids.

West Angelas ARD and Geochemical Risk Assessment **2010**

Internal reference: RTIO-PDE-0052917

Risk associated with acid rock drainage in the current, possible and future deposits at the West Angelas project area have been investigated.

Deposit C and G pose low-nil risk of acid and metalliferous drainage. Deposit A, E and F poses a low risk. Deposit D a moderate to low risk and Deposit B a moderate risk. High risks have been classified for WA6 Area (southern West Angelas project area) WA7 Area (northwest of West Angelas project area), WA8 Area (west of Deposit A), WA9 Area (west of Deposit A) and Angelo River.

Environmental Status of Selenium (Se) in the Pilbara Region of Western Australia – Potential Risk from Iron Ore Mining **2011**

Internal reference: RTIO-PDE-0103857

This report includes information about Selenium geochemistry, distribution in the environment, occurrence in rocks in the Pilbara and potential risks to the environment.

The Selenium (Se) content of shales containing significant pyrite should be recorded as part of the overall risk assessment for acid and metalliferous mine drainage. However, it should also be noted Se solubility is far less constrained by pH than in the case of metals and near neutral drainage may contain significant Se concentrations in solution. It would be most useful to study the Selenium budget of the wetlands in the Pilbara as, apart from the chance poisoning of livestock from the consumption of plants that have taken up high concentrations of Selenium, impacts are most likely to be felt in wetlands receiving mine site drainage.

Contaminant Leaching from Non-Sulfidic Waste Material **2011**

Internal reference: RTIO-HSE-0145041

The available leach extract data and information pertaining to the distribution of metals and metalloids in non sulfur materials at neutral pH was reviewed. Based on this review conceptual models for controls on their leaching and mobility were developed.

The review found that contaminant leaching from non-sulfidic materials was generally very limited. Usually the pH in leach tests was near-neutral (pH 6 to 8), and dissolved contaminant concentration were at or below detection limits. It is believed that a primary leachable contaminant source is the oxidation of sulfide minerals. Release from oxidising sulfides leads to release of soluble reaction products. Under neutral pH conditions, there is the potential for release of these contaminants when those products dissolve.

Contaminant Leaching from Low-Sulphur Waste Minerals (Summary) **2011**

Internal reference: RTIO-PDE-0090689

RTIO's Geochemical Database was reviewed and based upon this data, conceptual models for controls on the leaching and mobility of a range of metals and metalloids were developed. This summary also describes potential controls on the amount of dissolved element that may be released. This is a summary of a comprehensive report RTIO-PDE-0100104.

For most contaminants, dissolved concentrations at circum neutral pH (pH 6 to 8) were very low, typically at or below detection limit. Geochemical modelling indicates that water-rock interactions are controlled by equilibrium, for salt, carbonates and sulphates this equilibrium is often source term limited whilst hydroxyl-sulphates and hydroxides are solubility controlled. Results also indicate that sorption plays an important role in solute concentration; weak (but detectable) sorption occurred for selenium and zinc whilst the strongest sorption was evident for cobalt. The review suggested that storage waste facilities containing low-sulfur materials pose a low level of environmental risk however, there is a small risk of increased in mobility of some contaminants if acidic conditions arise. Acidic conditions can sometimes arise from the interactions between iron and aluminium hydroxyl-sulphates and hydroxides.

West Angelas Deposit B AMD Risk Ranking July 2012 **2012**

Internal reference: 0

Memo regarding review and update of the 2008 West Angelas deposit B AMD risk assessment and ranking.

The risk assessment (Terrusi 2008) indicated that the rocks from Deposit B were enriched in As and Fe and elevated in Sn for most strand-tag groups, with Cr, Mn and Pb elevated in some others. It is unlikely that these elements will mobilise under neutral conditions as demonstrated by Brown (2012). The overall AMD hazard score for West Angelas Deposit B is Moderate. One of the largest contributors to the Moderate risk rating is around surface water management. Currently there is a significant creek line that is located where the proposed Deposit B pit is located. Diversions are recommended to control the surface water from entering the pit or mobilising salts from the pit wall that would reduce the chance of contaminants from polluting the surrounding environment. If the diversion is implemented the AMD risk rating for the deposit would become low.

Geochemical Assessment of Samples from West Angelas Deposits, B, D and A West **2013**

Internal reference: RTIO-PDE-0120532

Report summarising geochemical testing of samples from West Angelas deposits B, D and A west for the purpose of; determining acid forming characteristics of waste rock, provide a preliminary assessment of the likelihood of occurrence of potentially acid forming rock types, assess the reactivity of any sulphide mineralisation to provide estimates of geochemical behaviour and lag times for acidification, identify element enrichments that could be environmentally significant and assess mobilisation of elements, provide recommendation for kinetic testing.

Testing has been conducted on seven different waste rock types from two deposits of the West Angelas Mine and indicates that 79% of the samples have a low total S content and 71% have a low acid neutralising capacity (ANC). About two thirds of the samples (66%) were NAPP negative and one third (34%) were NAPP positive.Sulphur speciation testing indicated that for all but one of the samples selected, the majority of the sulphur occurs in non-acid generating forms. Results suggested that the total S content of samples from West Angela Mine cannot be used reliably as criteria for identifying PAF material types at the West Angela Mine. Materials represented by the samples may have elevated concentrations of As, Be, Fe, S, Tl and V, however, the solubility of most of these elements at circum-neutral pH was low for the samples that were tested. Overall, 92% of the samples are classified as barren or non-acid forming (NAF) and 8% potentially acid forming (PAF or PAF-LC).

Greater West Angelas AMD Risk Assessment **2014**

Internal reference: RTIO-PDE-0120775

The acid and metalliferous drainage (AMD) risk assessment for the West Angelas deposits has been updated from an assessment completed in June 2008. This current assessment takes into account total sulfur concentrations within rock types, considering recent drillhole data associated with the greater West Angelas area and individually within the currently available final pit shells. Logging data and the samples location with respect to the water table was used to indicate whether sulfur is in the form of sulfide or sulfate minerals. Geochemical data is also assessed to identify enriched elemental concentrations which may pose an environmental risk. This data, along with site specific baseline information, can be used to generate a conceptual site model to describe mechanisms by which acid and metals/metalloids may mobilise and interact with environmental receptors.

AMD risks for all deposits are low, based on the current pit designs. Although pyrite has been visually identified in drillhole samples, no pyrite samples are located within the current proposed pit shells. The sulfur associated with elevated-sulfur samples are likely to be associated with sulfate minerals including gypsum which will not generate acid, or alunite which has the potential for relatively low levels of acid release from elevated-sulfate samples. The low solubility of alunite means that only a low flux of acid (and contaminant) release. Fe, As and Sn, as well as Co, Cr, Cu, Mn, Ni, Pb and Zn have been identified as being enriched in West Angelas deposits and should be monitored in groundwater.

Oxidation and solute accumulation in dewatered pit wall rocks **2014**

Internal reference: RTIO-PDE-0109045

Dewatering and removing the water table may result in de-saturation of sulphide-bearing lithologies. This study was undertaken to review how oxygen ingress and consequent sulphide oxidation of Mount McRae Shales could impact water quality when the groundwater table rebounds after mining.

Physical characterisation

Field rainfall simulator and overland flow study of waste and topsoil erodibility - Nammuldi and West Angelas Mines - Pilbara Iron **2006**

Internal reference: RTIO-HSE-0036709

This study was carried out to assess the erodibility of dominat wastes and topsoils on Nammuldi and West Angelas mine sites, to provide a basis for the design of stable landforms for rehabilitation. To determine the erodiblity of materials, simulated rain and overland flows were applied to experimental plots, and measurements made of runoff and sediment in runoff. Erodibility parameters for the WEPP runoff/erosion model were derived from the data, and the model was run using 100-year climate files.

Several of the West Angelas materials (two wastes, one topsoil) showed a degree of similarity. For those three materials, it appears that - if linear batter slopes are constructed - the maximum landform height likely to be stable is 20 m. If it is essential that waste dumps be constructed to a greater height, then concave profiles and rock armouring could enable a significant increase in landform height. If such options are likely to be requried, forward planning (including sourcing and stockpiling competent rock) would be advisable. The other material studied at West Angelas (low grade fines from the Roche crushing plant) would only give a 10 m high linear batter slope of acceptable stability, and will clearly need to be covered with more erosion-resistant material if batter slopes higher than 10 m are to be rehabilitated.

Water interactions and pit lakes

Geochemical and hydrological processes controlling groundwater salinity of a large inland wetland of northwest Australia **2013**

Internal reference: RTIO-HSE-0198428

Understanding mechanisms of hydrochemical evolution of groundwater under saline and brine wetlands in arid and semiarid regions is necessary to assess how groundwater extraction or injection in large-scale basins may affect the natural interface between saline–fresh aquifers in those systems. This paper investigated the evolution of groundwater of the Fortescue Marsh, a large inland wetland of northwest Australia.

The deep groundwater (>50m depth) of the Fortescue Marsh is highly saline (>100g/L), whilst shallow groundwater (~0–20m depth) and surface water are mainly fresh or brackish. Currently, the marsh is mainly recharged by occasional floodwater. Consequently, salt in the marsh is concentrated by evaporation of rainfall. It was found that groundwater associated with the marsh could be divided into two groups characterised by their stable isotope compositions; i) fresh and brackish groundwater (TDS b10 g L−1; δ18O −8.0 ± 0.9‰) and ii) saline and brine groundwater (TDS N10 g L−1, δ18O varies from +2.5 to −7.2‰). Fresh groundwater was evaporated by<20% compared to rainwater. Brackish water mainly reflects modern recharge whilst saline and brine groundwater reflects mixing between modern rainfall, brackish water and relatively old groundwater.

Flora

Flora & Vegetation Survey of Orebody A & B West Angela Hill and Rail Route Options March 1998 **1998**

Internal reference: RTIO-HSE-0202800

Report defines premining flora and vegetation communities for West Angelas Deposits A and B as well as the access road and proposed rail alignment options.

There are two vegetation types of conservation signficance in the West Angelas Deposit A and B and access road study areas. These consist of Cracking Clays and Mulga stands. Cracking clays found both to the west of Deposit A and south of Deposit B are locally signficant as the contain species which are both rare and edaphically restricted. There are two signficant stands of Mulga in the West Angelas area. The first of which is west of Deposit A on a broad alluvial fan. This area is of conservation signficance not because of its regional restriction as it is found elsewhere but because of the condition of the stand as it has had little to no impact from grazing. There are two vegetation types of conservation significance in the West Angelas deposit A and B and access road study areas. These consist of Cracking Clays and Mulga stands. Cracking clays found both to the west of Deposit A and south of Deposit B are locally significant as the contain species which are both rare and edaphically restricted. There are two significant stands of Mulga in the West Angelas area. The first of which is west of Deposit A on a broad alluvial fan. This area is of conservation significance not because of its regional restriction as it is found elsewhere but because of the condition of the stand as it has had little to no impact from grazing. The Mulga stand north of Deposit B and the mine access road is of high conservation value (vegetation type (6adb231)) and it appears distinct as there is limited about on overlap with associated species as the dominate species is Acacia aneura var. (green, flat; MET 15, 946). This species is only dominate in one other association.

Robe River Mining Southern Spur rail route Mulga monitoring programme – December 2004 **2004**

Internal reference: 0

Results of 2004 Mulga monitoring programme for the Southern Spur of the West Angelas Rail.

The results suggest that there has been no decline in the health of perennial emergent and perennial grasses along the southern spur rail route, with no overall increase in the cover of perennial grasses and health of perennial emergent at the control and experimental sites.

Vegetation and Flora Survey of Deposit E and F **2006**

Internal reference: 0

Biota Environmental Sciences (Biota) was commissioned to undertake a flora and vegetation survey of Robe River Mining's (Robe's) Deposits E/F study area at West Angelas in May 2004. This report describes the results of this study, and also integrates data previously collected from the area.

Twelve vegetation types were identified within the Deposits E/F study area. The following vegetation types within the study area are considered to have moderate conservation significance: • Mulga vegetation types M1-M5: which was considered to be relatively restricted in the area, and also comprise ecosystems at risk in the form of grove/intergrove and valley floor mulga; • Vegetation types Hi and H3 of stony hills and gorges respectively: these comprised the main mapping units from which the undescribed spinifex species Triodia sp. Mt Ella was recorded. This Priority 3 taxon is known only from the vicinity of West Angelas, and is apparently uncommon and restricted in distribution. It can therefore be surmised that any vegetation type in which this species is a significant component will also be uncommon and restricted. The remainder of the vegetation types are considered to be of low conservation significance, representing units that are likely to be widely distributed and relatively well represented in the Hamersley Range subregion. None of the vegetation types within the Deposits E/F study area are considered to be sufficiently rare or restricted at a subregional level to warrant designating them as being of high conservation significance. No Declared Rare Flora have been recorded within the Deposits E/F study area. Eight Priority flora have been recorded from the Deposits E/F study area. There were also five records of the Priority 2 Acacia effusa from south of the main study area.

West Angelas Coondewanna Mulga Monitoring 2008-2009 **2009**

Results of 2009-2009 Mulga monitoring programme for the Southern Spur of the West Angelas Rail.

Internal reference:
RTIO-HSE-0145907

The majority of perennial grass test site were moderately to heavily burnt in 2006, and the data from these sites clearly demonstrates that fire is still the dominant influence on the extent of perennial grass cover at these sites, although a partial recovery is now evident. The influence of fire on these sites is so great as to mask any other effects which may or may not be present due to change in surface hydrology. Comparison of the mulga health status 2008 data relative to 2002 indicated only six of the 51 transects tested were significantly different, of which three sites declined and three sites improved. As with the perennial grass data, the equal proportion of declining and improving sites suggests that, at least at a broad scale, the rail infrastructure is not resulting in deterioration in mulga health status.

UWA West Angelas Mulga Report - February2010 **2010**

Review of long term mulga vegetation monitoring that has been conducted for Rio Tinto ore iron. The review measured any potential impacts of slatered surface hydrology that maybe attributed to rail infrastructure, provide a combined monitroing data set and re-analyse each data set and combine to provide new insight to whether changes in vegetation condition could be attributed to rail infrastructure for the three long term monitoring site of Yandicogina, Marandoo and Coondewanna flats (West Angelas southern rail spur).

Internal reference:
0

Review, comtination and re-analyse of the three long term data sets found that there were no trends in the combined dataset that indicated that the Central Pilbara Railway has had a negative effect on the density of mulga on either side of the rail line. It was also found that fire is the most significant factor in mulga density and it could not be estiblished if a drainage shadow effect has occured as not soil moisture analyse has been complete upslope or downslope of the rail.

West Angelas Coondewana Mulga Monitoring 2011 **2012**

Results of 2011 Mulga monitoring programme for the Southern Spur of the West Angelas Rail.

Internal reference:
0

No clear trends in changes to total cover of perennial grasses at unburnt or lightly burnt test sites relative to the baseline survey were detected, suggesting that, at least at a broad scale and within this time frame, the rail infrastructure has not resulted in deterioration in the health of these species. Similarly the lack of any clear trend in unburnt or lightly burnt control sites relative to 2001 suggests that seasonal differences between surveys periods have not contributed significantly to the changes in total cover. Data from transects burnt moderately or severely clearly demonstrates that fire remains the major influence on the extent of perennial grass cover. The influence of fire on these transects is likely to mask any other effects which may or may not be present due to change in surface hydrology. There appears to have been a decline in seedling numbers at test sites, and a concurrent increase in shrub numbers, suggesting that some seedlings have grown to the extent that they are now classified as shrubs. The number of trees has increased marginally from the significant decline observed in 2006 post burning, but remains significantly lower that in the baseline survey of 2001. In contrast the cover of perennial grasses at burnt sites is generally now increasing, though still lower then pre-fire levels. Consideration of the location of each transect in the landscape has shown no trend in mulga health status. As with the perennial grass data, an equal proportion of declining and improving sites suggests that, at least at a broad scale, the rail infrastructure is not resulting in deterioration in mulga health status.

West Angelas Rehabilitation Record
South and East Waste Dumps **2012**

Two separate waste dump berms on the West Angelas South waste dump and East waste dump were rehabilitated in 2012.

Internal reference:
Rehab close out rep

The waste material on the berm was highly erodible West Angelas shale material, such that slope angles up to 17 degrees were required. The slopes were dressed with 200mm topsoil, deep ripped and seeded.

Greater West Angelas Vegetation and Flora Assessment, ecologia, April 2013 **2013**

Rio Tinto (RT) commisioned ecologia Environment (ecologia) to undertake a two phase assessment of the Greater West Angelas Study Area (Deposits C, D, D extension, G, F, H and Mt Ella were surveyed).

Internal reference:
RTIO-HSE-0185831

Overall the vegetation condition was found to be excellent. 22 vegetation communities were described. One Priority 1 PEC, West Angelas Cracking-Clays, occurs extensively within the Study Area. This community is further defined as open tussock, on derived cracking-clay loam depressions and flowlines. Local vegetation communities considered to be of conservation significance are detailed including vegetation located in; rocky midslopes, gullies, sandy undulating plains and rocky hilltops.

West Angelas - Rehabilitation Monitoring Report 2013 **2013**

Internal reference: 0

This report contains the analysis and summary of results from the 2013 West Angelas rehabilitation monitoring program. This report describes the findings from 2013 monitoring of two transects at the West Angelas east waste dump (WD1 T1 and WD1 T2), and two transects at the south waste dump (WD2 T1 and WD2 T2). For comparison, three reference sites were monitored, viz. C3 and C4 (both located on slopes) and C8 (located on a flatter area).

As the rehabilitation was monitored when it was only 9 months old, any conclusions regarding whether it has been successful or not will be preliminary, and further monitoring will be required to determine any likely trends over time. Several erosion gullys were recorded in WD1T2, and these may be related to the generally lower cover values recorded compared to WD1 T1. Apart from these, the site appears stable. It is apparent that, despite the two rehabilitated areas being given apparently similar rehabilitation treatments, the developing vegetation in the four transects is quite variable. It can be concluded that rehabilitation at some sites (particularly WD1 T1 and WD2 T2) has begun to develop well, while that at WD2 T1 has not yet developed as well. The vegetation, fauna habitat and erosion data provide a useful baseline for future comparison.

Fauna

West Aneglas Vertebrate fauna assessment study April 1998 **1998**

Internal reference: RTIO-HSE-0016008

Report documenting the findings of a vertebrate fauna assessment survey completed between June and October 1997. This report identifies vertebrate fauna species found, fauna habitats and their conservation significance in the West Angelas mine area.

Six fauna habitats were identified as being representative of both the landform features and vegetation associations of the mine area; mulga woodland, rocky gullies, cracking clay, creeklines, hilltop and spinifex plain. The ghost Bat Macroderma gigas was recorded in the mine area as well as several other priority and scheduled species were found. Significant habitats have been identified as the Cracking Clay habitat and Mulga woodland.

West Angelas Stygofauna assessment survey Nov 1998 **1998**

Internal reference: RTIO-HSE-0016004

The report summarises the findings of the preliminary stygofauna survey for the West Angelas mine and Turee Creek B borefield. The aim of the study was to determine if stygofauna are present in the mine and borefield areas, identify key habitat features and assess potential environmental impacts from water abstraction and detail management options. The study was commissioned to support the Part IV approval for West Angelas.

Of the 44 bores sampled in the area 6 bores contained stygofauna. Five specimens were collected in mine area and one specimen in the Turee Creek B borefield area. Species have not been identified as little was known at the time of taxonomy of Australian stygofauna. It was determined that most influencing factor for stygofauna habitat is dolerite and to a lesser degree black shale. It is thought that the presence of fractures and weathered zones in these two non-permeable substrates are utilised as habitat in the absence of more suitable habitat. Potential environmental impacts from mine are summarised as arising from mine dewatering and potential groundwater contamination

West Angelas Minesite - Ghost Bat Monitoring Survey **2001**

Internal reference: RTIO-HSE-0014000

Report documenting surveys were undertaken of known Ghost Bat roosting sites to determine the distribution and abundance of Ghost Bats within the caves located within the mine area. Caves surveyed were located within Deposit B and F as well as the eastern side of West Angelas Hill. A search for potential bat habitats was also conducted on the southern boundary of Deposit B and in a small gully between Deposit B and G that had not previously been investigated.

Recent activity of Ghost Bats were recorded in three out of five caves. No Ghosts Bats were present in any caves searched. Summary of completed manangement actions in regards to the Ghost Bat management plan and planned future actions.

West Angelas Stygofauna Assessment Survey **2002**

Internal reference: RTIO-HSE-0016003

A re-survey of stygofauna in the Turee Creek borefields and the Jeerinah Formation, within the West Angelas lease area. A total of 20 bores were investigated for their sampling potential. Of the 20 bores investigated only 12 were successfully sampled.

Stygofauna were found in five bores. Up to five major groups were recognised from a single bore location. Bore WB51 revelased representative Amphipods, Copepods, Syncarids, Tubellarians and possibly Isopods. Bore WB54 contained potentially two species of Amphipod, one Copepod species and one species of Tubellarian worm. Copepods were the most commonly recorded stygofaunal group with 40 individuals collected from WB54 and 225 individuals observed in bore WB51. WB51 also revealed a large number of Tubellarian worms with 35 individuals recorded.

West Angelas expansion deposits E & F subterranean fauna survey May 2004 **2004**

Internal reference: RTIO-HSE-0015937

Report summarises findings of targeted stygofauna survey for E and F deposits of the West Angelas mining operation.

A review of the geological units present in the valley system containing these deposits suggests that the area is not overly prospective for stygofauna. This is largely because the unit with greatest potential to provide habitat for stygofauna of those present, the superficial alluvials, is situated above the water table. There are also no significant calcrete systems present, which constitute core habitat for stygofauna in other parts of the Pilbara (Humphreys 1999). The deeper geological units that are saturated do not generally support stygal communities in most situations.

Fauna habitats and fauna assembalges of deposit E and F at West Angelas June 2005 **2005**

Internal reference: RTIO-HSE-018209

Robe River Iron Associates commissioned Biota Environmental Sciences to conduct a fauna survey of their Deposit E/F study area, adjacent to the existing operations at West Angelas. The survey was conducted over a 9-day period between the 4/5/2004 and 12/5/2004.

Four primary habitats were identified within the project area: broad colluvial valleys, lower stony footslopes, stony hilltops, incised gullies and creeks. One fauna habitat is considered to have moderate conservation significance within the study area, based on the vegetation types. Broad colluvial valleys dominated by Acacia aneura (Mulga vegetation types M1-M5) comprise ecosystems at risk in the form of grove/intergrove and valley floor mulga. Two priority listed species were identified and one short range endemic (trapdoor spiders).

Greater West Angelas Terrestrial Fauna Assessment, ecologia, January 2014 **2014**

Internal reference: RTIO-HSE-0215896

This report details a baseline fauna survey of the Greater West Angelas study area deposits C, D, D extention, G, F, H and Mt Ella.

Six mammal species (including Pilbara leaf nose bat), 12 bird species and three reptile species are listed as conservation significant. The literature review also identified 32 SRE species that have been previously recorded in the region surrounding the study area. A total of nine broad-scale habitat types have been identified within the study area; ‘footslope or plain’, ‘hilltop, hillslope, ridge or cliff’, ‘mixed Acacia woodland’, ‘mesa top’, ‘cracking clay’, ‘major gorge and gully’, ‘major drainage’, ‘mulga woodland’ and ‘cleared area’. No habitats recorded were regarded as rare or unique to the study area.

Biodiversity improvement studies

Evaluation of mine waste materials as alternative rehabilitation growth medium **2010**

Internal reference: RTIO-HSE-0109961

This study reviewed the physical and chemical properties of soil, tailing and mineral waste from select Pilbara mining operations, to identify waste material and material combinations for use as a topsoil substitute or supplement.

The study showed plant-available nutrients held within the waste materials, although variable, was characteristically low and comparable to natural soils in the region. The majority of the waste materials had macro and micro nutrient concentrations within the range or above the levels measured in benchmark Pilbara topsoil and rehabilitated soils. The pH and phosphorus buffering index of most waste materials were also comparable to that of the benchmark topsoil materials. However, some of the waste types and tailings may need to be mixed with rocky material due to poor physical / erodibility characteristics.

Irrigated seed orchard trial **2011**

Internal reference:

Commencing in 2011 (and still ongoing), a trial irrigated seed orchard was established at the Hamersley Agriculture Project (Marandoo). The purpose of the trial was to identify an alternate method of addressing seed deficits. If successful, the project may be implemented at other Rio Tinto operations, such as the Nammuldi agriculture project.

Genetic diversity in Eucalyptus leucophloia across the Pilbara: Provenance zone implications **2011**

Internal reference: RTIO-HSE-0108843

This study was undertaken to define the provenance seed collection zones for a common species of the Pilbara, Eucalyptus leucophloia (Snappy Gum). This report details information on genetic analysis conducted on E. leucophloia. Collections of E. leucophloia were made from 20 populations across the Pilbara bioregion and genetic analysis was conducted using microsatellite markers.

Genetic diversity in E. leucophloia was high and was typical of that found in other eucalypt species with wide spread distributions. Across the species the level of population differentiation was low and the majority of the diversity was maintained within populations with only 6% of variation partitioned between populations. Genetic variation in E. leucophloia showed little structure across the Pilbara with no clustering of populations based on any geographical proximity or in association with obvious topographical, physiogeographical or geological features such as the Hamersley or Chichester Ranges. Populations towards the edges of the species distribution within the Pilbara showed greater levels of differentiation from populations within the species main range. The high levels of genetic diversity and low levels of differentiation within E. leucophloia implies that seed resources for rehabilitation can be selected from a wide range within the Pilbara.

Genetic diversity in Acacia ancistrocarpa across the Pilbara: Provenance zone implications **2011**

Internal reference: RTIO-HSE-0119260

This study was undertaken to define the provenance seed collection zones for Acacia ancistrocarpa (Fitzroy Wattle). This report details information on genetic analysis conducted on Acacia ancistrocarpa. Collections were made from 24 populations across the Pilbara bioregion and genetic analysis was conducted on 16 populations using microsatellite markers.

Genetic diversity in A. ancistrocarpa was high but lower than that in E. leucophloia, another widespread species in the Pilbara. Across the species Pilbara range the level of population differentiation was low and the majority of the diversity was maintained within populations with only 3% of variation partitioned between populations. Genetic variation in A. ancistrocarpa showed little structure across the Pilbara with no clustering of populations based on geographical proximity or in association with obvious topographical, physiogeographical or geological features. Populations towards the edges of the species distribution within the Pilbara showed greater levels of differentiation from populations within the species main range. The high levels of genetic diversity and low levels of differentiation within A. ancistrocarpa implies that seed resources for land rehabilitation and mine-site revegetation programs can be selected from a wide range within the Pilbara

Baseline Terrestrial Fauna Assessment of Pilbara Rehabilitation Areas **2012**

Internal reference: RTIO-HSE-0134168

In 2011 a fauna survey was conducted within established rehabilitation areas at Brockman 2 and Tom Price mine sites, with the aim of identifying whether fauna is recolonising rehabilitation sites in assemblages comparable to reference sites.

The study found that at least 85 species of native vertebrate fauna, as well as representatives from each of six major groups of invertebrate fauna, are using rehabilitation areas at Brockman 2 and Tom Price, with species compositions that were broadly similar to reference sites. Ant collections were typical of the Pilbara bioregion, with an absence of invasive ant species. The study found greater data correlation between monitoring sites at a particular mine site (Tom Price or Brockman 2) than between rehabilitation and reference sites, indicating the importance of selecting local reference sites. The study concluded that the best candidates for bio-indicators are ants and reptiles.

Rehabilitation Quality Metric (RQM) Project **2012**

Internal reference: RTIO-HSE-0164020

Western Australia has no formal process to measure habitat quality and as such RTIO has needed to design its own customised metrics. Vegetation condition scoring has previously been developed by RTIO through a Biodiversity Net Positive Impact Assessment, but a more precise metric was needed. The Rehabilitation Quality Metric (RQM) project was developed to provide a repeatable method to assess rehabilitation quality against pre-determined reference sites, on a site by site basis, to predict rehabilitation ecosystem quality at the time of relinquishment.

The RQM methodology employs seventeen parameters to characterise the landscape, including vegetation, fauna habitat, fauna presence, erosion, and ecosystem function. Parameters are tailored to be an applicable measure for both rehabilitation and native vegetation (reference sites). Parameters are scored, based on measured or observed characteristics, with a value between 0 and 1, with 1 being functional (terrestrial ecosystem is functioning for the maintenance of biodiversity values at a local or property scale) and 0 being dysfunctional (terrestrial ecosystem is failing; indicators of ecosystem function have scored below acceptable levels). Both rehabilitation areas and reference sites are scored. Scores are subsequently determined for the entire mine lease, based on the condition of the land before mining (extrapolated from the reference sites, area weighted) and the likely post-mining conditions (extrapolated from the rehabilitation areas and expected closure domain distribution, area weighted, ie pits with no rehabilitation score 0). The difference between the pre-mining and post-mining scores represents the residual impact of mining.

Propagation of Pilbara spinifex (Triodia sp.) **2012**

Internal reference: RTIO-HSE-0169744

Triodia has often been observed to have very poor establishment from broadcast seed. This project investigated alternatives to growing Triodia (spinifex) from seed, focussing on ways to propagate seedlings from wild harvested material.

The project found the most successful propagating material was stolons. Greatest propagation success was achieved when Triodia were collected when semi to fully dormant (mid Winter-Spring). The ‘Moist Root Induction Method’ recommended by previous researchers was less successful than the standard propagation techniques employed in this project. Success varied notably between populations. Consequently, any future collections of propagating material should target multiple populations to maximise potential for success.

Pilbara Seed Science Project, Part 2 Final Report Jan 2012 **2013**

Internal reference: RTIO-HSE-0174944

Undertaken between 2009-2012, this seed research investigated germination, biology, dormancy classification and treatments for dormancy alleviation for a range of species from the Pilbara.

The *Acacia atkinsiana, Indigofera monophylla and Sida echinocarpa* seed lots have physical dormancy. Heat treatments and mechanical scarification improved germination on dormant seeds, however, heat treatments killed non-dormant seeds. The treatments used for *Goodenia stobbsiana* seeds failed to overcome dormancy, suggesting deep physiological dormancy. The *Hakea lorea/ chordophylla* seed lots were found to be non-dormant, with very high germination results in the controls. As such, they will not require any pre-treatments prior to direct seeding. The florets surrounding the *Triodia pungens* and *T. wiseana* seeds were found to restrict germination, however, many of the freshly extracted seeds out of the florets were found to be physiologically dormant. Treatments for dormancy include mechanical scarifier to rupture seed coat, hot water (noting potential damage to immature or non-dormant seeds) and increases to germination through wet / dry cycling and / or temperature cycling.

Priority Species Seed Quality and Germination Final Report **2013**

Internal reference: RTIO-HSE-0207487

This study investigated the quality and germination biology of a range of priority and keystone (Triodia) plant species from the Pilbara.

Eremophila magnifica subsp. Magnifica has physical & physiological dormancy. Propagation methods other than seed may be more successful. Geijera salicifolia and Olearia mucronata has physiological dormancy. Temperature cycling may be required to stimulate germination. Indigofera ixiocarpa and Indigofera sp. Bungaroo Creek has physical dormancy or is non-dormant. Mechanical scarification may be required. Ptilotus subspinescens is non-dormant and will germinate easily without removal from the perianth sheath. However, seed is likely to lose viability with a few years. Sida echinocarpa and Sida sp. Barlee Range has physical dormancy. Seeds should be removed from the mericarp and then scarified in order to germinate. Triodia pungens has T. wiseana non-deeep or deep physiological dormancy. Germination of de-husked seeds can be improved by applying gibberellic acid or 1% smoke water and wet/dry cycling.

Priority Species Project Progress Report 2013 **2014**

Internal reference: RTIO-HSE-0207486

The Priority Species Project, initiated in 2012, aims to improve knowledge of priority plant species and develop methods to successfully germinate and establish priority species, to enable priority plant species to be integrated into Rio Tinto rehabilitation programmes. This work is being undertaken in conjunction with the Department of Parks and Wildlife.

13 plant species were selected as being potentially suitable for establishment in rehabilitation: Eremophila magnifica subsp. magnifica, Indigofera sp. Bungaroo Creek, Indigofera sp. gilesii, Acacia bromilowiana, Sida sp. Barlee Range, Ptilotus subspinescens, Ptilotus mollis, Acacia subtiliformis, Isotropis parviflora, Grevillea sp. Turee, Hibiscus sp. Canga, Themeda sp. Hamersley Station, and Aluta quadrata. Indigofera sp. Bungaroo Creek and Ptilotus subspinescens were found to readily germinate in laboratory conditions, and a field trial was established at Brockman 4 late in 2013.

Landform design

Results of flume investigations of the stability of rock mulches **1998**

Internal reference: RTIO-HSE-0109221

This study assessed the potential for rock mulches to be stripped from the soil surface by overland flows.

Although 150-300mm diameter BIF was not removed by simulated overland flows, even for 100mm/hr simulated runoff on 55% gradients, considerable scour of the spoil between the rocks was observed, indicating potential for long-term development of rills or gullies if the level of rock cover was less than 100%. Large reductions in sediment concentrations were observed when finer rocks were mixed with BIF. The data indicate that it is crucial for any rock mulch to cover a wide range of particle diameters, including a component of finer rocks. The resulting mixed rock created a framework of large rocks that resist movement by flows, while the smaller rocks reduce erosion being anchored within the larger (framework) rock. For rock mulches with a mixture of rock diameters, 80% cover produced acceptable erosion rates. Sediment loads were slightly higher for 40% cover by rock of mixed diameters, and it was speculated that this may also achieve acceptable erosion rates with the addition of vegetation.

Final Landform Design Criteria for Use During Mine Planning **2012**

Internal reference: RTIO-PDE-0159989

Rio Tinto Iron Ore WA have historically designed closure landforms for waste materials with berms ~10 m, lifts ~20 m and ad hoc alterations to batter gradients where erosion rates have been perceived to be unacceptably high. This report integrates recent advances in characterisation and modelling of materials, climate and erosion processes to provide appropriate final landform batter characteristics for key Pilbara mineral wastes and soils.

Material properties of mineral wastes were assessed and classified for the range of mineral wastes found across Rio Tinto Pilbara sites. Climate sequences were used to model and test potential erosion rates for a range of batter configurations (shapes (linear, concave), heights, gradients, berm capacity) and validated against existing slopes for which material and climate data were available. This information was used to develop a searchable waste dump batter database for all major mineral wastes and soils, intended for use during mine planning design.

Contamination

Impact of Nitrogen from Explosives on Mine Site Water Quality **2008**

Internal reference: RTIO-PDE-0054638

The likely issues associated with the use of nitrogen based explosives on mineral waste and any leachate water are explored in this report. The amounts of explosives used on site are described, along with nitrogen chemistry and toxicity. Nitrogen concentrations for various mine sites and specific lithologies are presented which includes concentration in rock assays and liquid extracts.

It was concluded that the largest risk of nitrogen contamination is likely to arise from the discharge of surface waters that have been in contact with blasted materials and are discharged off site into creeks or waterways. This becomes a more significant issue if the water is also acidic. Algae (ie cyanobacteria) plumes have been identified in acidic water at Tom Price

West Angelas Preliminary Site Investigation Report **2008**

Internal reference: RTIO-HSE-0058441

The purpose of this preliminary site investigation was to identify areas of potential environmental concern associated with current and historical activities at the site.

Results from the risk ranking analysis show that in terms of overall risk factor, no "high risk" areas were identified at the site. The rail refuelling area, the diesel pipeline, the former landfill and the vehicle wash-down facilities were assessed to be of "moderate high" to "moderate low" risk. No previous environmental investigations have been undertaken at any of the facilities, these areas are potential areas of concern and have yet to be quantified. In all cases visual and/or anecdotal evidence suggested that potential adverse impacts to soil, groundwater or surface water, be it fuel spills, leaks or ongoing run-off/infiltration has historically occurred at these locations. For each of these areas of concern, a soil and groundwater sampling and analysis plan should be developed.

Control Measures for Potentially Acid Forming Pit Wall Rocks **2010**

Internal reference: RTIO-PDE-0079541

Desktop study of potential strategies to manage exposed sulfidic materials and find viable options for management was conducted with a focus on the Hope Downs 1 and Tom Price sites.

Chemical treatments have the potential to be effective only in the short-term and only for minor water quality issues. Grouting of the pit walls is expected to have limited applicability, although grout curtains behind the wall may have success (untested). Cover technologies have the greatest potential to be effective over the long term, but would need to be resistant to puncture by underlying rocks, resistant to weathering and UV damage ie shotcrete, geomembranes. For long term performance the exposed surface need to be as stable and free of loose material as possible. Treatment effectiveness will also depend on the site conditions, eg chemical less effective at Tom Price.

Workshop Summary and Desktop Review: Dewatering and Sulfate Accumulation **2012**

Internal reference: RTIO-PDE-0101903

This is a summary of a workshop held to determine the risks of dewatering sulphides within the pit wall. The outcomes from this workshop will be used to develop models to estimate the mass of sulfate produced as a consequence of dewatering activities.

There are many processes that contribute to poor pit water quality. Most of these processes are known and accounted for in existing models. However, the science of fluid flow in fractured rock is not well developed and this lack of knowledge restricts the outcomes of studies on pit water quality. There is a general lack of empirical data for estimating parameters used in models, creating a large degree of uncertainty in predictive models. Sensitivity analysis can be used to overcome some of these challenges.

Contaminated Site Investigation - Soil and Liquid Waste Dumping Area at West Angeles **2012**

Internal reference: RTIO-HSE-0142463

This report investigats the recent increase in contaminated material placed in storage ponds and potential for infiltration to occur through soil stockpiles to groundwater.

Results of the sampling concluded that there is minimal risk present at the area where the former contaminated stockpile was located. The remaining hydrocarbon concentrations are compliant with the ecological guidelines, with a few areas of elevated concentrations. Concentrations are expected to degrade over time, further reducing the potential for environmental impacts. A new bunded and graded cell has been created at the land farm. The area is expected to be suitable for rehabilitation.

Updated Preliminary Site Investigation and Sampling and Analysis Plan for West Angelas Final **2012**

Internal reference: RTIO-HSE-0148156

The objectives of the project was to update existing information relating to known or suspected contamination at West Angelas and to subsequently develop a sampling and analysis plan in order to further characterise identified areas of interest.

The review of the Preliminary Site Investigation found that, in general, the existing findings are accurate and have been carried out and presented in a manner consistent with the Department of Environment and Conservation Contaminated Sites Management Series. Additional areas of environmental concern were identified during the review. Areas of further interest presented in the sample and analysis plan are: 1) Mine Area - Rail refuelling area, former landfill, fire training ground, contaminated soils stockpile area, crusher area and the current mine landfill; and 2) Workshop / Administration Area - Light vehicle refuelling area, heavy vehicle refuelling area, heavy and light vehicle workshop area, heavy vehicle workshop area, light vehicle workshop areas, heavy and light vehicle wash-down facilities, bulk oils store, bulk fuels store, intermediate lube store, emergency power plant, recycling yard and the ammonium nitrate / fuel oil shed.

Development of a conceptual model: Sulfate accumulation as a consequence of pit dewatering activities, memo **2012**

Internal reference: RTIO-PDE-0101903

Mine dewatering and the consequent lowering of the water table may result in desaturation of sulfide bearing lithologies. The objective of this work was to develop a conceptual model of the associated processes: where sulphide bearing rock intersects the pit walls, and where the sulphide bearing rock is located behind the pit walls but not directly exposed on the pit wall face.

The conceptual model developed estimates the mass of sulfate produced as a consequence of dewatering activities, considering processes during operations and after operations cease, and using sensitivity analysis where parameter inputs are uncertain. The model output provides the basis for an assessment of potential impacts on water quality for general risk assessment applications. Further work was identified to improve parameterisation of the model, including the collection of additional empirical data for pit wall fracturing, saturation of pit wall fractures and sulfide oxidation rates in talus and on pit walls.

Ethnographic or archaeological values

Water and Indigenous People in the Pilbara: A Preliminary Study, CSIRO: Water for a Healthy Country **2011**

Internal reference: RTIO-HSE-0218222

Water resources are vital to Indigenous identities, beliefs, environmental philosophies and livelihoods. This report provides a broad-scale scoping study of Indigenous relationships to water in the Pilbara and considers the potential impacts of Indigenous water values.

Indigenous belief systems perceive water as an elemental part of the broader cultural landscape, held and managed under customary systems of law. Water sources were derived during the Dreaming and are the most important features in the Pilbara cultural landscape. Interviews raised issues of long term drying, obstruction of water flow, over-extraction, inappropriate discharge from de-watering and access restrictions.