Government of **Western Australia**
Department of **Mines and Petroleum**

COVER LETTER PROFORMA:
SUBMISSION OF NEW/REVISED INFORMATION

To:
Assessment Officer Name: Rosemarie DE BARI
Minerals Branch,
Environment Division
Department of Mines and Petroleum
100 Plain Street
EAST PERTH WA 6004

This cover letter profoma **must be used** whenever additional information is submitted to DMP in relation to a document under DMP assessment (including new versions of documents). This cover letter proforma is required to ensure that additional information is appropriately recorded, assessed and filed in departmental records.

Please tick **one** box, fill out the required information and then attach on top of all additional information.

☒ **FURTHER INFORMATION SUBMITTED FOR A MINING PROPOSAL (OR OTHER DOCUMENT)**
When specified by an Environmental Officer, minor supplementary or explanatory information for a Mining Proposal can be received as 'further information', all other changes must be in the form of a revised Mining Proposal. Further information must be in the form of a letter or report signed by the Tenement Holder, Manager or authorised representative and will become a legal obligation as a tenement condition.

Registration ID:	58730
MP Title:	Mine Closure Plan Ravensthorpe Nickel Operations Pty Ltd
MP date (from Appendix 6 Checklist):	February 2016
Date information requested:	4 April 2016
Who requested the information:	Rosemarie DE BARI
Indicate (Y/N) if all additional information has been provided in this document. **If (N); Provide further detail of outstanding information to be sent separately.**	**Y/N** **Detail:** Section 9.5 was updated to include a commitment to formulating a Care and Maintenance Plan, within 3 months of the event of premature closure.

☐ **RESUBMISSION OF A MINING PROPOSAL (OR OTHER DOCUMENT UNDER ASSESSMENT).**

Registration ID:	
MP Title: *Note: Title must state 'Revised' and the version #. The cover page must also state the revised MP date.*	
Date of revised MP:	
Version Number:	
Date information requested:	
Who requested the information:	
☐ **A new signed and dated Appendix 6 checklist has been provided.** *Note: Checklist date must be consistent with the date of revised MP.*	
☐ **A new electronic copy has been provided, and is identical to the hard copy submitted**	
☐ **All requested information has been provided in the new document**	

OFFICE USE ONLY - Records	
Affix Scanned Stamp:	
Doc ID:	

FQM AUSTRALIA NICKEL
PTY LIMITED ABN 92 135 761 465

Ravensthorpe Nickel Operations Pty Ltd

Mineral Field 74

Submitted: February 2016

Document ID	Revision Number	Contact Telephone	Contact Email
RNO-ENV-PLN-0011B	Rev 0	(08) 9838 2000	rav.environmental@fqml.com

Mine Closure Plan Checklist

Q No	Mine Closure Plan (MCP) checklist	Y/N NA	Page No.	Comments
1	Has the Checklist been endorsed by a senior representative within the tenement holder/operating company? (See bottom of Checklist.)	Y	5	
	Public Availability			
2	Are you aware that from 2015 all MCPs will be made publicly available?	Y	NA	
3	Is there any information in this MCP that should not be made publicly available?	Y	NA	Financial provisioning contains sensitive information
4	If "Yes" to Q3, has confidential information been submitted in a separate document\section?	Yes	NA	Appendix 7
	Cover Page, Table of contents			
5	Does the MCP cover page include; • Project Title • Company Name • Contact Details (including telephone numbers and email addresses) • Document ID and version number • Date of submission (needs to match the date of this checklist)	Y	1	
	Scope and Purpose			
6	State why is the MCP is submitted (as part of a Mining Proposal or a reviewed MCP or to fulfil other legal requirements)	Y	13	Reviewed MCP as per tenement conditions
	Project Summary			
7	Does the project summary include; • Land ownership details(include and land management agency responsible for the land/reserve and the purpose for which the land/reserve [including surrounding land] is being managed); • Location of the project; • Comprehensive site plan(s); • Background information on the history and status of the project.	Y	14	
	Legal Obligations and Commitments			
8	Has a consolidated summary or register of closure obligations and commitments been included?	Y	33	Appendix 2
	Stakeholder Engagement			
9	Have all stakeholders involved in closure been identified?	Y	42	
10	Does the MCP include a summary or register of historic stakeholder engagement with details on who has been consulted and the outcomes?	Y	47	
11	Does the MCP include a stakeholder consultation strategy to be implemented in the future?	Y	51-63	
	Post-Mining Land use(s) and closure objectives			
12	Does the MCP include agreed post-mining land use(s), closure objectives and conceptual landform design diagram?	Y	49-51	
13	Does the MCP identify all potential (or pre-existing)	Y	54	

Q No	Mine Closure Plan (MCP) checklist	Y/N NA	Page No.	Comments
	environmental legacies, which may restrict the post mining land use (including contaminated sites)?			
14	Has any soil or groundwater contamination that occurred, or is suspected to have occurred, during the operation of the mine, been reported to DER as required under the Contaminated Sites Act 2003?	N		No suspected contamination
15	Does the MCP include an appropriate set of specific completion criteria and closure performance indicators?	Y	55-58	
	Collection and analysis of Closure Data			
16	Does the MCP include baseline data (including pre-mining studies and environment data)?	Y	63	
17	Has materials characterisation been carried out consistent with applicable standards and guidelines (e.g. GARD Guide)?	Y	59-70	
18	Does the MCP identify applicable closure learnings from benchmarking against other comparable mine sites?	N		No data available
19	Does the MCP identify all key issues impacting mine closure objectives and outcomes (including potential contamination impacts)?	Y	70	
20	Does the MCP include information relevant to mine closure for each domain or feature?	Y	79-110	
21	Does the MCP include gap analysis/risk assessment to determine if further information is required in relation to closure of each domain or feature?	Y	71	Appendix 4
22	Does the MCP include the process, methodology, and has the rational been provided to justify identification and management of the issues?	Y	70	
	Closure Implementation			
23	Does the reviewed MCP include a summary of closure implementation strategies and activities for the proposed operations or for the whole site?	Y	90	
24	Does the MCP include a closure work program for each domain or feature?	Y	93-124	
25	Have site layout plans been provided to clearly show each type of disturbance as defined in schedule 1 of the MRF Regulations?	Y	93-124	
26	Does the MCP contain a schedule of research and trial activities?	Y	110	
27	Does the MCP contain a schedule of progressive rehabilitation activities?	Y	111	
28	Does the MCP include details of how unexpected closure and care and maintenance) will be handled?	Y	120	
29	Does the MCP contain a schedule of decommissioning activities?	Y	121	
30	Does the MCP contain a schedule of closure performance monitoring and maintenance activities?	Y	124	
	Closure Monitoring and Maintenance			
31	Does the MCP contain a framework, including methodology, quality control and remedial strategy for closure performance monitoring including post-closure monitoring and maintenance?	Y	126 - 127	Appendix 6

Q No	Mine Closure Plan (MCP) checklist	Y/N NA	Page No.	Comments
	Financial Provisioning for Closure			
32	Does the MCP include costing methodology, assumptions and financial provision to resource closure implementation and monitoring?	Y	125	Appendix 5
33	Does the MCP include a process for regular review of the financial provision?	Y	124	
	Management of Information and Data			
34	Does the mine closure plan contain a description of management strategies including systems, and processes for the retention of mine records?	Y	128	

Corporate Endorsement:

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

Name: CHRISTOPHER BATES **Signed:** _____

Position: CO. SECRETARY **Date:** 29/2/2016.

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

Contents

Tables in Text

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1. Scope and Purpose

1.1 Purpose

This Mine Closure Management Plan has been prepared for submission to the Department of Mines and Petroleum (DMP) as part of Ravensthorpe Nickel Operations Pty. Ltd. (RNO) commitments to operating requirements under the *Mining Act 1978* and *Ministerial Statement 633 (September 2003)*.

The objectives of the RNO Mine Closure Plan are to:

- Identify actions necessary to meet legal requirements and other obligations in the closure of the site;
- Identify significant closure risks and mitigating actions;
- Highlight gaps in knowledge and identify future actions/research to assist in addressing the gaps;
- Facilitate the discussion of expectations for closure with stakeholders and enable appropriate closure criteria to be agreed;
- Enable appropriate cost estimates to be developed for the purposes of closure provisioning;
- Provide the basis for on-going review of closure assumptions and closure activities;
- Identify opportunities for progressive rehabilitation; and
- Identify further research or investigations required to confirm that closure is achievable and effective, and optimum use of available resources and technology are made.

1.2 Scope

The specific areas covered by the Closure Management Plan are listed below and are defined by currently disturbed areas associated with Halley's and Hale Bopp open cut mines and supporting infrastructure. Future iterations of the plan will contain more detail on aspects of the project that have currently not been implemented, in particular the Shoemaker Levy pits. The various site areas are described in further detail in Section 2.

2. Project Overview

2.1 Site Overview and History

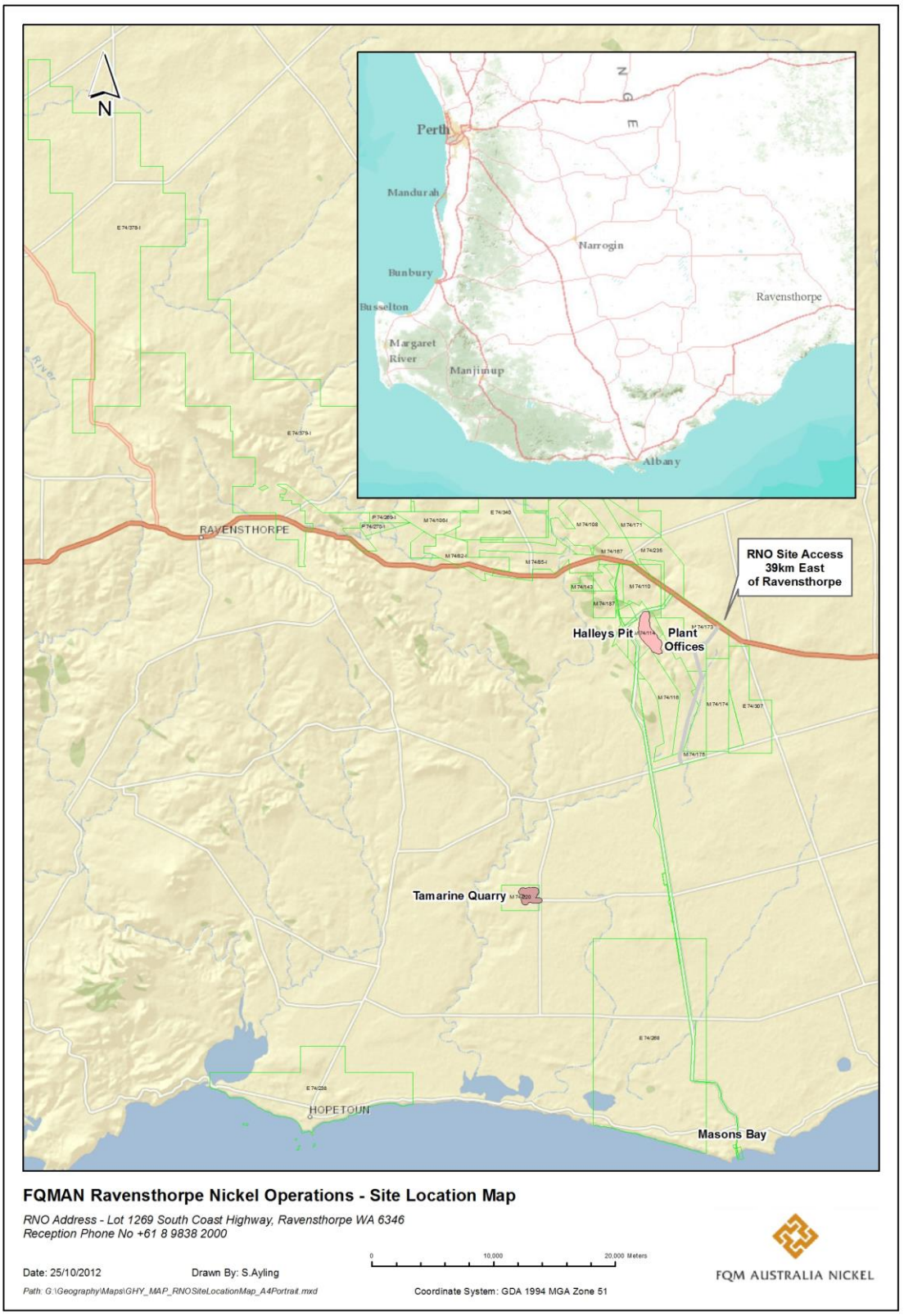
The location of Ravensthorpe Nickel Operations (RNO) is approximately 35 km east of the town of Ravensthorpe and 155 km west of Esperance along the South Coast Highway. RNO is located within the Shire of Ravensthorpe in Mineral Field 74 and the Phillips River District, 571 km by road from Perth (Figure 1).

The original Ravensthorpe Nickel Project (RNP) was commenced by Comet Resources in 1998. BHP Billiton (BHPB) purchased RNP in 2002 and commenced construction in 2003 and operations in 2008. BHPB shut down the operation due to operational difficulties in 2009, and the plant was placed into care and maintenance. In February 2010, First Quantum Minerals Australia Nickel (FQMAN) purchased RNO and commenced modifications and upgrades. Commissioning started in June 2011 and nickel was first produced in October 2011, with first exports shipped on 25th November 2011; commercial production was achieved on the 28th December 2011.

The plant continued to perform at design throughput until 14 December 2014 when Atmospheric Leach Tank 9 suffered a structural failure. Approximately 2000 cubic meters of acidic slurry was released throughout the process plant and impacted on the RNO power supply. Subsequently, the operation was temporarily shut down. In February 2015 the plant was brought back online at reduced rates.

The Project consists of three nickel laterite deposits, Halley's, Hale-Bopp and Shoemaker-Levy, which will be mined by conventional open cut methods. The nickel content in the ore is upgraded through a beneficiation process and followed by a series of treatments utilising pressure and atmospheric acid leach technology and solution purification techniques. The Project produces a mixed nickel-cobalt hydroxide, which is bagged and containerised prior to being transported to customers by road or by ship if exported.

Figure 1 FQMAN Ravensthorpe Nickel Operations – Site Location Map



2.2 Land Tenure and Ownership

2.2.1 Tenements

A site plan (including RNO tenements and infrastructure) is included as Figure 1. The tenements currently disturbed by operations undertaken by RNO are listed in Table 1.

More detailed information (aligned with the Mine Rehabilitation Fund reporting format) regarding tenement disturbance (to December 2015) is included in Appendix 1.

Figure 2 RNO Tenements and Site layout

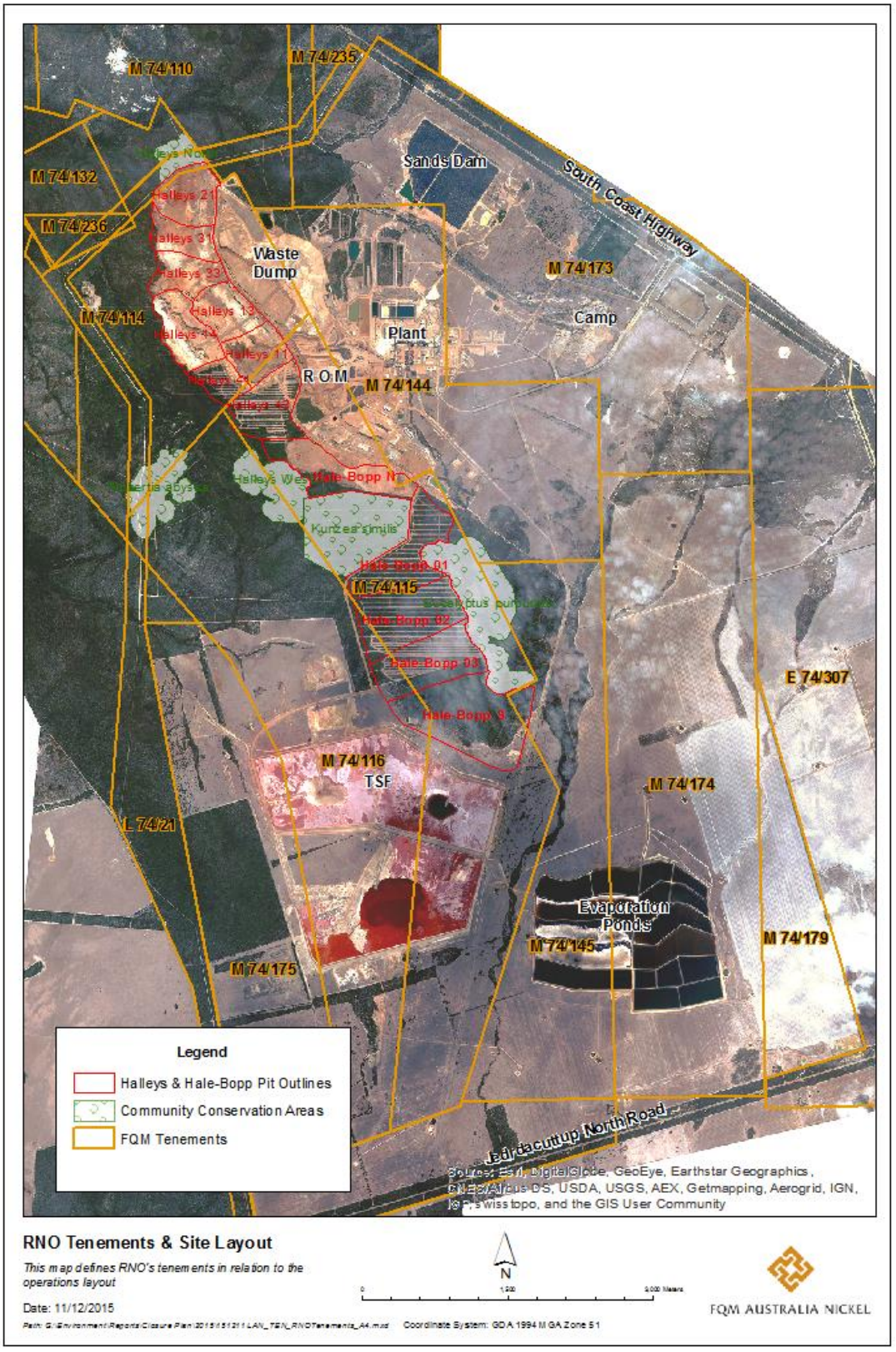


Table 1: RNO Tenements and Associated Infrastructure

Tenement	Holder	Area (ha)	Expiry	Site Area(s)
M74/108	FQM Australia Nickel Pty Ltd	805	18/06/2022	
M74/114	FQM Australia Nickel Pty Ltd	631	6/05/2019	Halley's open cut mine, Waste rock dump, ROM pad, Conveyor, Pipelines and services corridor
M74/115	FQM Australia Nickel Pty Ltd	953	6/05/2019	Tailings Storage Facility, Halley's open cut mine, Waste rock dump, ROM pad, Conveyor, Pipelines and services corridor
M74/116	FQM Australia Nickel Pty Ltd	973	6/05/2019	Tailings Storage Facility, Gravel borrow areas
M74/123	FQM Australia Nickel Pty Ltd	56	6/08/2024	
M74/142	FQM Australia Nickel Pty Ltd	108	30/08/2026	
M74/143	FQM Australia Nickel Pty Ltd	130	27/10/2023	
M74/144	FQM Australia Nickel Pty Ltd	632	27/10/2023	Halley's open cut mine, Waste rock dump, ROM pad, Conveyor, Process plant, Tailings Storage Facility, Waste rock dump, Laydown yards, Buffer Ponds and Sands Reject Storage Facility
M74/145	FQM Australia Nickel Pty Ltd	542	27/10/2023	Evaporation Ponds, Groundwater Abstraction
M74/167	FQM Australia Nickel Pty Ltd	441	24/03/2031	
M74/168	FQM Australia Nickel Pty Ltd	955	24/03/2031	
M74/169	FQM Australia Nickel Pty Ltd	617	26/06/2028	
M74/170	FQM Australia Nickel Pty Ltd	287	24/03/2031	
M74/171	FQM Australia Nickel Pty Ltd	417	24/03/2031	
M74/172	FQM Australia Nickel Pty Ltd	901	26/06/2028	
M74/173	FQM Australia Nickel Pty Ltd	999	6/01/2025	Accommodation village, Gravel borrow areas
M74/174	FQM Australia Nickel Pty Ltd	995	6/01/2025	Evaporation Ponds
M74/175	FQM Australia Nickel Pty Ltd	815	6/01/2025	Tailings Storage Facilities
M74/179	FQM Australia Nickel Pty Ltd	217	8/11/2025	
M74/187	FQM Australia Nickel Pty Ltd	286	24/03/2031	
M74/220	FQM Australia Nickel Pty Ltd	450	28/03/2027	Tamarine Limestone Quarry
M74/235	FQM Australia Nickel Pty Ltd	883	24/03/2031	
M74/236	FQM Australia Nickel Pty Ltd	38	24/03/2031	
M74/237	FQM Australia Nickel Pty Ltd	48	24/03/2031	
L74/19	FQM Australia Nickel Pty Ltd	5	6/08/2022	Seawater intake
L74/20	FQM Australia Nickel Pty Ltd	4	6/08/2022	Seawater pumping station
L74/21	FQM Australia Nickel Pty Ltd	890	20/01/2021	Seawater pipeline
L74/22	FQM Australia Nickel Pty Ltd	34	6/08/2022	RNO access roads between mine and South Coast Highway
L74/33	FQM Australia Nickel Pty Ltd	32	16/02/2026	Seawater intake
L74/36	FQM Australia Nickel Pty Ltd	9	6/10/2026	Seawater pipeline
L74/37	FQM Australia Nickel Pty Ltd	17	6/10/2026	Seawater pipeline
L74/43	FQM Australia Nickel Pty Ltd	1	13/11/2027	

2.2.2 Ownership

Details of site ownership are included as Table 2.

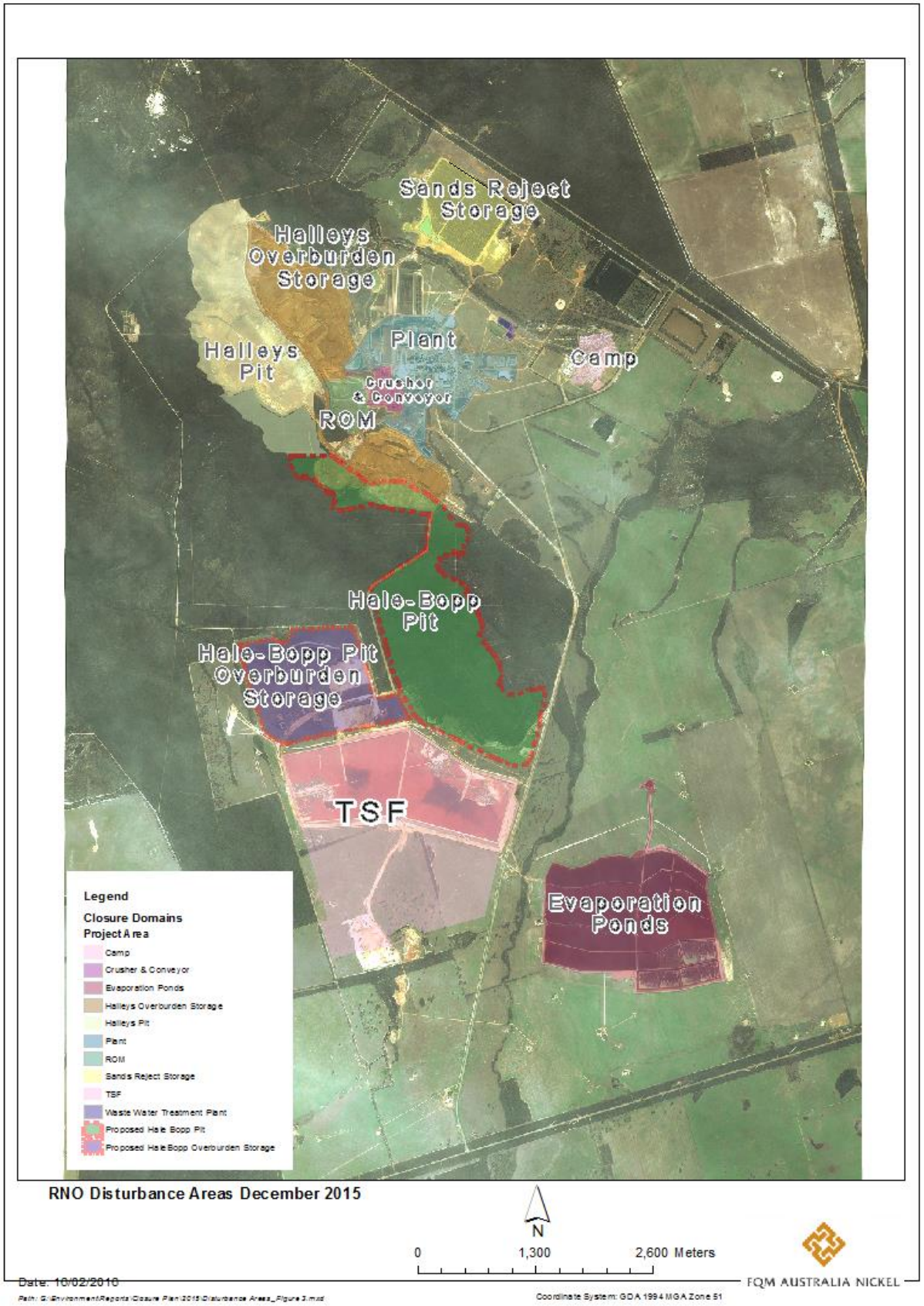
Table 2: Site Ownership Details

Company Name	FQM Australia Nickel Pty Ltd
Postal Address	Locked Bag 100, Ravensthorpe WA 6346
Site Address	Lot 1269 South Coast Highway, Ravensthorpe WA 6346
Contact Details	Telephone: +61 (0)8 9838 2000 Facsimile: +61 (0)8 9838 2001

2.3 Site Description

The site has been segregated into 11 main areas as described in Sections 2.3.1 to 2.4.7 below and shown in Figures 3, 4 and 5. Figure 3 shows the RNO disturbance areas on the mining leases.

Figure 3 RNO Disturbance Areas



2.3.1 Halley's open cut mine

Mine operations have been conducted in Halley's deposit to date. The current mining schedule includes the introduction of Hale Bopp followed by Shoemaker Levy deposits. Halley's open cut mine area, on Tenements M74/114, M74/115, M74/116, M74/144 currently comprises;

- Halley's pit
- Topsoil stockpiles
- Waste rock dumps
- Cleared area yet to be mined
- Stockpile area

2.3.2 Hale-Bopp Pit open cut mine

Mine operations have not yet begun in the Hale-Bopp area. Development is scheduled to be carried out in 2016. Hale-Bopp open cut mine area, on Tenements M74/115, M74/116, M74/145 will comprise;

- Hale-Bopp pit
- Topsoil stockpiles
- Waste rock dumps

2.3.3 Process Plant and Infrastructure

The process plant uses conventional and established processes to upgrade, extract, purify and produce nickel and cobalt in the form of an intermediate hydroxide product. The plant area on Tenements M74/144 and M74/173 includes:

- High Density Polyethylene (HDPE) lined Ponds
- Pad Area
- Nickel Processing Plant
- Acid Plant
- Limestone Plant
- Power Plant
- ROM Pad
- Administration Buildings
- Workshops
- Laydown Area
- Fuel Farm

- Lube Bay and
- Explosive Reagents Shed

2.3.4 Process Water Storage Facilities

Tailings Storage Facility

The first cell of the Tailings Storage Facility (TSF) has been formed approximately 4 km south of the process plant. The second cell of the TSF is adjacent to the first, to the South. Residue accumulates and consolidates in the TSF and supernatant liquor is drawn off via decant sumps and submersible pumps. The decant liquor is discharged to evaporation ponds.

The Tailings Storage Facilities area on Tenement No's M74/115, M74/116, M74/175 includes:

- Tailings Dam 1 (North), including cells 1(west) and 2 (east)
- Tailings Dam 2 (South)
- Tailings Pipelines
- Decant pipelines
- Sediment Ponds

Evaporation Ponds

Evaporation Ponds: excess water from tailings and surplus wash water from the Manganese removal thickener overflow is pumped to the evaporation ponds (500m east of TSF). The Evaporation Pond facility on Tenement No's M74/145 and M74/174 includes:

- 11 HDPE lined ponds, separated into 17 cells
- Polyurethane lined steel and HDPE pipelines to allow discharge to the cells.

Sands Rejects Storage Facility

Sands Rejects Storage Facility (SRSF): was designed to store coarse rejects separated during the beneficiation process. It is located about 1km to the north of the process plant. This facility has not been commissioned for its original purpose and it is now used to harvest and store rainwater. It occupies Tenements M74/173 and M74/144 and includes:

- A HDPE lined area;
- Two HDPE lined surface runoff sumps, each with a capacity of 2,800 m^3;
- A HDPE lined overflow pond with a capacity of 35,000 m^3;

- A leakage detection system beneath the HDPE liner; and
- Polyurethane lined steel pipes for transportation of the rejects sands material and HDPE pipes for water return from the SRSF to Plant.

2.3.5 Other Areas

Other areas include:

- Sediment Control Structures
- Groundwater Supply Bores –RWB02, RWB03 and RWB04
- Accommodation Village (M74/173)
- Decommissioned Construction Camp (M74/173)
- Wastewater Treatment Plant (M74/173)
- Gravel Pits

2.3.6 Tracks and Roads

Tracks and roads that have been developed, or amended to service RNO include:

- Onsite haul roads
- Northern and southern access sealed roads to the mine site
- Mason Bay Road, Lee Road, Middle Road, Jerdacuttup Road, Tamarine Road and South Coast Highway road works, public roads (no closure activities required) – Tenement No's L74/19, L74/21, L74/33, L74/36, L74/37.

2.3.7 Seawater Pipeline and Infrastructure

Seawater is drawn from an onshore intake structure with associated pumps and screens at Masons Point (Figure 4), stored in a holding pond approximately 80 metres from the shoreline and pumped some 41km north to the plant. The desalination plant is located within the processing plant. The output streams from the desalinisation plant consist of desalinated water and a brine solution with a TDS of approximately 65,500 mg/L. The brine solution is used within the process water stream, and ultimately disposed of to the evaporation cells as excess wastewater. The seawater intake and facilities area is situated on Tenements L74/19, L74/20, L74/21, L74/33, L74/36 and L74/37 includes:

- Intake channel and pumping station
- Pipeline
- Pumping infrastructure including three (3) intermediate pumping stations
- Holding ponds
- Desalination Plant

- Steam turbines and Diesel Generators: three steam turbines of nominal 18 MW capacity each; three package boilers each with a maximum continuous rating of 85 t/h; and three diesel generator sets each with a rating of 1.7 MW

2.3.1 Tamarine Limestone Quarry

Limestone is required as part of the processing operation and for pH control. Tamarine Quarry (Figure 5) is located on Tenement No. M74/220.

Figure 4 Seawater Pipeline Disturbance Area

Figure 5 Tamarine Quarry Disturbance Areas

3. Closure Obligations and Commitments

Legal requirements arise predominately from State and Commonwealth legislation, mining tenement conditions, commitments made in Notices of Intent (NOIs) or Mining Proposals (after February 2006), conditions on environmental approvals (such as Ministerial Statements, operating licences and clearing permits) and conditions in contracts RNO has entered into with other parties.

3.1 Licences, Approvals and Tenement/Lease Conditions

RNO maintains a Legal Obligations Register which contains legally binding conditions and commitments and/or legal obligations applicable under relevant State and Federal legislation. A copy is included at Appendix 2.

3.2 Potential Obligations Arising from Management Plans

Tenement conditions and Ministerial Statement No. 633 include specific requirements for management plans to be developed and implemented by RNO. The following Plans have commitments relevant to closure:

- Management Plan for Priority Flora and Significant Vegetation Communities.
- Groundwater Management Plan.
- Surface Water Management Plan.
- Dieback Management Plan.
- Heritage Management Plan.

3.3 Third Party Agreements

The following third party Agreements have been considered in the development of the Closure Management Plan:

- Memorandum of understanding (MOU) with State Government regarding delivery of community infrastructure by the Western Australian Government to attract and retain locally based workforce;
- Option deed with LandCorp regarding commercial aspects and land development by LandCorp;
- Agreement with the Shire of Ravensthorpe regarding the operation of the Shire of Ravensthorpe airport;

These Agreements will be reviewed prior to closure and obligations relevant to closure will be implemented or discussed with the third party.

3.4 Non-legal obligations

Non-legal obligations may arise from informal commitments made to stakeholders. No non-legal obligations have been identified at the time of writing of this Mine Closure Plan.

It should be noted that non-legal commitments may become legal requirements if they are incorporated into contracts with third parties, tenement conditions or other conditions on approvals that regulate mine closure activities.

3.5 Closure Standards

This Closure Management Plan has been prepared following the *Guidelines for Preparing Mine Closure Plans* (DMP 2015).

4. Stakeholder Engagement

4.1 Social Setting

4.1.1 History of settlement

Archaeological and anecdotal evidence demonstrates that there was extensive Aboriginal habitation in the Ravensthorpe area until the late 1800s, when the local Aboriginal people were largely displaced by mining and agriculture. This displacement was preceded by the massacre of a number of local Noongars by settlers at Cocanarup in the mid 1880s (Eades and Roberts, 1984).

Gold was found at Annabel Creek in 1898 and a gold rush occurred in the ensuing decade, resulting in the development of gold and copper mining and smelting in and around Ravensthorpe. Mining has continued spasmodically over the years with activity fluctuating according to metal prices.

The earliest settlement for agriculture was in 1868. The area of good quality soils close to Ravensthorpe was fully developed for agriculture by the 1930s. The extensive areas of sandier soils elsewhere in the shire were not cleared and settled for agriculture until after the 1950s, when improved knowledge of soil and plant nutrition enabled adequate growth of crops and pastures. Until the commencement of construction of RNO, agriculture was the major industry for the shire.

4.1.2 Heritage

Aboriginal cultural, heritage and ethnographic surveys took place throughout the project area's history, paving the way for exploration, construction and operations.

FQMAN has in place a *Heritage Management Plan (HMP)*, which is a condition of Ministerial Statement 000633. There are currently eight (8) known places on RNO tenements that conform to the definitions of places to which the *Aboriginal Heritage Act 1972* applies, and their management is included in the HMP.

The *Aboriginal Heritage Act 1972* requires RNO to ensure that it is not at risk of, or actively, impacting any heritage places in disturbance areas. WA Government approval processes also ensure that this process has been completed prior to any future disturbance.

In addition, RNO has in place the *Ravensthorpe Operations Agreement* with the Wagyl-Kaip/Southern Noongar Peoples, which includes extensive commitments and procedures relating

to heritage matters. These commitments form the backbone of the FQMAN HMP, and ensure that we meet our legal obligations and our commitments to the Wagyl-Kaip/Southern Noongar Peoples (including ongoing consultation and engagement).

Natural heritage is also an important factor for RNO, which is located within the Fitzgerald River biosphere, one of 12 UN recognised international biospheres in Australia. The biosphere captures the Fitzgerald River National Park and Ravensthorpe Ranges. This natural heritage is important as a focus for tourist activity within the region (Shire of Ravensthorpe 2006). RNO is sensitive to its location within the Fitzgerald River biosphere and ensures that in the implementation of the project we contribute to the maintenance of the Biosphere's biodiversity and functioning of ecological functions.

4.1.3 Socio-economic conditions

The Shire of Ravensthorpe is 12,872km^2 in size and lies just south of the wheat belt region 530 km south east of Perth (Shire of Ravensthorpe, 2011). The shire has two main towns, Ravensthorpe, inland to the north and Hopetoun, a coastal town approximately 59km south of Ravensthorpe. The small settlements of Munglinup, Jerdacuttup and Fitzgerald are also within the Shire's boundaries. About 40 per cent of the shire is cleared for agriculture.

Historically, the region's economy has been dominated by mining and agriculture. More recently, the region's economy has diversified, with key industries being agriculture, mining, manufacturing, tourism, and professional services (ABS, 2006).

As the next census of Population and Housing is scheduled for August 2016, below is data for the residential population of this region obtained from the Australia Bureau of Statistics Census, 2011:

- Total Shire of Ravensthorpe (Local Government Area) = 2,126 persons (9% increase on 2006).
    - From this population, 55.2% were male and 44.8% were female. The population for Aboriginal and Torres Strait Islander people was made up of 1.4%.
- Town of Ravensthorpe = 391 persons (65% decrease on 2006).
    - From this population, 55.3% were male and 46.3% were female. The population for Aboriginal and Torres Strait Islander people was made up of 2.8%.
- Town of Hopetoun = 1,398 persons (238% increase on 2006).
    - From this population, 52.4% were male and 47.6% were female. The population for Aboriginal and Torres Strait Islander people was made up of 1.4%.

The analysis of the regional population data (2006-2011 Census) above indicated a recent dramatic change in demographics. This could potentially reflect the transition of RNO from a construction to operational phase.

In 2006, most employees working on the RNO project were construction workers, based either on site or in and around Ravensthorpe town site. However, by 2011 out of RNO's total workforce of around 480, the vast majority were operational and approximately 200 resided in Hopetoun, where RNO owns 160 houses. The current RNO employee population is summarised in section 5.1.6.

4.1.4 Culture and community

The Shire of Ravensthorpe has a total of four schools. Primary schools are located in Ravensthorpe, Hopetoun, Munglinup and Jerdacuttup. A Junior High School is located in Ravensthorpe. The nearest Senior High School is at Esperance.

The region has a strong civic capacity, with many well-functioning community groups, including:

- Hopetoun Progress Association
- Ravensthorpe Progress Association
- Jerdacuttup Community Association
- Munglinup Community Group
- Hopetoun Community Resource Centre & Public Library
- Friends of Fitzgerald National Park
- Ravensthorpe Volunteer Fire & Rescue
- Ravensthorpe Wildflower Show
- Ravensthorpe District Recreation Association
- Munglinup Catholic Church
- Jerdacuttup RNO Working Group
- Hopetoun Community Resource Centre and Public Library
- Ravensthorpe Regional Herbarium

There are a number of recreational and sporting clubs with facilities in Hopetoun and Ravensthorpe including cricket, badminton, basketball, bowls, football, golf, hockey, motocross, netball, swimming, tennis and soccer.

Ravensthorpe Health Service provides routine services and emergency care, supported by the WA

Country Health Services Great Southern Region. The local General Practitioner alternates his practice between Hopetoun and Ravensthorpe. Patients that require evacuation for major procedures and intensive care are transferred via The Royal Flying Doctor Service to Esperance, Albany or Perth.

4.1.5 Local Infrastructure Capacity

Historically, RNO worked closely with the State, Local and Commonwealth Governments to plan for the infrastructure requirements of an expanded residential population in the region, as well as specific industry-impacts (notably on roads). As a consequence, from 2004 – 2008 the State Government, Federal Government and RNO invested an estimated +$50 million in Ravensthorpe and Hopetoun infrastructure, including:

- New Ravensthorpe District Hospital (2004)
- Wind turbine for Hopetoun power ($3 m, 2004)
- New Ravensthorpe Airport ($5m, in 2005)
- New housing and subdivisions in Hopetoun and Ravensthorpe (2006)
- New school in Hopetoun ($5.2m, 2008)
- Upgrade of Ravensthorpe District High School ($500,000, 2008)
- New Ravensthorpe Entertainment Centre (2008).
- Upgrade of Hopetoun-Jerdacuttup Road.
- Upgrade South Coast Highway.
- YMCA Childcare centre (+$1m, 2008).
- Waste water treatment plant ($15m, 2008)
- Public sector buildings and housing in region ($11m for Police, Nurses, Teaches etc).

In addition, in excess of $50m was estimated to be invested by RNO on land and housing developments in Hopetoun.

When RNO went into care and maintenance in 2009, the Western Australian and Commonwealth Governments jointly committed $40 million to upgrade roads and facilities through the National Park. These upgrades are almost complete and will further boost regional tourism and economic diversification.

As a consequence of this significant planning and investment by Government and RNO, Ravensthorpe and Hopetoun are comparatively well serviced for quality social and physical infrastructure. This infrastructure has the capacity to absorb growth in the community and support economic diversification, without significant further capital investment. Nevertheless, all levels of

Government and industry in the region continue to coordinate information and programs to ensure that services and infrastructure meet the needs of the community.

4.1.6 RNO Workforce

RNO's operating workforce is approximately 270 – 300 permanent personnel. Of these, approximately 150 currently live locally in Hopetoun (where FQMAN owns 160 dwellings), approximately 40 are Drive-in-Drive-Out (DIDO) based in the immediate region, and the remainder are Fly-in-Fly-Out (FIFO). The total workforce has reduced by approximately 30% since 2012 in response to volatile nickel prices and employment market factors.

FQMAN's preference is for a locally based residential workforce, however the structure of the labour market is such that FIFO is a part of the RNO workforce.

4.1.7 Potential socio-economic impacts of closure

The placement of RNO into care and maintenance by the previous owner in February 2009 served as a useful, but not precise, indicator of the potential impacts of any permanent closure of RNO on the local community. A range of key issues were highlighted:

- Communication with workforce, contractors and the community regarding timing and nature of the closure.
- The need to have a coordinated approach, between the company and Government, on information and service provision for impacted employees and local businesses.
- Overstated expectations in the community and Government regarding the viability of the mine and its potential to underwrite substantial economic growth and development.
- Over-emphasis on RNO as the source of community support and funding.

RNO has learnt from these lessons and will ensure these issues are identified and discussed during on-going stakeholder engagement and the execution of this Mine Closure Plan.

RNO's Mine Closure Plan and related stakeholder engagement will focus on managing key issues in relation to socio-economic impact:

- Employment transitions and emotional well-being of workers and contractors and their families.
- Supporting community cohesiveness, noting the impacts of potential removal of children from schools and adults from community groups and volunteer organisations.

- Information to assist local businesses plan for future change in regional economy and demographics.
- Partnership with the Shire relating to the transition of RNO assets and infrastructure.

The extent of the impact will be influenced by the health of the economy at the time of closure and the ability of people, organisations and businesses engaged with RNO to find alternative means of support, employment and income.

The community will be left with considerable infrastructure assets that will underpin the region and will remain the responsibility of Local and State Governments.

4.2 Stakeholder Engagement Strategy

FQMAN is committed to effective consultation with stakeholders throughout the life of RNO will facilitate the incorporation of stakeholder concerns and objectives into the Mine Closure Plan, and reduce the risk of delay to closure, or damage to RNO's reputation arising as a result of failing to adequately identify stakeholder issues.

Stakeholder engagement, community consultation and participation in the planning, development, construction and operation phases of RNO have been extensive. The Government approvals process involved significant community engagement, and subsequent regulatory approvals require on-going consultation.

RNO's primary stakeholder engagement is through:

- Quarterly meetings of the Jerdacuttup RNO Working Group (JRWG), the group of key fence line neighbours.
- Ongoing dialogue with the Wagyl-Kaip/Southern Noongar (WKSN) native title parties, including quarterly meetings of the RNO-WKSN Relationship Committee.
- Ongoing dialogue with the Shire of Ravensthorpe and the Shire of Esperance.
- Annual regulatory-required audits and reports with the Department of Mines and Petroleum and the Department of Environment Regulation.
- Direct consultation and engagement on specific closure issues with local stakeholders and experts (such as environment rehabilitation planning).
- Direct communications and briefings on key issues, as they arise.

As the RNO project contains large deposits capable of facilitating a long mine life, the above mechanisms will be used to inform the increasing level of detail with the Mine Closure Plan.

4.2.1 Identified Stakeholders

In order to minimise the impact that any planned closure may have on stakeholders, it is important that adequate consultation is undertaken with potentially affected parties prior to entering the closure phase.

Stakeholders have been identified as the communities in the south coast region of Western Australia, government and non-government organisations and local community interest groups. FQMAN has developed a Mine Closure Stakeholder Register at Table 3: Closure Stakeholder Register

The level of involvement of each stakeholder in the consultation process will depend on the degree to which (a) the stakeholder is involved in the mine closure process and (b) the mine closure will impact them. The levels of stakeholder involvement can be summarised as:

1. **Inform** – provision of balanced and objective information to assist them in understanding mine closure.
2. **Consult** – provision of balanced and objective information to assist them in understanding mine closure and seeking feedback on alternatives, analysis and/ or decisions.
3. **Involve** – working directly with stakeholders throughout the mine closure process to ensure that issues and concerns are understood and considered.
4. **Partnership** – to work in partnership with stakeholders in each relevant aspect of mine closure including the development of alternatives and the identification of the preferred solution.

Table 3: Closure Stakeholder Register

Interest Area	Stakeholder	Key socio-economic areas of interest in closure	Level and nature of involvement
Internal Stakeholders	FQMAN Staff & Contractors	Transition of employment, contractors, demobilisation	High - partnership
Australian Government	Department of Employment	Involvement in assisting redundant employees to find alternative employment	High - involve
	Department of Social Services	Assistance for any ex-employees and families having difficulty in adjusting to closure and loss of employment	High - involve
	Department of Human Services (centrelink)	Assistance for any ex-employees and families having difficulty in adjusting to closure and loss of employment	High - involve
	Department of Environment	Ensuring that closure and rehabilitation commitments of any EPBC approvals are met.	High - involve
WA State Government	Local Primary and High Schools	Impact on student numbers, welfare and planning	High - partnership
	Goldfields-Esperance Development Commission	Impact on local economy, infrastructure and social life in the area	Medium -involved
	Great Southern Development Commission	Impact on local economy, infrastructure and social life in the area	Medium - consult
	Department of Aboriginal Affairs	Heritage management, performance against closure objectives	Medium - consult
	WA Country Health Service	Impact on local community services	Medium - involved
	Housing Authority	Changes in tenancy, currently tenanted dwellings becoming available	Low - inform
	Fire & Emergency Services Authority	Impact on emergency services provision	Low - involved
	Department of local Government and Communities	Impact on local community life and family health	Medium - involved
	Western Power & Horizon Power	Impact on local community and infrastructure	Low - inform
	Department of Environment Regulation	Performance against closure objectives.	High - partnership
	Department of Mines and Petroleum	Performance against closure objectives.	High - partnership
	Main Roads WA	Impact on transport infrastructure	High-partnership
	WA Police Service	Impact on local services and community safety	High - involve
	Esperance Port Authority	Impact on port and harbour	High - partnership
	Department of Health	Impact on local and regional services	High - involved
	Department of Education	Impact on local and regional school services	High - involved

Interest Area	Stakeholder	Key socio-economic areas of interest in closure	Level and nature of involvement
	Department of Sport and Recreation	Impact on local and regional services	Low - inform
	Tourism WA	Impact on local infrastructure and services used for tourism	Low - inform
	Water Corporation	Impact on local and regional services	High - involved
	LandCorp	Impact on land use and distribution after closure	High - involved
Local Government	Shire of Ravensthorpe Councillors and Administrators	Impact on local services	High - partnership
	Shire of Esperance Councillors and Administrators	Impact on local services	Medium - involved
Hopetoun-Ravensthorpe Community	General Public	Impact on local community, economy and infrastructure	High - consult
	Traditional Land Owners	Post-mining land use, impact on Native Title claims	High - partnership
	Ravensthorpe Chamber of Commerce	Impact on local community, economy and infrastructure	High - involve
	Ravensthorpe Agriculture Initiative Network	Impact on local community, economy and infrastructure, performance against closure objectives	Medium - consult
	Jerdacuttup Community Association	Impact on local community, economy and infrastructure, post-mining land use	High - involved
	Hopetoun Progress Association	Impact on local community, economy and infrastructure	High - involve
	Ravensthorpe Progress Association	Impact on local community, economy and infrastructure	High - involve
	Friends of the Fitzgerald River National Park	Impact on local community, culture and environment, post-mining land use	Low - inform
	Munglinup Community Association	Impact on local community, culture and environment, post-mining land use	High - involve
Esperance Community	General Public	Impact on local community, economy and infrastructure	Medium - involve

Interest Area	Stakeholder	Key socio-economic areas of interest in closure	Level and nature of involvement
	Esperance Chamber of Commerce and Industry	Impact on local community, economy and infrastructure	medium - involved
	Port Consultative Committee	Impact on local community, economy and infrastructure	High - involved
Non-Governmental Organisations and Government Funded Organisation	Conservation Council of WA	Impact on local environment	Low - inform
	Western Australian Farmers Federation (Esperance-Ravensthorpe Zone)	Impact on local community and economy	Low - inform

4.2.2 Stakeholder Engagement prior to next MCP review

A goal of RNO's stakeholder consultation program is to create a framework that provides stakeholders with accurate information about, and appropriate involvement in, mine closure planning and managing any adverse impacts on local communities.

Stakeholder engagement and participation in the planning, development, construction and operation phases of RNO has been extensive, and included mine closure issues. For example, the RNO regulatory approval processes have involved significant community engagement, and subsequent Government approvals require ongoing consultation. Therefore, RNO already has in place strong stakeholder engagement frameworks for informing this Mine Closure Plan.

FQMAN's Mine Closure Plan Stakeholder Engagement Program has two stages:

1. Ongoing partnership and engagement.

   While in stable operations, RNO will continue with ongoing key stakeholder consultation and partnerships regarding, amongst other things, closure planning issues:

   - Annual Community Meetings that give project updates and address long term impacts, rehabilitation and closure issues.
   - Jerdacuttup RNO Working Group (JRWG), with quarterly meetings reviewing the status of the mine and reviewing environmental issues including rehabilitation, long term impacts and future land uses. Mine closure planning will be an important agenda item when periodic reviews of the MCP are in progress.
   - Wagyl-Kaip/Southern Noongar (WKSN) native title parties, with quarterly Relationship Committee meetings
   - Regular engagement with the Shire of Ravensthorpe regarding RNO's status and mine closure planning.
   - Reporting performance through the *Annual Environment Report* to the Department of Mines and Petroleum.
   - Reporting performance through the *Annual Environment Report* to the Department of Environment and Conservation.

During these ongoing engagement processes RNO will:

- Ensure that the necessary regulatory requirements are fulfilled.

- Provide all stakeholders with accurate, timely and comprehensive information about the mine closure process and closure related issues.
- Identify areas of concern for stakeholders, and allow them to provide input to the mine closure process and in assessing relevant closure related issues.
- Encourage partnership and participation by key stakeholders.

2. Pre-closure Planning & Implementation

As closure nears, stakeholder engagement will be broadened and intensified. While Stage 1 mechanisms will continue, additional engagement will be required consistent with the RNO Stakeholder Register including:

- Staff and contractors will be engaged in planning for closure, both at mine and in community.
- Targeted communications will be developed for all stakeholders, according to level and nature of involvement.
- Individual engagement sub-plans will be developed with key “partnership” and “involve” stakeholders.

4.2.3 Stakeholder Engagement with this 2016 Mine Closure Plan

In preparing this 2016 Mine Closure Plan, FQMAN has drawn on relevant input from stakeholders over the past 3 years as well as specific stakeholder engagement focused on the key Objectives and Criteria of this plan. The summary of that engagement and input to the Plan is in the Stakeholder Engagement Register, Table 4 below.

Table 4: Stakeholder Engagement Register

Date	Consultation Description	Stakeholders	Stakeholder comments/issue	Proponent Response
1 Oct 2012	Mine Closure Plan Briefing	JRWG & Community	*Post-mining land use:* • General support for returning lease areas to native vegetation. • Concern about influx of native flora that may negatively impact adjoining farms. • Community keen to explore community uses for Tamarine Quarry – RNO happy to explore options during future consultation. *Closure Objectives and Completion Criteria:* • General support for current closure objectives and criteria. Discussion about the need to do research to determine soil availability regarding rehabilitation options. *Stakeholder engagement* • Discussion about when community input to detailed planning for rehabilitation will happen.	RNO believes as ecosystem establishes, and RNO-formed water sources are removed, flora should not be over-representative in closure area. RNO agreed that soil availability research was key issue that would influence closure options (especially for TSF). Mine closure planning will be regular agenda item for JRWG. Annual JRWG site visit would include visit to RNO's rehabilitation trial areas.
2006 - 2015	Quarterly Meetings	JRWG	Key concerns: • Groundwater monitoring • Fugitive dust emissions • Containment of saline material • Management of weeds • Post-closure land uses	Concerns are subject to ongoing monitoring and engagement and will be incorporated into Mine Closure Plan
15 Jan 2016	Quarterly Meeting	JRWG	Issue Raised • Concerns over a potential contaminant pathway from decommissioned TSF and Evaporation Pond. i.e. How will the final landforms be managed to ensure deep rooted plants do not perforate the liners. • Concerns around dust generation from the TSF and bare areas should the operation go into care and maintenance as this happened before.	There will need to be active management of decommissioned areas for many years. This is so any repairs to cover materials can be done but will also include bore sampling and analysis to check for contamination. Deep rooted plants will be controlled so they do not penetrate the cover material. Only shallow rooted shrubs will be used. Care and maintenance is not closure and requires a plan to be submitted and approved by DMP.
July 2012	Rehabilitation Workshop	Environment professionals and local stakeholders	This was the first FQML rehabilitation workshop held on site. Environment professionals and local stakeholders were encouraged to be part of this engagement activity. Historic information (RNO) was presented and discussions towards where future emphasis and site management and research could be directed.	An items list for research and environment management activities was an outcome developed from the workshop. There is the opportunity to hold further discussions and set out priorities over the next 3 years and set budget schedules on these outcomes.
2010 – ongoing	Quarterly Meetings	Wagyl-Kaip/Southern Noongar Native Title Parties	Post-closure land uses – meeting 24th October 2012 Transition of employees Employment opportunities in post closure land management	To be developed in partnership with WKSN and other partner stakeholders.
Ongoing	Annual Environment Report and Inspection	Department of Mines and Petroleum	Concerned with tenement condition compliance and reporting and analysis of monitoring data that will impact current operations and	Ongoing, regular engagement as required

			mine closure planning.	
Ongoing	Annual Environment Report and Inspection	Department of Environment and Regulation	Concerned with licence condition compliance and reporting and analysis of monitoring data that will impact current operations and mine closure planning. Submission and development of Mine Closure Plan is priority.	Ongoing, regular engagement as required
2010 – ongoing	Periodic meetings to discuss operational and post-closure issues	Shire of Ravensthorpe	Post closure land uses and impact on regional community Shire to continue to own and operate regional airport	To be developed in partnership with WKSN and other partner stakeholders.

5. Post-Mining Land Use(s) and Closure Objectives

5.1 Post Mining Land Uses

Draft final land use objectives for RNO have been identified as follows;

- All plant, equipment and associated infrastructure will be removed.
- Disturbed areas will be progressively rehabilitated to biologically sustainable eco-systems, requiring minimum long-term management, and which are compatible with either agricultural or conservation land use of farming and undisturbed crown land areas.
- All areas of vacant Crown Land supporting native vegetation that are to be disturbed as part of the operation will be returned to native vegetation , with landforms constructed to allow the areas to be managed in the same way as for undisturbed Crown Land.
- The Tailings Storage Facility (TSF), located on farmland will be vegetated with appropriate perennial vegetation and is not intended to be returned to farmland.
- The final land use of cleared farmland that will be supporting the project infrastructure during operations is subject on-going negotiation with stakeholders.

Table 5 lists proposed final land use objectives for RNO, as defined by RNO's legal obligations (Appendix Two: Legal Obligations Register).

RNO will, in consultation with key stakeholders refine the specific details of post-closure planning for each area.

5.2 Closure Objectives

RNO's Closure objectives include:

- Achieve a safe, stable and non-polluting landform that provides for a sustainable post-closure land use as agreed with government regulators and affected communities and other stakeholders. (specific detail provided below)
- Comply with legal requirements.
- Protect sites of cultural/heritage/indigenous interest within the site area during closure activities.
- Rehabilitated sites will be capable of achieving similar ecological values and biodiversity of the original or surrounding area where practical and provide appropriate habitat for fauna.
- Minimise the risk of negative impacts on receiving environments as a result of surface water management

- Preserve, as far as practically possible, pre-mining surface water flow rates, volumes and quality at points of discharge from the project area
- Eliminate or mitigate adverse environmental and health effects to an acceptable and reasonably practicable level of risk.
- Protect the health and safety of our workforce during closure activities.
- Minimise negative social impacts, and seek to exploit positive, socio-economic impacts in the local area to assist community and workforce resilience during and post closure.

Table 5: Proposed Final Land Use for RNO Project Areas

Domain	Domain ID	Project Area	Land use
Halley's Pit	1.1	Mine Pits - Halleys (backfilled as part of normal mining operations)	Reinstate "natural" ecosystems to be as similar as possible to the original ecosystem.
Halley's Pit	1.2	Waste rock dumps	Reinstate "natural" ecosystems to be as similar as possible to the original ecosystem.
Halley's Pit	1.3	ROM Pad	Reinstate "natural" ecosystems to be as similar as possible to the original ecosystem.
Hale-Bopp Pit	2.1	Hale-Bopp pit	Reinstate "natural" ecosystems to be as similar as possible to the original ecosystem.
Hale-Bopp Pit	2.2	Waste rock dumps	Develop an alternative land use with higher beneficial uses than the pre-mining land use
Shoemaker-Levy	3.1	Shoemaker Levy pit (void)	Reinstate "natural" ecosystems to be as similar as possible to the original ecosystem.
Shoemaker-Levy	3.2	Waste rock dumps	Reinstate "natural" ecosystems to be as similar as possible to the original ecosystem.
Rehabilitation Offsets	4	Rehabilitation offset (new areas to be rehabilitated, in addition to disturbed mining/plant areas)	Rehabilitate previous farmland to native vegetation.
Tailings Storage Facility	5	Tailings storage facility	Develop an alternative land use with beneficial uses other than the pre-mining land use.
Evaporation Ponds	6	Evaporation ponds	Develop an alternative land use with beneficial uses other than the pre-mining land use.
Plant & Infrastructure	7.1	Beneficiation and Hydrometallurgical Plant sites	Rehabilitate previous farmland to native vegetation.
Plant & Infrastructure	7.2	Accommodation Village	Rehabilitate previous farmland to native vegetation.

Domain	Domain ID	Project Area	Land use
Plant & Infrastructure	7.3	Associated Infrastructure	Rehabilitate previous farmland to native vegetation.
Plant & Infrastructure	7.4	Access roads	Rehabilitate previous farmland to native vegetation.
Seawater Pipeline & Infrastructure	8	Seawater pipeline and infrastructure	Reinstate the pre-mining land use
Limestone Quarry	9	Limestone Quarry	Rehabilitate previous farmland to native vegetation.
Sands Rejects Storage Facility	11	Sands rejects storage facility	Rehabilitate previous farmland to native vegetation.
Production Bores and Gravel Pits	12	Production Bores and Gravel pits	Rehabilitate previous farmland to native vegetation.

5.3 Conceptual Landform Designs

There are several scenarios to be considered in terms of final landforms, for both the Halley's and Hale Bopp Pit. For the purpose of outlining conceptual final landforms, Halley's and Hale Bopp landforms are illustrated separately below. Note: Hale Bopp Pit has not been mined to date and the Shoe Maker Levy pit will not be mined within the next reporting period, based on the current mine plan.

5.3.1 Halley's Pit and the Plant

Figure 6 below illustrates the (approximate) current topography of the mining and plant area, minus infrastructure.

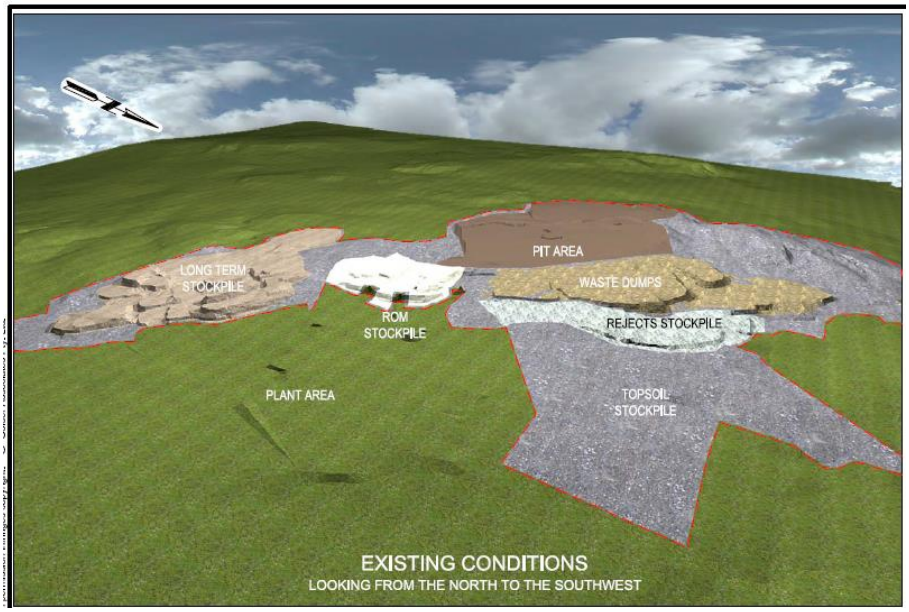


Figure 6 Existing Landforms

Figure 7 illustrates the conceptual landform for the life of mine closure plan i.e. closure occurs according to the current life of mine plan (+25years).

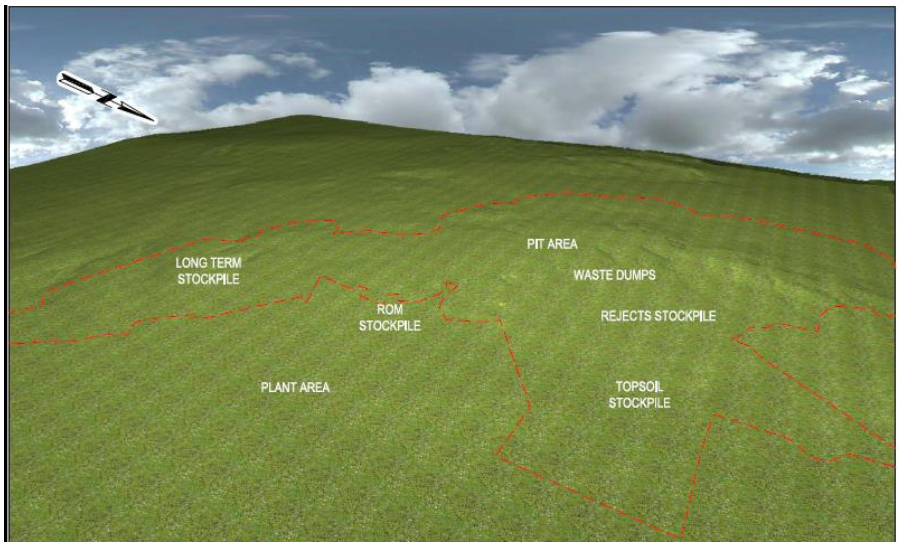


Figure 7 Complete Backfilling of Halley's Pit

5.3.2 Hale Bopp Pit

Figures 8 and 9 below illustrate illustrates the conceptual landform for the life of mine closure plan i.e. closure occurs according to the current life of mine plan (+25years). Hale-Bopp Pit.

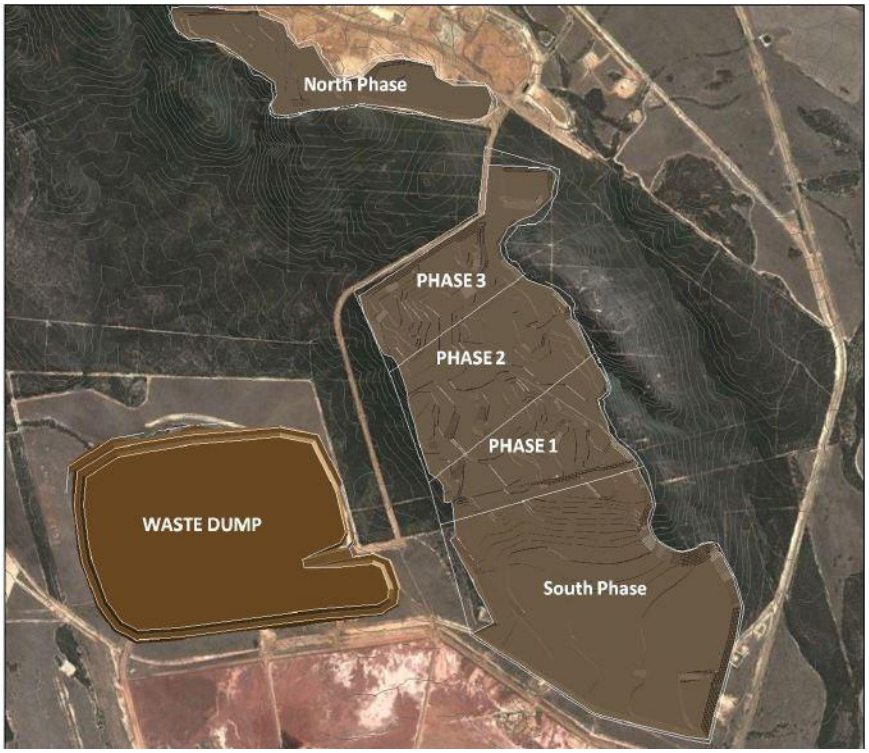


Figure 8 Hale Bopp Pit and Waste Dump Overhead

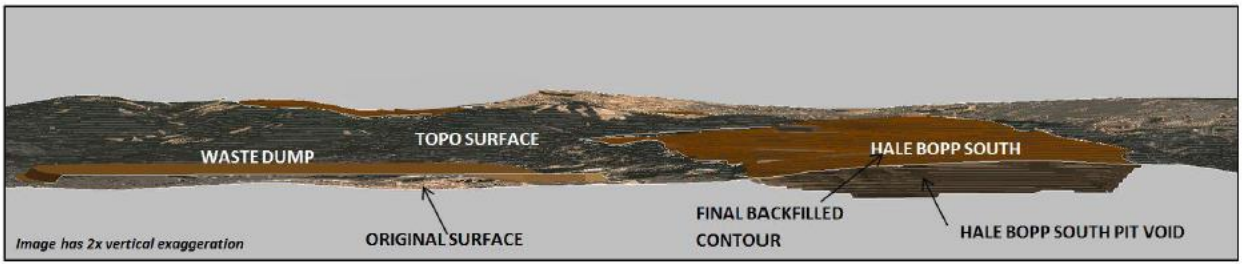


Figure 9 Hale Bopp Pit and Waste Rock Dump (cross section)

5.3.3 TSF and Evaporation Ponds

There are no conceptual drawings available for the TSF and Evaporation Ponds at this stage; however, consideration has been given to potential landforms if premature closure were to eventuate. These options are summarised in section 9.5.

5.4 Environment Legacies (incidents and site contamination)

FQMAN has a site register for environment incidents that occur during operations. Reportable incidents are lodged with the DER and the DMP in Annual Environment Reports. The company has a practice of addressing remediation and rehabilitation of site incidents as they are identified each year.

Annual groundwater monitoring programs and analysis have been introduced across site to identify impacts of the mine on the groundwater environment. Results of all monitoring are reported on an annual basis to the DER.

6. Completion Criteria

This section presents the indicative completion criteria for RNO. The purpose of the completion criteria is to provide a set of measures which can be used to establish whether closure objectives have been met. The completion criteria should be agreed with the regulators to facilitate the relinquishment of the leases. Detailed criteria for closure are typically developed as the Mine Closure Plan develops, and information from research can be used to determine what is achievable. Detailed completion criteria have yet to be developed for RNO. Indicative completion criteria are presented below in Table 6.

Table 6: Closure objectives & Completion Criteria

Closure Objective	Indicative Completion Criteria	Measurement Tools
Landforms		
Achieve a safe, stable and non-polluting Landform that provides for a sustainable post-closure land use as agreed with government regulators and affected communities and other stakeholders. (specific detail provided below)	• Concept level engineering designs and specifications for final WRLs, TSF and Evaporation ponds that will not be prone to slumping, mass movement or significant erosion, accepted by key stakeholders. • Waste Rock Landform construction integrated into progressive mine plan. • Identify stakeholders and record consultation outcomes	• Review/Audit of final design plans against legal and other requirements/specification/standards. • Certificates of completion for constructed landforms. • Review meeting minutes from stakeholder engagements (e.g. Jerdacuttup River Working Group meeting) • Review mine plan and inspect progressive rehabilitation activities
- Waste rock Landforms	• Progressive contouring to blend with topography • Final batters on external WRL walls $\leq$ 20 degrees. • Internally draining substrate • Low salinity substrate • Seeded with local species, incorporating priority species • Establish approximate pre-mining vegetation communities	• Comparison of rehabilitation topography versus original topography • Measure waste landform batter angle • Inspection for water ponding and salt rise • Audit of seeding activities • On-going assessment of rehabilitation sites

Closure Objective	Indicative Completion Criteria	Measurement Tools
- Mine Pits	• Progressive backfill and contouring to approximate pre-mining profiles • Internally draining upper surface • Batters ≤ 20 degrees. • Low salinity substrate • Seeded with local species, incorporating priority species • Establish approximate pre-mining vegetation communities	• Comparison of rehabilitation topography versus original topography • Inspection for water ponding and salt rise • Measure pit landform batter angle • Audit of seeding activities • On-going assessment of rehabilitation sites
- Tailings Storage Facility and Evaporation Ponds	• Maximize consolidation and drying for machine access • Batter external walls to < 20 degrees • Undertake trials to investigate appropriate capping material • Revegetate using native salt tolerant species	• Monitor and measure consolidation • Measure pit landform batter angle • Review outcomes of trials • On-going assessment of rehabilitation sites
Compliance		
Comply with legal requirements.	• Implement and Maintain a legal register that identifies all legal requirements relevant to closure planning and implementation	• Review/Audit of compliance with legal requirements listed in the compliance register. • Review of non-compliances in in the operational incident database (InControl).
Protect sites of cultural/heritage/indigenous interest within the site area during closure	• All sites of cultural/heritage/indigenous interest within the operational area identified and	• Review of impact to sites of cultural/heritage/indigenous interest within

Closure Objective	Indicative Completion Criteria	Measurement Tools
activities.	recorded in spatial database. • Where practical and/or necessary sites are sign posted and/or secured to avoid potential impact.	the site area during closure activities.
Revegetation		
Rehabilitated sites will have similar ecological values and biodiversity of the original or surrounding area where practical	• Vegetation in rehabilitated areas will be appropriate in terms of diversity and structure. • All species planted or seeded will be from the local area/region. • Species with conservation status represented in rehabilitation. • No new weed species will be introduced to the operational area. • Do not introduce dieback into any area not currently affected. • Topsoil will be stripped and stored per community type.	• Quantitative vegetation monitoring using recognized standard techniques acceptable to regulators. • Review of rehabilitation records.
Fauna		
Rehabilitated Areas provide appropriate habitat for fauna.	• Rehabilitated areas provide habitat for species in adjacent areas • Local species reintegrate into mined areas post closure	• Quantitative fauna monitoring using recognized standard techniques acceptable to regulators.
No negative impact on Priority and Significant Fauna Species	• No decline in Priority or Significant species attributable to the RNO operation	• Fauna monitoring results compared against baseline studies/data.

Closure Objective	Indicative Completion Criteria	Measurement Tools
Water		
Minimise the risk of negative impacts on receiving environments as a result of surface water management	• No significant impact on flow rate, volume or quality of surface water in or surrounding the project area	• Water quality testing
Preserve, as far as practically possible, pre-mining surface water flow rates, volumes and quality at points of discharge from the project area.	• Post mining surface water flow rates, volumes and quality at points of discharge from the project area are approximately (if not the exactly) the same as pre-mining.	• Comparison of water quality data versus baseline data
Health and Safety		
Eliminate or mitigate potential adverse environmental and health effects to an acceptable and reasonably practical level of risk.	• No unacceptable impact to the environment • No unacceptable impact on the health of any person	• Comparison of monitoring data against baseline data and relevant standards/guidelines.
Minimise negative social impacts, and seek to enhance positive, socio-economic impacts in the local area to assist community acceptance both during operations and post closure.	• Number of community complaints or submissions relating to closure	• Review of complaints register and meeting minutes.
Protect the health and safety of our workforce during closure activities.	• No injuries sustained during closure activities.	• Review of injury data and statistics

7. Collection and Analysis of Closure Data

7.1 Minesite Environmental Setting

7.1.1 Regional Land Use

The region surrounding RNO supports agricultural and conservation land uses. The operation falls partly within the Bandalup Corridor, a buffer zone for the Fitzgerald Biosphere Reserve that consists of an area of uncleared vacant Crown Land and private property that is maintained for agricultural purposes.

Prominent natural landmarks in the region include the Ravensthorpe Ranges, 27 km west northwest of the site and the distinct peaks of the Barren Ranges in the Fitzgerald River National Park.

End land use for RNO needs to be compatible with the surrounding land uses to provide continued opportunity for agriculture or assist in enabling a self-sustainable natural ecosystem to be developed and the maintenance of the Fitzgerald Biosphere Reserve's biodiversity and functioning of the ecological functions.

In line with meeting closure land use objectives there is extensive baseline environmental data that has been researched since commencement of RNO in 1998. A record of environment reports and documents is found in Appendix 3. A brief summary of environment conditions is found in sections 4.1.2 to 4.1.9 below.

7.1.2 Climate

The Ravensthorpe to Esperance region (inclusive of Mason Bay) has a Mediterranean climate typified by warm summers in January and cool winters in July. Table 4 demonstrates the climate averages for RNO, sourced from the Australian Government's Bureau of Meteorology (2015).

Overall, predominant winds at RNO are mainly from the north-west and south-east, with wind speeds from 11 to 15 km/h. Average annual rainfall at the site is approximately 429 mm, with about 60% falling during winter (April – September) with occasional heavy summer rainfall events.

Climate change has the potential to impact closure activities and rehabilitation success. The

nature of climate change likely to be experienced at RNO should be reviewed and impact on plant structure assessed in future.

Table 7: RNO Climate Statistics

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann	Yrs
Mean Max Temp (^{0}C)	29.0	28.4	26.6	23.7	20.0	17.3	16.3	17.3	19.5	22.5	25.1	27.2	22.7	1962-2015
Mean Min Temp (^{0}C)	14.1	14.6	13.6	11.8	9.6	7.9	6.8	6.7	7.4	9.1	11.0	12.8	10.4	1962-2015
Highest Temp (^{0}C)	45.4	45.9	41.6	38.2	33.9	26.0	26.1	29.5	33.0	38.1	42.1	43.3	45.9	1962-2015
Lowest Temp (^{0}C)	5.9	5.6	3.3	3.3	1.3	-0.5	-1.0	-0.1	0.0	1.2	2.1	4.3	5.9	1962-2015
Highest Monthly Rainfall (mm)	223.2	179.3	126.1	144.7	127.0	117.9	129.6	136.6	144.8	121.4	189.4	140.1	734.5	1901-2015
Lowest Monthly Rainfall (mm)	0.0	0.0	0.0	2.3	6.4	10.5	8.2	9.2	3.2	3.9	0.0	0.0	234.1	1901-2015
Mean Rainfall (mm)	24.7	24.4	31.8	33.1	44.2	43.4	47.3	44.8	42.1	38.2	30.6	23.9	428.8	1901-2015
Mean No. of Raindays	5.7	5.8	7.6	8.4	10.9	12.2	13.3	12.8	11.4	10.0	7.5	6.0	111.6	1901-2015

7.1.3 Topography and Drainage

The region features a flat to generally undulating sandplain, falling gradually to the coast 40km to the south. RNO mine site lies in the upper reaches of the Jerdacuttup River catchment and encompasses Bandalup Hill, which forms a prominent rise within the surrounding sandplain.

RNO mine site is drained by Burlabup and Bandalup Creeks, which ultimately discharge into the Jerdacuttup River, and by a dense network of minor watercourses, particularly around Bandalup Hill and the area proposed for the Shoemaker-Levy open cut mine. Stream flow tends to be intermittent as a result of short term, high rates of runoff and the absence of significant aquifers to sustain a baseflow. Runoff can occur at any time, but mainly occurs in winter as a result of winter rains, or in January - February as a result of storm events.

Burlabup Creek's catchment includes part of the processing area, part of Halley's open cut mine area, and the evaporation ponds and tailings storage facility. Drainage is well defined in the northern parts of the catchment, near the accommodation areas, but becomes distributed and less well defined toward the south as the land slope flattens. Gnamma Creek drains the eastern side of

the catchment, joining Burlabup Creek just south of the Jerdacuttup North Road. The main upper branch of Burlabup Creek drains the western side of the catchment.

Bandalup Creek drains most of the mine pit areas, accommodation areas and part of the processing area and flows generally to the southwest. Drainage is generally well defined through the catchment where it crosses the South Coast Highway, joins with an unnamed creek from the east and discharges into the Jerdacuttup River some 10 km south west of the project area.

Rehabilitated landforms should aim to blend in with the local topographical features so that natural drainage is maintained post closure. Potential impacts on closure that could arise from irregular landforms include:

- alteration of natural drainage regimes within the disturbed areas due to contoured landscape intersecting minor and major drainage lines;
- erosion of rehabilitation works during high intensity rainfall events as disturbed soil is mobilised from the site and discharged as sediment via runoff; and
- changes to Bandalup and Burlabup Creeks and Jerdacuttup River stream ecology, due to changes in drainage water quality and quantity.

Pools occur in places throughout the Jerdacuttup River catchment and the lower Jerdacuttup River has extensive and normally permanent ponding. Key receiving environments for surface water sourced throughout the project area are:

- Farmland to the south, in the Burlabup Creek catchment.
- Bushland in the Bandalup Corridor to the west and north west.
- Local pools, the Jerdacuttup River and Jerdacuttup Lakes.

A baseline study of these receiving environments needs to be carried out to provide an indication of pre-existing runoff water quality, holding capacity and recharge rates. The purpose of the baseline study would be to provide adequate information to establish completion criteria for closure. The quantity and quality of water discharged from RNO, and the assimilation capacity of the pools will need to be verified and monitored to determine the ability to meet the completion criteria.

7.1.4 Geology

RNO Mine Site

RNO is located close to the southern margin of the Archaean Yilgarn Craton within the Ravensthorpe Greenstone Belt. The residual lateritic profile at Bandalup Hill, derived from the Bandalup Ultramafics, extends over an area 7 km long by 1 km wide and includes the Halleys deposits. Bandalup Hill rises above the surrounding country and hosts the maximum thickness of laterite development (80 m).

A west-south westerly trending palaeochannel, incised into the Archaean bedrock, passes to the south of the project area, following a major fault zone which separates the Archaean rocks from younger Proterozoic gneiss of the Albany-Fraser Province. This is termed the Jerdacuttup Palaeochannel, which is up to 60 m deep, and is infilled with Tertiary sediments consisting of sands, clayey sands, peat and siltstone. A similar palaeochannel, the Oldfield Palaeochannel, lies to the east of the project area and trends south-easterly.

A more extensive covering of Tertiary siltstone (the Pallinup Siltstone) overlies the Archaean rocks on the south-western side of the project area.

Tamarine Limestone Quarry

The Tamarine deposit comprises fossiliferous limestone. Calcrete development within the limestone is generally limited to the top few metres of the profile. The average thickness of limestone within the Tamarine resource is 12 metres.

7.1.5 Soils

Much of the area is mapped as shallow, sandy duplex soils or shallow gravels. A band of shallow gravel and grey, deep sandy duplex soils runs through the processing area and Halleys Pit areas and includes Bandalup Hill.

Topsoil thickness on ridge tops and upper slopes of RNO are highly variable, with no distinguishable topsoil layer existing in some areas, in other areas it averages 150 mm. Where there is well developed indurated lateritic duricrusts, the topsoil thickness can reach 250 mm. Topsoil on the lower slope and gully areas of RNO is typically underlain by clay-rich saprolite.

Sufficient topsoil will need to be retained and recorded for areas disturbed to assist with the process of re-establishing familiar growth medium that can support the particular vegetation that

was established prior to RNO.

Geotechnical Stability and Geochemistry

The shallow duplex soils are likely to have a moderate infiltration capacity at the surface, but drainage at depth is likely to be restricted by clay, rock or cemented layers. As a result, surface runoff is likely to be relatively low except during very wet periods when the soil profile fills. Slow drainage of the soil profile could be the cause of the naturally high salt storage within the soil substrate. Plant-available water-holding capacity is likely to vary from low to moderate.

Little information is available on the erodibility of soils through the project area, but it is likely that exposed soils and or soils on steeper slopes will be susceptible to storm-water erosion. Geotechnical baseline data obtained by RNO will need to be reviewed so as to determine whether further studies may be required to develop appropriate actions for minimising the potential for erosion of newly rehabilitated areas on sloped areas prior to the establishment of vegetation.

Even though the deposit is lateritic the potential exists to encounter waste rock that has been identified as having high acid forming potential, management strategies will need to be implemented to ensure effective encapsulation within the waste dumps and TSF's for any identified material.

7.1.6 Contamination

There is potential for contamination to occur within the vicinity of areas utilising hydrocarbons, chemicals and saline water during RNO operations (e.g. the workshop, process plant and dust suppression equipment). Spills may impact soils and vegetation and require remediation prior to revegetation activities. Containment of saline water within infrastructure such as evaporation ponds and TSF's could also result in potential seepage and localised contamination of soil medium during rehabilitation.

A review of baseline information obtained by RNO on soil salinity would be required to determine natural salinity levels and provide a benchmark for assessing soil contamination post closure. RNO records of spills and remedial activities could also assist in identifying remediation likely to be required at closure.

7.1.7 Hydrogeology

Hydrogeologically, the area is characterised by low permeability rock, overlain and in-filled with deposits of clay, silt and sand. Where groundwater does occur, it is in a series of interconnected

local aquifers within this overall low permeability ground mass. These local aquifers occur in fractured basement, sandy deposits occurring along ancient courses (palaeochannels) and some shallow patches of sand and alluvium.

The prevalence of low permeability material over most of the area means there is little active groundwater recharge. The general low permeability means the regional groundwater system is slow-draining, broadly to the south east. Discharge from the system occurs locally where there are permanent pools in the Jerdacuttup River and more regionally in rivers and lakes in the coastal zone.

Groundwater Levels and Quality

The water table surface is typically at elevations between 90 to 120 m Australian Height Datum (AHD) and flows to the southwest. Groundwater levels have been monitored on a monthly basis since July 2001. There has been little observed evidence of a seasonal variation in hydrographs, indicating that little active recharge to the groundwater system occurs. A baseline report on groundwater quality has been developed to provide a reference source for determining completion criteria. Groundwater levels and flows across the Project Area are consistent with the regional trend.

Consistent with the concept that little active recharge occurs, groundwater quality across the area is poor, ranging from brackish to saline. All of the samples collected across the area show that the groundwater is a sodium chloride type water; pointing to the accumulation of salts in the water during long aquifer residence times (i.e. slow draining and limited recharge) and probably also the salt laden soil profile.

A baseline report on groundwater quality has been developed for RNO which will provide a reference source for determining completion criteria for groundwater within the project area.

7.1.8 Land Systems and Vegetation

The nearest conservation reserves to RNO include Nature Reserve 27177 (20.64 ha), for Conservation of Flora, 1.5 km west of the Project Area; and Nature Reserve 43060, Scarlet Pear Gum Reserve, located on the corner of Mason Bay Road and Jerdacuttup Road. Other reserves include the adjacent Fitzgerald River National Park, Kundip Nature Reserve to the west and Jerdacuttup Lakes Nature Reserve to the south of Project Area.

RNO leases fall within the buffer zone (defined as vacant Crown land and other reserves) of the Fitzgerald Biosphere Reserve. The part of the buffer zone known as the Bandalup Corridor is an area of remnant vegetation which, along with other vegetation corridors such as the Ravensthorpe Ranges and Carlingup Corridor, links the Fitzgerald River National Park with vegetation to the northeast, leading to the eastern Goldfields.

The following vegetation formations exist at RNO:

- Woodland (trees 8 to 20m);
- Mallee Shrubland;
- Thicket Shrubland (dense to mid-dense shrubs >2m);
- Mallee Heath;
- Scrub (sparse shrubs >2m);
- Heath (shrubs <2m); and
- Sedge Heath.

Although there are no ecological communities from the Project Area listed in the "Threatened Ecological Communities" database administered by Department of Parks & Wildlife (DPAW), the following vegetation communities have been identified as having a high degree of significance:

- Sandy Silcrete Thicket (SST) community hosting *Kunzea similis* subsp. *mediterranea*;
- *Eucalyptus purpurata* woodland community; and
- Mallee Heath on Komatiite (HK) habitat type including *Eucalyptus flocktoniae – Melaleuca coronicarpa* 'gorse' woodland.
- Five Threatened Flora (Declared Rare Flora (DRF)) species exist in the Project Area; these are *Kunzea similis* subsp. *mediterranea*, *Eucalyptus purpurata, Beyeria cockertonii*, *Hibbertia abyssa* and *Acrotriche orbicularis.* Twenty five priority species are present within the Project Area.

DRF, priority flora and significant vegetation communities occurring alongside operational areas of RNO will require management to minimise impacts from the mine site and associated infrastructure so as to retain conservation value.

Rehabilitation should also consider the provision of mature habitat areas and debris material to encourage colonisation by native fauna and the ecosystem requirements of the significant vegetation communities, priority flora and areas requiring conservation.

7.1.9 Pests and Weeds

RNO consists of pastoral land that is contaminated by weed species. Two declared weed species exist in the region, mainly within the farmland areas. They are;

- Saffron Thistle (*Carthaumus lanatus*); and
- Doublegee (*Emex australis*).

Other exotic or pest species found in the region include;

- *Rumex sp*. Dock;
- Fleabane (*Conyza albida*);
- Spear thistle (*Cirsium vulgare*);
- Smooth catsear (*Hypochaeris glabra*);
- Jersey cudweed (*Pseudognaphalium luteoalbum*);
- Common century (*Centaurium erythraea*); and
- Blue pimpernel (*Anagallis arvensis*).

Weed management to control weeds on adjacent farmland and spreading throughout the operational and conservation areas is required to minimise liabilities at closure. Further preventative actions should be taken during closure and rehabilitation activities to minimise the spread of weeds into rehabilitation and conservation areas.

7.2 Mason Bay Environmental Setting

7.2.1 Regional Land Use

The coastal environment, approximately 40 km south of RNO site, is characterised by rocky headlands and fine sandy beaches. The majority of Mason Bay beach is backed by prominent sand dunes, which are in turn backed by saline lakes and the Jerdacuttup Lakes Nature Reserve.

7.2.2 Climate

Mason Bay is subject to wide variations in the weather; from hot summer days when northerly winds blow from the interior of the state, to cold, wet winter days with southerly winds from the Southern Ocean.

Even though fronts and depressions may bring strong to gale force winds, winter winds are more variable and generally lighter than those during summer. Mean annual rainfall at nearby Hopetoun

is 498 mm, mostly falling in May to September, with significant summer rain in many years.

Table 6: Masons Bay (Hopetoun) Climate Statistics

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Ann	Yrs
Mean Max Temp (^{0}C)	25.4	25.6	24.8	23.5	21.0	19.0	17.9	18.8	20.2	21.4	23.4	24.1	22.1	1996-2015
Mean Min Temp (^{0}C)	15.3	15.9	14.1	12.6	10.3	8.5	7.6	7.8	8.5	10.2	12.4	13.8	11.4	1996-2015
Lowest Temp (^{0}C)	8.2	8.7	6.8	5.0	1.8	0.6	-1.1	0.6	1.6	0.5	4.9	5.8	-1.1	1996-2015
Mean no. of days of rain ≥ 1mm	3.5	2.8	4.3	5.7	6.8	8.7	10.0	9.4	7.8	6.2	5.6	3.7	74.5	1996-2015
Highest Monthly Rainfall (mm)	39.9	18.6	29.7	38.8	46.1	48.4	69.8	53.1	51.8	39.8	37.6	25.7	498.1	1996-2015
Lowest Monthly Rainfall (mm)	0.0	0.2	0.0	0.0	8.2	14.4	30.0	19.6	5.2	2.6	1.4	1.6	274.0	1996-2015
Mean Rainfall (mm)	39.9	18.6	29.7	38.8	46.1	48.4	69.8	53.1	51.8	39.8	37.6	25.7	498.1	1996-2015

*Data sourced from the Australian Government's Bureau of Meteorology (2015).

7.2.3 Topography and Drainage

The main coastal landforms in Mason Point area are moderately steep sandy beaches interspersed with small rocky promontories. The location of the seawater intake is in a rocky shoreline that extends for approximately 1 km in a north easterly direction from Mason Point. The seawater intake site is directly exposed to the sea and swell waves from the Southern Ocean.

The alignment consists of a series of pumping and storage stations and a pipeline that cross a number of minor drainage lines and the ephemeral Burlabup Creek line. The crossings, the intake pump station and transfer stations will need to be reviewed at closure to ensure that drainage lines are not impacted by altered ground levels (exhuming infrastructure and backfilling) or subsidence from slumping of the pipeline.

There is also potential for the spread of dieback from existing localised contaminated areas along the alignment. Surface water ponding and drainage will need to be managed so that the potential for transferring dieback to unaffected areas is minimised.

7.2.4 Geology and Soils

Closest to the ocean, the shoreline comprises large, weathered granite blocks, some of which are

detached from the mainland. The area of bare granite extends approximately 30 m landward from the waters edge. The granite blocks decrease in size and become increasingly irregular in shape with distance from the ocean. The granite is orange grey and exhibits quartz veins, cracks and jointing. The rock on this coastline is likely to be granite derived from the southern edge of the Yilgarn Block.

There is little detail provided to date on the types of soils that exist at the intake pumping system, the second transfer station or along the length of the salt water pipeline. Each of these infrastructure areas have the potential to cause localised soil contamination through leachate and, or spills of saline water. A baseline study focused on soil salinity within these infrastructure areas would determine natural salinity levels and provide a benchmark for assessing soil contamination post closure. A thorough record of spills and remedial activities could also assist in identifying remediation likely to be required at closure.

7.2.5 Land Systems and Vegetation

The marine environment in between Mason Bay and Mason Point incorporates a low profile reef dominated by brown macroalgae growing on granite boulders. The habitat in the vicinity of the seawater pipeline is characteristic of the region.

The wave washed areas of the Mason Point headlands are colonised (~50% cover) by a black algae that forms a thin, slimy veneer on the rocks. The wave washed rocks (up to 10m from the ocean) are also colonised by small gastropods, thinning in cover with distance from the ocean. The algae and gastropods at Mason Point headland are typically restricted to a narrow horizontal band around the shore.

However, it has not been established whether the seawater intake infrastructure will provide a habitable environment for future colonisation. The potential impact of the removal of the pipeline will need to be taken into account during closure planning, should the seawater intake provide for marine life.

Twenty (20) species of significant flora (priority listed or newly recognised undescribed taxa) were identified during the field survey along Mason bay Road pipeline alignment conducted by Western Botanical from November 2004 to September 2005.

To assess the current conservation statue of these species, the Western Australia's Florabase

(2015) was reviewed. Table 7 below identifies species whose conservation statues have been changed:

Table 7: Priority species identified along Mason Bay

Taxon	Previous Conservation Statues	Current Conservation Statues	Comments
Dampiera sericantha Beth	Priority 1	Priority 3	
Goodenia phillipsiae Coralin.	Priority 1	Priority 4	
Allocasuarina scleroclada ssp echinata (G.Cockerton 5016) ms	Priority 3	Priority 4	
Astroloma microphyllum Stschegl	Priority 3	Not threatened	
Verticordia vicinella A.S. George	Priority 4	Not threatened	This taxon is more recently known as *Allocasuarine hystricosa* Wege
Comesperma acerosum steetz	Priority 3	Not threatened	

Rehabilitation should consider the provision of mature habitat areas and debris material to encourage colonisation by native fauna.

8. Identification and Management of Closure Issues

An assessment of risks related to closure has been undertaken under previous ownership of RNO. Significant risks are detailed in sections below.

8.1 Risk assessment method

Risk events and the potential impacts that could occur were identified under a risk assessment methodology referred to as Enterprise Wide Risk Methodology (EWRM), presented in Appendix 4. The magnitude of the most likely consequences to occur as a result of the risk event was assessed and a Severity Factor was assigned according to the severity ratings contained in the standard. It should be noted that the assessments of financial severity are based on the change in net present value (NPV).

The Exposure Factor and the Probability Factor were identified for each risk event, again, based on the guidelines in the standard. The product of the Exposure Factor and the Probability Factor produces a Likelihood Factor.

The Severity Factor was multiplied by the Likelihood Factor to determine the Risk Rating. Both inherent risk (i.e. the risk before controls) and the residual risk (i.e. the level of risk remaining after the application of control measures) were given a rating. The risk identification exercise focused on material closure risks that need to be factored into closure planning. More detailed risk assessments should be conducted as closure approaches.

Significant risks for RNO have been graphed in Figure 9. A detailed description of the risks is provided in Sections 8.2.1 to 8.2.3.

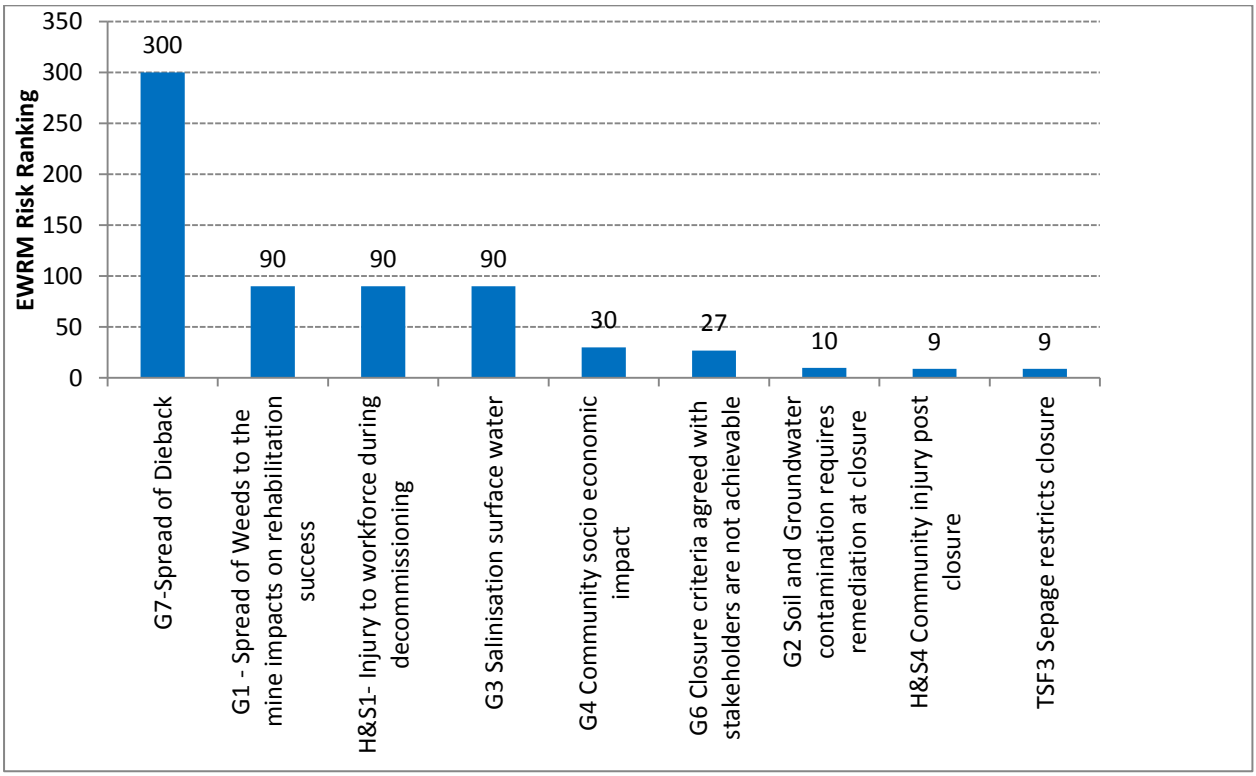


Figure 9 Risk Ranking

8.2 Summary of RNO Risks

Each of the RNO closure site areas (refer Section 2.3) were evaluated through the risk assessment method described in Section 8.1. However, the majority of the risks have been identified as 'General' risks due to the limited duration of operational history. The General risks encapsulate several site areas that could have a similar impact or causal effect on RNO closure (e.g. the potential for surface water contamination from storage of saline material in waste dumps and run-off from rejects stockpiles has been combined into the same risk). The General risks will need to be re-assessed in further detail in the future so that risk ratings can be assigned to individual site features, as appropriate.

The significant risks that have been identified for RNO Closure are:

- General (G) – 6 significant risks were identified.
- Health and Safety (H&S) – 2 significant risks were identified.
- Tailings Storage Facilities (TSF) – 1 significant risk was identified.

8.2.1 General Risks

G1*-Spread of weeds to the mine area impacts on rehabilitation success*: Machinery entering onto site and airborne transfer of weeds has the potential to contaminate topsoil stockpiles and newly vegetated areas. Weed infestations have the potential to impact early revegetation within rehabilitated areas and compromise the ability to meet final rehabilitation criteria. Inability to meet rehabilitation criteria will require rework and weed control.

G2*-Soil and Groundwater contamination requires remediation at closure*: Point sources for potential contamination are acid, diesel and reagent storage areas, lube building, fuel stores, evaporation cells, TSF and SRSF pipelines, seawater intake and associated infrastructure and hydraulic equipment failure. Areas of contamination not identified prior to rehabilitation could compromise RNO's ability to achieve final closure criteria, and remediation and rehabilitation rework, could extend the planned RNO closure timeframe and cost.

G3*-Salinisation surface water*: Point sources for surface water contamination have been identified as the waste dump (disposal of saline material), aerosol from evaporation ponds, run-off from rejects stockpiles and the use of saline water for dust suppression. High salinity areas not identified prior to closure have the potential to further contaminate localised areas of topsoil and require additional rehabilitation works to enable final rehabilitation criteria to be achieved. This could extend the planned closure timeframe and could result in reputation damage with stakeholders and regulators.

G4*-Community socio economic impact*: RNO closure will reduce employment opportunities within the region. Decreased employment could significantly impact community services and infrastructure that may develop either a direct or indirect dependency during the operational life of the mine.

G6*-Unable to meet regulator expectations for rehabilitation*: Vegetation rework will be required for areas that don't meet regulator expectations. Inability to meet expectations would result in loss of bonds, or require mitigation through rehabilitation of offset areas. Further rehabilitation works could extend the planned RNO closure timeframe. Any resulting reputation damage with regulators has the potential to hinder future FQMAN mining approvals.

G7*-Spread of dieback during & after closure*: This risk could occur if an area within the site was affected during operations and could be spread to non-infected, rehabilitated or conservation areas through inadequate vehicle hygiene procedures during closure. Dieback could prevent closure

criteria from being achieved and could impact on the biodiversity of surrounding areas. Reputation damage with regulators has the potential to hinder future mining approvals and could lead to long term monitoring and remediation requirements for diseased areas.

8.2.2 H&S Risks

H&S1 *Injury to workforce during decommissioning/closure*: Accident or injury to personnel could result from a lack of sufficient controls for managing activities associated with closure/demolition. RNO may not be accustomed to managing and supervision may not be as prolific. The use of contractors that are not used to the unique hazards associated with the RNO site may also lead to a higher incidence of injuries. An injury could result in litigation leading to compensation payments. The severity of this risk was ranked on an incident as this is the most likely occurrence but there is also a possibility that there could be a fatality.

H&S4*-Community injury:* Accident/injury to the public post-closure. This could be due to inadequate rehabilitation of the site including demarcation, signage, and restrictions to access etc. The public could be exposed to hazardous materials, and/or be injured due to a fall/trip hazard. An injury to a third party could result in litigation leading to compensation payments. An additional implication associated with an injury is the potential for FQMAN's reputation to be impacted, and for this to affect the company's ability to obtain approvals for future projects. The severity of this risk was ranked as an incident as this is the most likely occurrence with some possibility that there could be a fatality.

8.2.3 TSF Risks

TSF3*-Seepage restricts closure*: acid seepage resulting from inadequate TSF covering could result in infiltration of the jarosite capping and subsequent contamination of topsoil during rehabilitation. Additional costs would be incurred to rectify the TSF covers. Further rehabilitation works could extend the planned RNO closure timeframe. Any resulting reputation damage with regulators has the potential to hinder future FQMAN mining approvals.

8.3 Risk Mitigation Measures

The mitigation measures for the key risks identified in Section 8.2 are listed in Table 8.

Table 8: Risk Mitigation Measures

Risk Event	Mitigation Measures	
	Existing	**Future**
G1-Spread of weeds to the mine area impacts on rehabilitation success.	Weed spraying of topsoil stockpiles and mine site boundaries. Managing adjacent farmland to minimise weed spread.	Implementation of vehicle hygiene program in the event that vehicles need to move between areas of heavy weed infestation and other areas.
G2-Soil and Groundwater contamination requires remediation at closure.	Bunding and pipeline maintenance and inspections. Inventory reconciliation. Vehicle inspections. Hydraulic hose inspections. Mobile equipment inspections Groundwater monitoring and implementation of remediation measures during operations Clean-up of areas affected by spills during operations.	Groundwater monitoring and implementation of remediation measures during operations Clean-up of areas affected by spills during operations.
G3-Salinisation surface water	Surface drainage is controlled via a network of surface water drains as per the Surface Water management plan. Clean-up of saline spills during operations	Incorporate the requirement to remediate salt affected areas into the closure plan Undertake a study to determine the minimum depth of waste rock required to prevent capillary rise of saline water (from reject material) into topsoil of rehabilitated waste rock landforms.
G4-Community socio economic impact	None identified.	Develop and implement a Community Development program to minimise the impacts of closure.
G6-Unable to meet regulator expectations for rehabilitation.	Materials handling procedure for rehabilitation medium. Topsoil has been surveyed, quantified and stored in stockpiles. Seed collection is carried out prior to clearing site areas. Progressive research being is being carried out to determine best practice rehabilitation for the local environment.	Involve regulators in rehabilitation development of closure criteria. Carry out progressive rehabilitation and research to develop opportunity to assess effectiveness of current practices.
G7-Spread of dieback during & after closure.	Hygiene program in place to prevent the spread of dieback from adjacent diseased areas and eliminate contamination within conservation and rehabilitation areas.	Further expand on the effectiveness of the hygiene controls.
	Topsoil seeding program has been developed Education and training	Application of potential solutions identified through significant investment in research and development

Risk Event	Mitigation Measures	
	Existing	**Future**
H&S1- Injury to workforce during decommissioning/closure	None identified.	Develop a health and safety plan for closure including a contractor selection process to ensure contractor has high level of proven experience in this field, adequate safety management/ controls/ processes/ systems in place.
H&S4-Community injury	None identified.	Restrict access where necessary (eg fencing), remove/eliminate hazards and contamination from site.
TSF3-Seepage restricts closure	Design and construction in accordance with industry standards EM survey and groundwater monitoring	Field trials and progressive TSF rehabilitation.

8.4 Management of Risk Issues

The tailings storage facility (TSF) and the Evaporation ponds hold significant amounts of contaminants (saline materials) that need to be addressed at the early stages of operation. While the final outcomes of the closure of the TSF with respect to the capping of the dam need to be finalised, a water shedding design has been viewed as least impacting to the groundwater environment. Limitation of seepage from the dam is a critical objective for prevention of long term contamination to groundwater sources in the future.

Previous closure plans had identified the removal of all saline contaminants and liners from the evaporation ponds and disposal to the TSF. While proposals to reinstate the land to a farmland end use for economic reasons were considered under previous ownership FQMAN believe the risk to long term seepage from the TSF is not in the interest of the community. Practical closure of the evaporation ponds being considered are to consolidate the saline contaminants at the current area (reduced footprint), cap the ponds and cover with suitable growing media to permit rehabilitation with native grasses and native shrubs.

8.5 Summary of Key Opportunities

Key potential opportunities for reducing closure liabilities include;

- Undertake progressive backfilling of mine voids prior to closure
- Undertake progressive rehabilitation of mine and offset areas prior to closure
- Assess the optimum cover design over rejects, TSF and EP wastes so that environmental objectives are achieved by economically efficient means
- Utilising existing equipment on site to carry out rehabilitation works (reduced mobilisation

costs)

- Relinquishment of bitumen roads and access tracks to other users (pastoralists, Shire, other companies)
- Sale of assets within the plant prior to demolition
- Sale of houses and land with consideration of local market conditions and opportunities
- Finish with surface scarifying rather than deep ripping in non-compacted areas.

8.6 Closure Plan Review process

The Closure Plan will be reviewed in accordance with the process shown in Figure 10. In general, the Closure Plan will be reviewed annually, or whenever there is a significant change to the operation's future. The Closure Plan will be fully reassessed and updated every three years to take account of new information, technology and changes to operations. Audits of the Closure Plan and the closure planning process will be undertaken, as required.

The closure concepts presented in this plan will evolve over time to reflect the most up to date circumstances. More detailed closure plans will be developed closer to the date of closure.

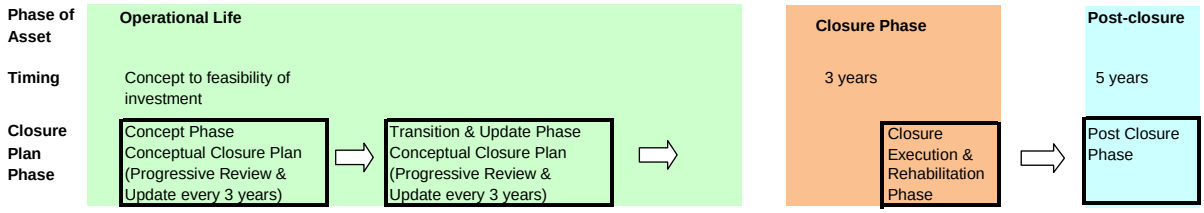


Figure 10 Lifecycle of Closure Planning and Execution Process

9. Closure Implementation

This section outlines the:

- Closure Implementation Strategies and Activities for RNO (Section 9.1);
- Closure Work Programs for Site Domains (Section 9.2);
- Research, Investigation and Trial Activities (Section 9.3);
- Progressive Rehabilitation Activities (Section 9.4);
- Premature Closure – permanent closure or suspended operations under care and maintenance (Section 9.5)
- Schedule (Timeline) of Decommissioning Activities (Section 9.6)
- Schedule of Closure Performance Monitoring Activities (Section 9.7)

9.1 Closure Implementation Strategies and Activities for RNO

9.1.1 Management of Socio-economic Impacts

Plans for managing the socio-economic impacts of closure fall into two categories – those associated with direct impacts of closure on RNO employees, their families and those contractors entirely reliant on RNO business, and those associated with the indirect impacts of mine closure on Ravensthorpe businesses and organisations that provide services such as air transport and community services.

Recommendations for further developing the Closure Plan to incorporate the management of socio-economic impacts on the workforce are as follows:

- It is essential that early planning is done to ease the transition of RNO employees and their families to a situation of possible unemployment. Planning should determine the number of people, and the options available for assisting them with adjustment. Conceptual-level planning for retrenchment of employees and contractors, including consideration of the need for labour market analysis, skills audit and outplacement support, needs to occur closer to the date of closure.

9.1.2 Management of Indirect Socio-economic Impacts

In order to develop appropriate plans for the management of indirect socio-economic impacts of closure, the following studies need to be conducted:

- Assess the sustainability of community and local employment programs currently supported by RNO, identifying the likely funding, capacity and resource needs of those programs post-

closure.

- Develop and commence the implementation of a high level strategy for optimising community benefits and mitigating negative impacts associated with closure. Include criteria for post-closure socio-economic conditions that promote the resilience of the community to the closure of RNO (control for risk G4-Community socio-economic impact).

9.1.3 Actions to Address Risks and Closure Criteria

Actions required to be developed further to the Closure Plan prior to the commencement of the closure execution phase include;

- In consultation with industry experts, develop and implement a best industry practice rehabilitation programme including associated completion criteria; identify and implement research required on propagation methods for key recalcitrant vegetation not representative in the rehabilitation that provides practical ways to enhance the biodiversity of rehabilitation areas (control for risk G6-Unable to meet regulator expectations).
- Identify practical limits to disturbance in operating and closure in consultation with key stakeholders, develop final designs for mine landforms taking into account the key characteristics of the natural landform and research into the performance of different landforms (refer criterion 8), and obtain formal approval from the regulators for landform design.
- In consultation with key stakeholders, develop a detailed drainage plan with measurable criteria for contours and drainage characteristics that should be established to achieve the objective of restoring the natural drainage; and levels of erosion that will be considered acceptable to achieve lease relinquishment (refer criterion 9), and obtain formal approval from regulators for any departures from previous commitments.
- Review opportunities for closure and rehabilitation activities to contribute to the conservation of flora and vegetation communities and incorporate options for consideration into future closure plans.
- Develop a rehabilitation prescription that documents compacted areas that require deep ripping (according to defined criteria), measurable criteria for rehabilitating drill holes, wells and other holes in the ground, seed mixes and planting densities, and the provision of fauna habitats. Incorporate completion criteria to demonstrate that suitable infiltration rates and an appropriate self-sustaining vegetation community (e.g. species mix, abundance, juvenile recruitment) have been re-established.
- Agree completion criteria with regulators closer to the date of closure (control for risk G6-Stakeholder signoff).

- Develop a strategy for managing the spread of weeds and soil borne diseases during closure and nearer to the time of closure, develop acceptable completion criteria in consultation with regulators (control for risk G1-Spread of weeds to the mine area impacts on rehabilitation success and risk G7-Spread of dieback during and after closure).
- In consultation with key stakeholders, develop risk based criteria for local surface and groundwater quality and, if required, develop and implement a contamination remediation plan to meet these criteria (control for risk G2-Soil and groundwater contamination requires remediation at closure).
- Develop a public access control plan closer to closure, with measurable lead criteria including the locations for further signage, fencing etc (control for risks H&S4-Community injury).
- Develop a closure project execution plan that contains;
  - measurable criteria for executing closure in a timely manner and makes efficient use of resources;
  - a health and safety plan for closure activities which includes lead indicators for health and safety management and performance, the identification of safety hazards including hazardous materials, and contractor selection processes (control measures for “H&S1 Injury to contractor personnel during demolition” and “H&S3- Safety and health hazard during decommissioning”)
  - Develop a waste management plan for closure activities, including measures for recycling materials where practical
  - Incorporate dieback (and other soil borne diseases) and weed management into contractor personnel scopes of work for closure.
- Develop a demolition plan in conjunction with a demolition contractor.
- Notify the local DER, Shire Engineer and District Inspector prior to the cessation of operations.
- Conduct geotechnical / engineering review of the TSF at decommissioning and prior to rehabilitation, submit the report to the State Mining Engineer.

9.2 Closure Work Program for Site Features (Domains)

A description of closure activities for each area is provided below. Where an activity relates to the control of a risk identified in Section 8.2, the relevant risk reference number has been provided.

9.2.1 Halley's – Domain 1

Requirements

- Department of Environmental Protection, Works Approval No. 3911.
- Notice of Intent for the Construction of a Nickel Processing Plant and Project Infrastructure for the Ravensthorpe Nickel Project (NOI 4394), February 2004.
- Notice of Intent, Halley's Open Cut Pit Ravensthorpe Nickel Project (NOI 5232), February, 2006.
- Ministerial Approval 633 and associated RNO Management Plans

Earthworks – drainage, rip, contour and rehabilitate	Yes
Area to rip and seed	Yes
Oxide rock capping slopes and top surface	Yes – as required
Caprock coverage	Yes – as required
Topsoil coverage	Yes

CLOSURE ACTIVITIES

Description	Domain 1.1 Pit (current disturbance)	**Area (ha)**	252.92

Engineering Works

a) Investigate drainage characteristics to determine feasibility of maintaining through-flow system
b) Batter walls to <20º, with 5 m back-sloping berms at 10 m vertical intervals where required (voids)
c) Batter upper pit walls of mine pits for safe access and create shallows where required (voids)
d) Construct abandonment bunds where required (voids)

Environmental Works

a) Existing ramps to have potentially saline contaminated material removed and disposed of into pit and covered with clean fill material
b) Use beneficiation process reject material and waste rock to backfill pits (beginning 2013)
c) Utilise low salinity substrate material (waste rock)
d) Progressively re-contour backfilled pit(s)
e) Construct internally draining upper surfaces into the re-contoured ground to minimise erosion
f) Deep rip on contoured surface areas
g) Re-spread topsoil and stockpiled vegetation
h) Seed with local native vegetation and incorporate priority species or seed or direct plant wetland and fringing vegetation in any void areas
i) Restore and monitor self-generating ecosystem function

CLOSURE ACTIVITIES

Description	Domain 1.2 Eastern waste rock dumps (stockpile area and topsoil stockpiles not included).	**Area (ha)**	177.82

Engineering Works

a) Investigate drainage characteristics to determine feasibility of maintaining through-flow system.

Environmental Works

a) Existing ramps to have potentially saline contaminated material removed and disposed of into pit

9.2.1 Halley's – Domain 1

b) Place erosion control banks (drop structures) on existing ramps
c) Push down slopes to <20^{o} or less where required and cover slopes with caprock, or, re-contour to a shape similar to pre-mining profiles
d) Re-spread topsoil and stockpiled vegetation to cover contour and slopes with topsoil.
e) Deep rip on contour
f) Rip compacted areas and maximise infiltration
g) Seed with local native vegetation to approximate pre-mining vegetation communities and incorporate priority species
h) Restore and monitor self-generating ecosystem function

CLOSURE ACTIVITIES

Description	(Included in Domain 1.2) Sediment control structures	**Area (ha)**	Included in domain 1.2

Engineering Works

a) Demolish or remove the structures and any concrete slabs and footings to 0.5 m depth.
b) Dispose of all waste/debris.

Environmental Works

a) Spread available topsoil over cleared areas.
b) Cover slopes and top with oxide material, then place caprock to slopes only, followed by topsoil to all surfaces.
c) Re-contour by grading over entire area to reinstate local existing drainage and establish additional drainage where required in the final stages of land profiling.
d) Contour rip (generally to compacted areas) to minimum of 0.5 m depth at maximum spacing of 3 m to maximise infiltration.
e) Prior to seeding, inspect area and remove all rubbish and debris.
f) Scarify/seed with local provenance species to blend with surrounding habitat units.

CLOSURE ACTIVITIES

Description	Domain 1.3 Rom Pad	**Area (ha)**	24.54

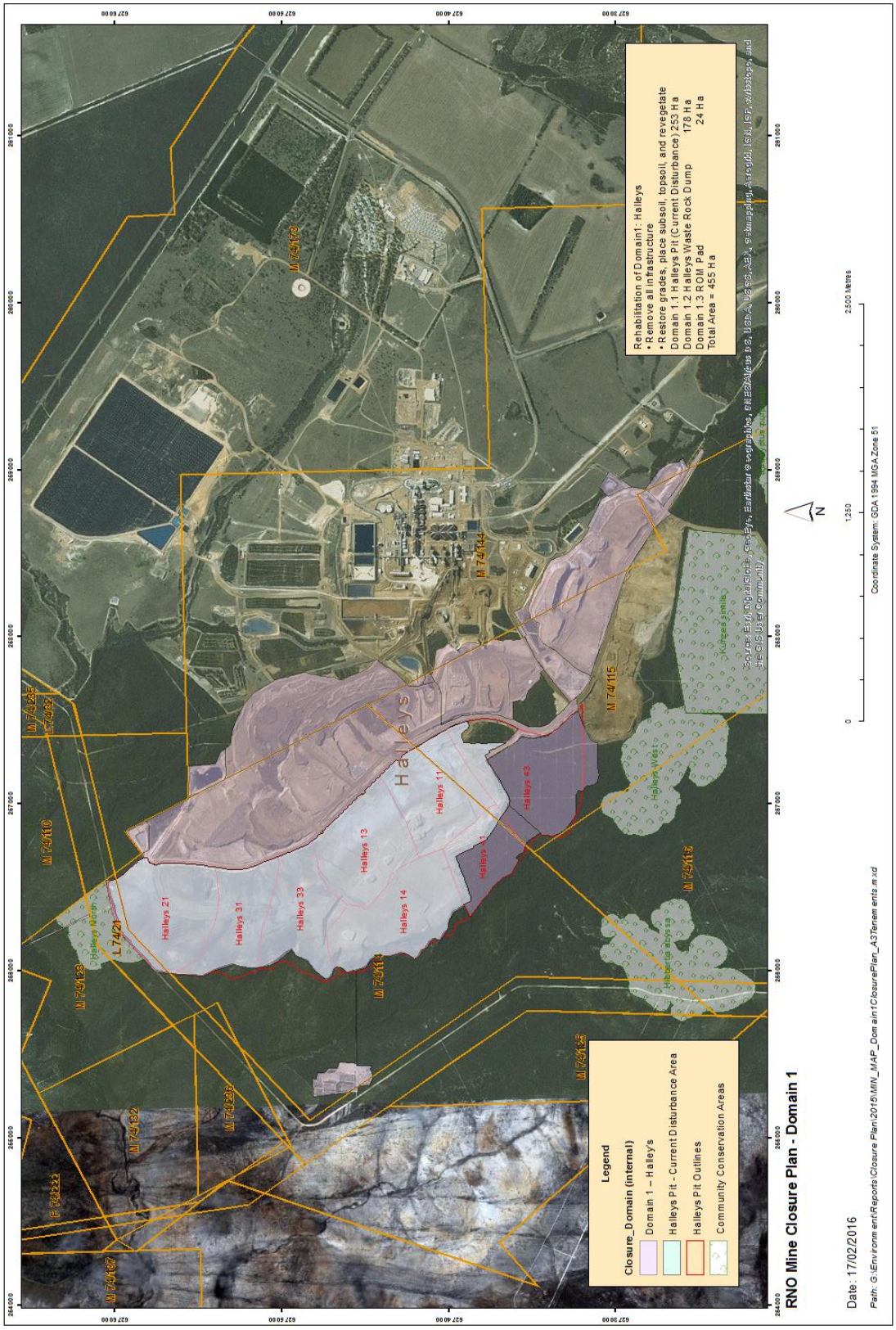
Engineering Works

a) Investigate drainage characteristics to determine feasibility of maintaining through-flow system.

Environmental Works

a) Existing ramps to have potentially saline contaminated material removed and disposed of into pit
b) Place erosion control banks (drop structures) on existing ramps
c) Push down slopes to <20^{o} where required and cover slopes with caprock, or, re-contour to a shape similar to pre-mining profiles
d) Re-spread topsoil and stockpiled vegetation to cover contour and slopes with topsoil.
e) Deep rip on contour
f) Rip compacted areas and maximise infiltration
g) Seed with local native vegetation to approximate pre-mining vegetation communities and incorporate priority species
h) Restore and monitor self-generating ecosystem function

Figure 11 RNO Mine Closure Plan – Domain 1



9.2.2 Hale Bopp – Domain 2

Requirements

- Notice of Intent for the Construction of a Nickel Processing Plant and Project Infrastructure for the Ravensthorpe Nickel Project (NOI 4394), February 2004.

Earthworks – drainage, rip, contour and rehabilitate	Yes
Area to rip and seed	Yes
Oxide rock capping slopes and top surface	Yes – as required
Caprock coverage	Yes – as required
Topsoil coverage	Yes

CLOSURE ACTIVITIES		
Pit (current disturbance)	**Area (ha)**	91.22

Engineering Works

a) Investigate drainage characteristics to determine feasibility of maintaining through-flow system
b) Batter walls to <20º, with 5 m back-sloping berms at 10 m vertical intervals where required (voids)
c) Batter upper pit walls of mine pits for safe access and create shallows where required (voids)
d) Construct abandonment bunds where required (voids)

Environmental Works

a) Existing ramps to have potentially saline contaminated material removed and disposed of into pit.
b) Use beneficiation process reject material and waste rock to backfill pits
c) Utilise low salinity substrate material
d) Progressively re-contour backfilled pit(s) to a shape similar to Bandalup Hill (pre-mining profiles), partial backfill only is achievable.
e) Construct internally draining upper surfaces into the re-contoured ground to minimise erosion
f) Deep rip on contoured surface areas
g) Re-spread topsoil and stockpiled vegetation
h) Seed with local native vegetation and incorporate priority species OR seed or direct plant wetland and fringing vegetation in any void areas
i) Restore and monitor self-generating ecosystem function

CLOSURE ACTIVITIES		
Hale Bopp Waste Rock Dump	**Area (ha)**	N/A

Engineering Works

a) Investigate drainage characteristics to determine feasibility of maintaining through-flow system.

Environmental Works

a) Waste material proposed to be used in closing of the TSF cells, remainder of the material to be stablised in an appropriately constructed dump
b) Existing ramps to have potentially saline contaminated material removed and disposed of into pit
c) Place erosion control banks (drop structures) on existing ramps
d) Push down slopes to <20^{o} where required and cover slopes with caprock, OR, re-contour to a

9.2.2 Hale Bopp – Domain 2

shape similar to pre-mining profiles

e) Re-spread topsoil and stockpiled vegetation to cover contour and slopes with topsoil.
f) Deep rip on contour
g) Rip compacted areas and maximise infiltration
h) Seed with local native vegetation to approximate pre-mining vegetation communities and incorporate priority species
i) Restore and monitor self-generating ecosystem function

CLOSURE ACTIVITIES

Haul Roads	**Area (ha)**	N/A

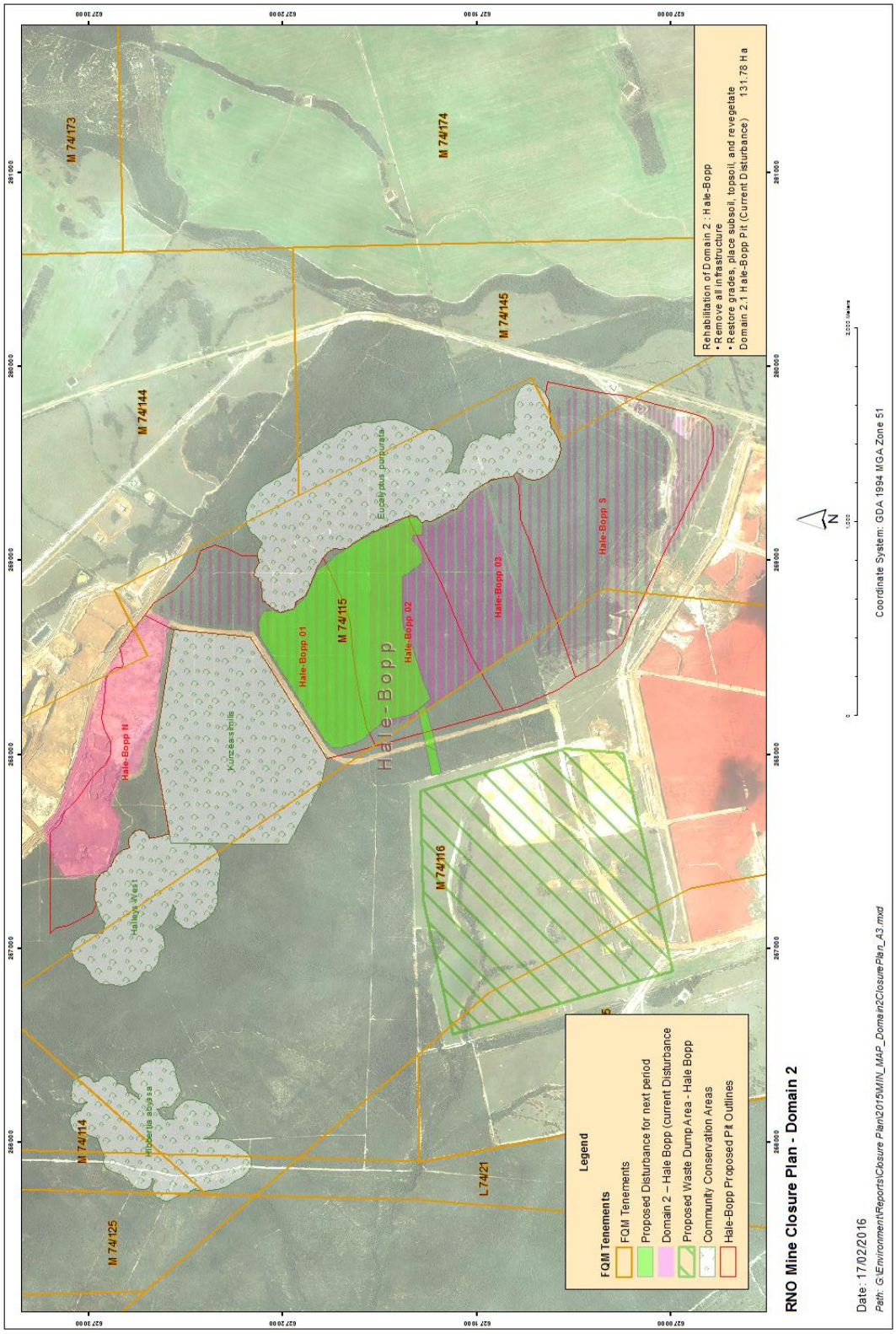
Engineering Works

a) Remove upper 200 mm saline material from road surface.

Environmental Works

a) Cart away windrow bunds and stockpile or spread over adjacent disturbed areas.
b) Remove built-up material to reinstate drainage and scrape off remaining surfaces that contain salt from haul road dust suppression, profile, rip and seed.
c) Dispose of materials appropriately.
d) Place fresh rock bund across pit access ramp.
e) Install abandonment bund and signage around pit perimeter.
f) Contour rip (generally to compacted areas) to ~0.5 m depth at maximum spacing of 3 m to maximise infiltration on haul roads and pit surrounds.
g) Prior to seeding, inspect area and remove all rubbish and debris.
h) Over the area spread available topsoil and scarify/seed with local provenance species to blend with surrounding habitat units.

Figure 12 RNO Mine Closure Plan – Domain 2



9.2.3 Shoemaker Levy – Domain 3

Requirements

- Notice of Intent for the Construction of a Nickel Processing Plant and Project Infrastructure for the Ravensthorpe Nickel Project (NOI 4394), February 2004.

Earthworks – drainage, rip, contour and rehabilitate	Yes
Area to rip and seed	Yes
Oxide rock capping slopes and top surface	Yes – as required
Caprock coverage	Yes – as required
Topsoil coverage	Yes

CLOSURE ACTIVITIES		
Pit	**Area (ha)**	N/A

Engineering Works

a) Investigate drainage characteristics to determine feasibility of maintaining through-flow system
b) Batter walls to <20º, with 5 m back-sloping berms at 10 m vertical intervals where required (voids)
c) Batter upper pit walls of mine pits for safe access and create shallows where required (voids)
d) Construct abandonment bunds where required (voids)

Environmental Works

a) Existing ramps to have potentially saline contaminated material removed and disposed of into pit.
b) Utilise low salinity substrate material
c) Construct internally draining upper surfaces into the re-contoured ground to minimise erosion
d) Deep rip on contoured surface areas
e) Re-spread topsoil and stockpiled vegetation
f) Seed with local native vegetation and incorporate priority species OR seed or direct plant wetland and fringing vegetation in any void areas
g) Restore and monitor self-generating ecosystem function

CLOSURE ACTIVITIES		
West Waste Rock Dump	**Area (ha)**	N/A

Engineering Works

a) Investigate drainage characteristics to determine feasibility of maintaining through-flow system.

Environmental Works

a) Existing ramps to have potentially saline contaminated material removed and disposed of into pit
b) Place erosion control banks (drop structures) on existing ramps
c) Push down slopes to <20^{o} where required and cover slopes with caprock, OR, re-contour to a shape similar to pre-mining profiles
d) Re-spread topsoil and stockpiled vegetation to cover contour and slopes with topsoil.
e) Deep rip on contour
f) Rip compacted areas and maximise infiltration
g) Seed with local native vegetation to approximate pre-mining vegetation communities and incorporate priority species
h) Restore and monitor self-generating ecosystem function

9.2.3 Shoemaker Levy – Domain 3

CLOSURE ACTIVITIES		
East Waste Rock Dump	**Area (ha)**	N/A

Engineering Works

a) Investigate drainage characteristics to determine feasibility of maintaining through-flow system.

Environmental Works

a) Existing ramps to have potentially saline contaminated material removed and disposed of into pit
b) Place erosion control banks (drop structures) on existing ramps
c) Push down slopes to <20^{o} where required and cover slopes with caprock, OR, re-contour to a shape similar to pre-mining profiles
d) Re-spread topsoil and stockpiled vegetation to cover contour and slopes with topsoil.
e) Deep rip on contour
f) Rip compacted areas and maximise infiltration
g) Seed with local native vegetation to approximate pre-mining vegetation communities and incorporate priority species
h) Restore and monitor self-generating ecosystem function

CLOSURE ACTIVITIES		
Rom Pad	**Area (ha)**	N/A

Engineering Works

a) Investigate drainage characteristics to determine feasibility of maintaining through-flow system.

Environmental Works

a) Existing ramps to have potentially saline contaminated material removed and disposed of into pit
b) Place erosion control banks (drop structures) on existing ramps
c) Push down slopes to <20^{o} where required and cover slopes with caprock, OR, re-contour to a shape similar to pre-mining profiles
d) Re-spread topsoil and stockpiled vegetation to cover contour and slopes with topsoil.
e) Deep rip on contour
f) Rip compacted areas and maximise infiltration
g) Seed with local native vegetation to approximate pre-mining vegetation communities and incorporate priority species
h) Restore and monitor self-generating ecosystem function

CLOSURE ACTIVITIES		
Haul Roads	**Area (ha)**	N/A

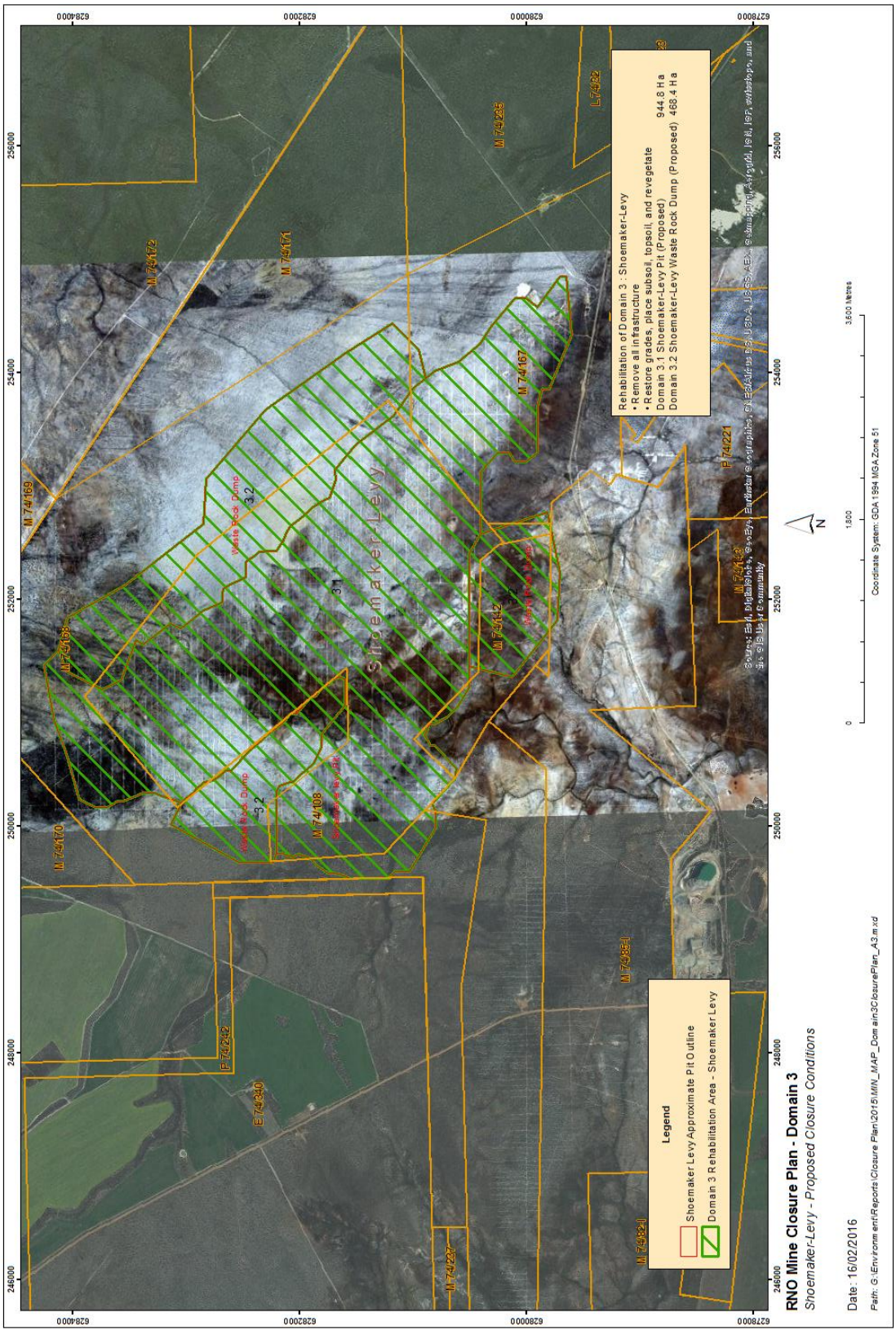
Engineering Works

a) Remove upper 200 mm saline material from road surface.

Environmental Works

a) Cart away windrow bunds and stockpile or spread over adjacent disturbed areas.
b) Remove built-up material to reinstate drainage and scrape off remaining surfaces that contain salt from haul road dust suppression, profile, rip and seed.Dispose of materials appropriately.
c) Place fresh rock bund across pit access ramp.
d) Install abandonment bund and signage around pit perimeter.
e) Contour rip (generally to compacted areas) to minimum of 0.5 m depth at maximum spacing of 3 m to maximise infiltration on haul roads and pit surrounds.
f) Prior to seeding, inspect area and remove all rubbish and debris.
g) Over the area spread available topsoil and scarify/seed with local provenance species to blend with surrounding habitat units.

Figure 13 RNO Mine Closure Plan – Domain 3



9.2.4 Rehabilitation Offsets – Domain 4

Requirements	
Ministerial Statement 633 – Schedule 2, No.2 - rehabilitate 0.4ha of uncleared land for every 1ha of land cleared as part of the project	
Topic	Conservation offsets
Action	In addition to the purchase of 660ha of uncleared land referred to in commitment 1, rehabilitate 0.4ha of uncleared land for every 1ha of land cleared as part of the project
Objective	Offset clearing associated with project development within the Bandalup Corridor
Compliance Criteria	Land rehabilitated
Timing	To be completed prior to the completion of closure activities

CLOSURE ACTIVITIES			
Description	Rehabilitation Offsets	**Area (ha)** (current offset required based on clearing to date)	255

Engineering Works

a) All works to be decided once stakeholder consultation is finalised
b) Final area depends on final level of land preparation required prior to seeding

Environmental Works

a) All works to be decided once stakeholder consultation is finalised.
b) Weed control is required prior to revegetation works
c) Direct seeding with native species (shrubs) is the method of rehabilitation required

Figure 14 RNO Mine Closure Plan – Domain 4

9.2.5 Tailings Storage Facility – Domain 5

Requirements

- Department of Environmental Protection, Works Approval No. 3911.
- Notice of Intent for the Construction of a Nickel Processing Plant and Project Infrastructure for the Ravensthorpe Nickel Project (NOI 4394), February 2004.
- Ravensthorpe Nickel Project Supplementary Notice of Intent for the Construction of Tailings and Evaporation Ponds (NOI 5136) September 2005.
- Mining Proposal (MP 5860) for the Construction of Additional Evaporation Ponds at Ravensthorpe Nickel

Earthworks – drainage, rip, contour and rehabilitate	Yes
Area to scarify and seed	Yes
Oxide rock capping slopes and top surface (1000 mm depth)	Yes
Caprock coverage (500 mm depth)	Yes
Topsoil coverage (150 mm depth)	Yes
Infrastructure to be retained	None

CLOSURE ACTIVITIES

Description	Tailings storage facility (current)	**Area (ha)**	463

Engineering Works

a) Remove any superstructures, surface installation to monitoring bores and foundations to pump shed.
b) Plug monitoring bores and rehabilitate
c) Dispose all pipework and debris to appropriate landfill.

Environmental Works

a) Place cap and rock layer to top surface of TSF.
b) Backfill the decant system (cement/grout)
c) Establish bund on top edge and profile top surface to retain drainage.
d) Place erosion control banks (drop structures) on access ramps.
e) Remove all excess water from return water ponds, remove silt and dispose of accordingly.
f) Push down embankments to $<20^{o}$ place caprock followed by topsoil
g) Contour rip all areas (generally to compacted areas) to ~0.5 m depth at maximum spacing of ~3m to maximise infiltration.
h) Scarify and seed top surface with local provenance species (shallow rooted native shrubs and grasses) to blend with surrounding habitat units.

Figure 15 RNO Mine Closure Plan – Domain 5

9.2.6 Evaporation Ponds – Domain 6

Requirements	
Remove all water (pump/evaporate) from ponds	Yes
Contaminants removed from eastern ponds and placed in western ponds	Yes
Seal contaminants with HDPE liner from eastern ponds	Yes
Cover western ponds with ~0.5m depth of soil and seed with low shrubs and native grasses	Yes

CLOSURE ACTIVITIES			
Description	Evaporation ponds	**Area (ha)**	268.55

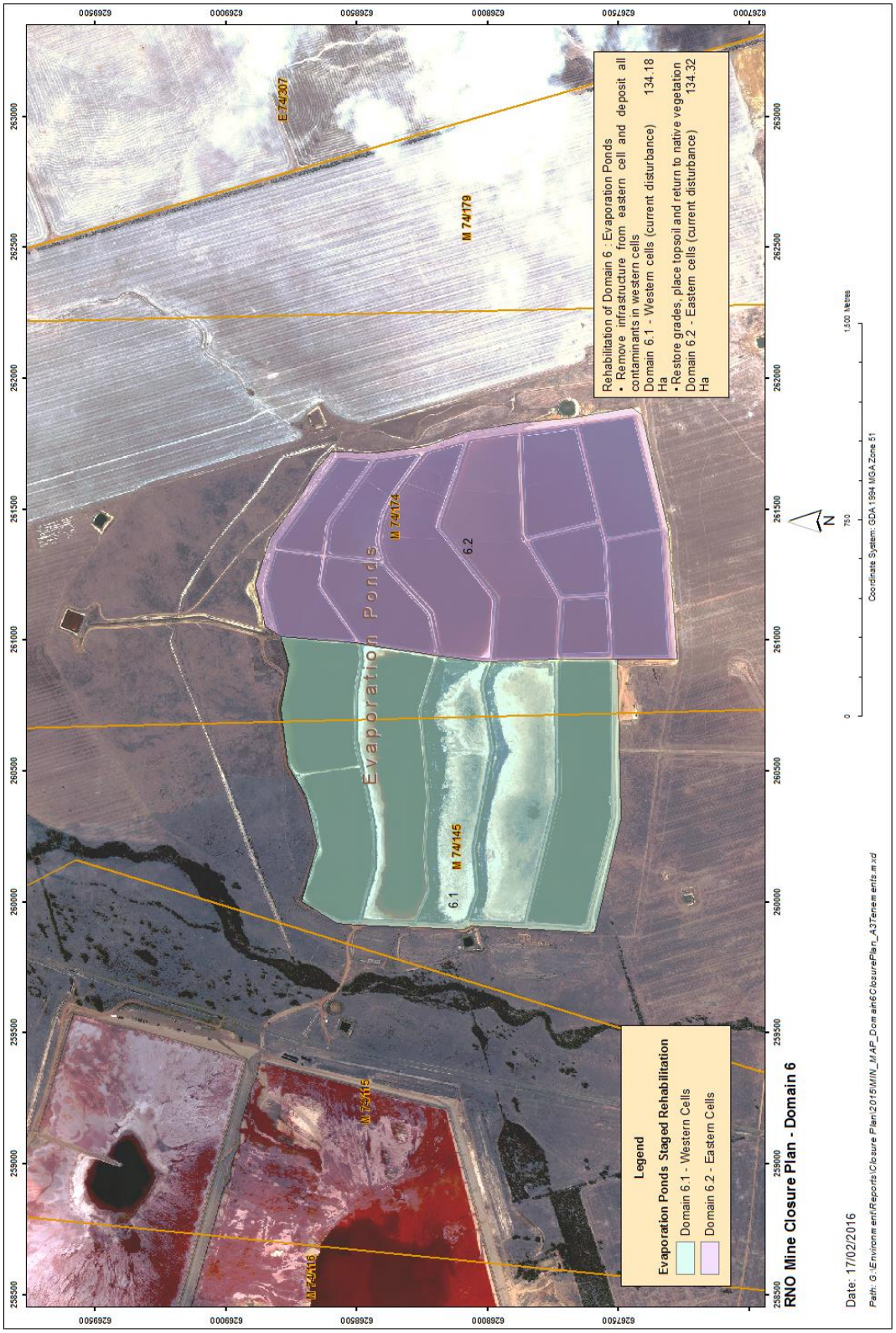
Engineering Works

a) Pump out water or allow to evaporate.
b) Remove any final salt, and salt contaminated base material, from the evaporation ponds and dispose in western cells. Bulldoze the embankments flat to approximately the pre-disturbance ground level.
c) Remove all above-ground water pipelines
d) Leave any services buried at greater than 1.0 m depth in place.
e) Prior to surface treatments, inspect area and remove all rubbish and debris to an appropriate waste disposal site.

Environmental Works

a) Backfill and re-contour dams using the embankment materials used in their construction. Grade to reinstate original local drainage or create new free-draining, stable landform, using additional crushed rock fill as required.
b) Spread topsoil over surfaces of in-filled dams and surrounding cleared areas.
c) Scarify and seed with local provenance species to blend with surrounding habitat.
d) Remove liner from eastern cells and use as a containment barrier to cover and seal contaminants in western cells.

Figure 16 RNO Mine Closure Plan – Domain 6



9.2.7 Plant and Infrastructure – Domain 7

Requirements

- Department of Environmental Protection, Works Approval No. 3911.
- Notice of Intent for the Construction of a Nickel Processing Plant and Project Infrastructure for the Ravensthorpe Nickel Project (NOI 4394), February 2004.
- Notice of Intent, Halley's Open Cut Pit Ravensthorpe Nickel Project (NOI 5232), February, 2006.

Earthworks – drainage, rip, contour and rehabilitate	Yes
Area to rip and seed	Yes
Oxide rock capping slopes and top surface	No
Caprock coverage	No
Topsoil coverage (~50 mm depth)	Yes

CLOSURE ACTIVITIES

Description	7.1.1 Crushers and Conveyor	**Area (ha)**	Inclusive of Domain 7.1, total 146.5 ha

Engineering Works

a) Demolish all superstructures. Demolish all concrete slabs and footings to 0.5 m depth.
b) Remove all pipelines and services and those brought to the surface during ripping.
c) Dispose of all waste/debris.

Environmental Works

a) Remove top 150 mm of soil including all bitumen, kerbing and aggregate from site and import fill material.
b) Spread available topsoil over entire area, ~0.05m. If topsoil is not available use caprock.
c) Re-contour by grading over entire area to reinstate local existing drainage and establish additional drainage where required in the final stages of land profiling.
d) Contour rip (generally to compacted areas) to ~0.5 m depth at maximum spacing of 3 m to maximise infiltration.
e) Prior to seeding, inspect area and remove all rubbish and debris.
f) Scarify/seed with local provenance species to blend with surrounding habitat units.

CLOSURE ACTIVITIES

Description	7.1.2Pad Area and Laydown Area	**Area (ha)**	Inclusive of Domain 7.1, total 146.5 ha

Engineering Works

a) Remove all sheet piling.
b) Demolish all concrete slabs and footings to 0.5m depth.
c) Remove all pipelines and services and those brought to the surface during.
d) Dispose materials in designated waste disposal area (TSF)

9.2.7 Plant and Infrastructure – Domain 7

Environmental Works

a) Remove all ore containing material from the ROM pad and dispose of accordingly.
b) Shape top surface of ROM pad to contain drainage, establish caprock bund on top edge, spread available caprock and topsoil, contour rip and seed.
c) Push down slopes to <20^{o}; spread available caprock and topsoil, contour rip and seed.
d) Re-contour by grading over entire area to reinstate local existing drainage and establish additional drainage where required in the final stages of land profiling.
e) Contour rip (generally to compacted areas) to minimum of 0.5 m depth at maximum spacing of 3 m to maximise infiltration.
f) Prior to seeding, inspect area and remove all rubbish and debris.
g) Scarify (rip) and seed with local provenance species to blend with surrounding habitat units.

CLOSURE ACTIVITIES

Description	7.1.3 Crushing and Beneficiation Plant	**Area (ha)**	3.42

Engineering Works

a) Demolish all superstructures. Demolish all concrete slabs and footings to 0.5 m depth.
b) Remove all pipelines and services and those brought to the surface during ripping.
c) Dispose of all waste/debris.

Environmental Works

a) Remove top 150 mm of soil including all bitumen, kerbing and aggregate from site and import fill material.
b) Spread available topsoil to over entire area. If topsoil is not available use caprock.
c) cover slopes and top with oxide material, then place caprock to slopes only, followed by topsoil to all surfaces.
d) Re-contour by grading over entire area to reinstate local existing drainage and establish additional drainage where required in the final stages of land profiling.
e) Contour rip (generally to compacted areas) to minimum of 0.5 m depth at maximum spacing of 3 m to maximise infiltration.
f) Prior to seeding, inspect area and remove all rubbish and debris.
g) Scarify/seed with local provenance species to blend with surrounding habitat units.

CLOSURE ACTIVITIES

Description	7.1.4 Acid Plant	**Area (ha)**	3.42

Engineering Works

a) Demolish all superstructures. Demolish all concrete slabs and footings to 0.5m depth.
b) Remove all pipelines and services and those brought to the surface during ripping.
c) Dispose of all waste/debris (TSF)

Environmental Works

a) Remove top 150 mm of soil including all bitumen, kerbing and aggregate from site and import fill material.
b) Spread available topsoil to over entire area. If topsoil is not available use caprock.
c) cover slopes and top with oxide material, then place caprock to slopes only, followed by topsoil to all surfaces.
d) Re-contour by grading over entire area to reinstate local existing drainage and establish additional drainage where required in the final stages of land profiling.

9.2.7 Plant and Infrastructure – Domain 7

e) Contour rip (generally to compacted areas) to ~0.5 m depth at maximum spacing of 3 m to maximise infiltration.
f) Prior to seeding, inspect area and remove all rubbish and debris.
g) Scarify/seed with local provenance species to blend with surrounding habitat units.

CLOSURE ACTIVITIES

Description	Maintenance and Workshop Facilities, Workshops, Store areas, Amenities Building, Ablution Facilities, Administration and Laboratory Building, Lube Bay Fuel Farm and Fuel Storage Tanks.	**Area (ha)**	6.75

Engineering Works

a) Decommission all fuel, oil and chemical storages and drain all associated pipework.
b) Remove above-ground pipework and services, and pipework and services located at less than 0.5 m below the surface, and dispose of at appropriate waste disposal site.
c) Leave pipes and services buried at greater than 1.0 m depth in place.
d) Drain waste / storage tanks and transfer waste to appropriate disposal facility or ensure that tank is fully sealed and ready for removal from site.
e) Remove waste / storage tanks and washdown for salvage.
f) Demolish and dispose of workshop buildings.
g) Remove and dispose of affixed hand railings around pits and sumps.
h) Demolish concrete slab and dispose of concrete at appropriate waste disposal site.
i) Demolish concrete bund in oil storage area and dispose of concrete at appropriate waste disposal site.
j) Remove concrete bunding around refuelling facility and dispose of at appropriate waste disposal site.
k) Remove any hydrocarbon-contaminated fill or soil material. Dispose of contaminated material at appropriate waste disposal site.
l) Remove concrete footings down to 0.5 m below natural ground level. Demolish and dispose of at appropriate waste disposal site. Concrete footings below 0.5 m depth can be left in place.
m) Prior to surface treatments, inspect affected areas and remove all rubbish and debris to appropriate waste disposal site.

Environmental Works

a) Bury any concrete footings/foundations remaining at greater than 0.5 m below ground.
b) Grade surface profile as required to blend with surrounding landscape and create free-draining, stable landform.
c) Spread topsoil over disturbed area.
d) Contour rip to a depth of approximately 300 mm at a maximum spacing of 3m.
e) Seed with local provenance species to blend with surrounding habitat.

CLOSURE ACTIVITIES

9.2.7 Plant and Infrastructure – Domain 7

Description	7.2 Accommodation Village	**Area (ha)**	29.8

Engineering Works

a) Decommission pipes and services.
b) Remove above-ground pipework services, and pipework and services located at less than 0.5m below the surface, and dispose of at appropriate waste disposal site.
c) Leave pipes and services buried at greater than 0.5m depth in place.
d) Transportable buildings are to be set aside for disposal by others.
e) Demolish concrete slab and dispose of concrete at appropriate waste disposal site.
f) Remove gravel pad layer down to natural ground level and dispose of at appropriate waste disposal site.
g) Remove concrete footings down to 0.5 m below natural ground level. Demolish and dispose of at appropriate waste disposal site. Concrete footings below 0.5 m depth can be left in place.
h) Prior to surface treatments, inspect affected areas and remove all rubbish and debris to appropriate waste disposal site.

Environmental Works

a) Bury any concrete footings/foundations remaining at greater than 0.5 m below ground level.
b) Grade surface profile as required to blend with surrounding landscape and create free-draining, stable landform.
c) Spread topsoil (~50mm) over disturbed area.
d) Contour rip to a depth of approximately 300 mm at a maximum spacing of 3 m.
e) Seed with local provenance species to blend with surrounding habitat.

CLOSURE ACTIVITIES

7.4 Onsite Roads and Tracks	**Length (km)**	38.5 [252 (ha)]

Engineering Works

a) Remove upper 200 mm saline material from road surface.

Environmental Works

a) Cart away windrow bunds and stockpile or spread over adjacent disturbed areas.
b) Remove built-up material to reinstate drainage and scrape off remaining surfaces that contain salt from haul road dust suppression, profile, rip and seed.
c) Dispose of materials appropriately.
d) Place fresh rock bund across pit access ramp.
e) Install abandonment bund and signage around pit perimeter.
f) Contour rip (generally to compacted areas) to ~0.5 m depth at maximum spacing of 3 m to maximise infiltration on haul roads and pit surrounds.
g) Prior to seeding, inspect area and remove all rubbish and debris.
h) Over the area spread available topsoil and scarify/seed with local provenance species to blend with surrounding habitat units.

CLOSURE ACTIVITIES

Description	Desalination Plant	**Area (ha)**	Inclusive of Domain 7.1, total 146.5 ha

Engineering Works

a) Decommission plant, pipes and services.
b) Remove above-ground pipework services, and pipework and services located at less than 0.5 m

9.2.7 Plant and Infrastructure – Domain 7

below the surface, and dispose of at appropriate waste disposal site.

c) Leave pipes and services buried at greater than 1.0 m depth in place.
d) Deconstruct and salvage plant building.
e) Remove and salvage plant.
f) Demolish concrete slab and dispose of concrete at appropriate waste disposal site.
g) Remove concrete footings down to 0.5 m below natural ground level. Concrete footings below 0.5 m depth can be left in place.
h) Prior to surface treatments, inspect affected areas and remove all rubbish and debris to appropriate waste disposal site.

Environmental Works

a) Bury any concrete footings/foundations remaining at greater than 0.5 m below ground.
b) Grade surface profile as required to blend with surrounding landscape and create free-draining, stable landform.
c) Spread topsoil over disturbed area.
d) Contour rip to a depth of approximately 300 mm at a maximum spacing of 3 m.
e) Seed with local provenance species to blend with surrounding habitat.

CLOSURE ACTIVITIES

Description	7.1.6 Steam Turbines and Diesel Generators	**Area (ha)**	2.4

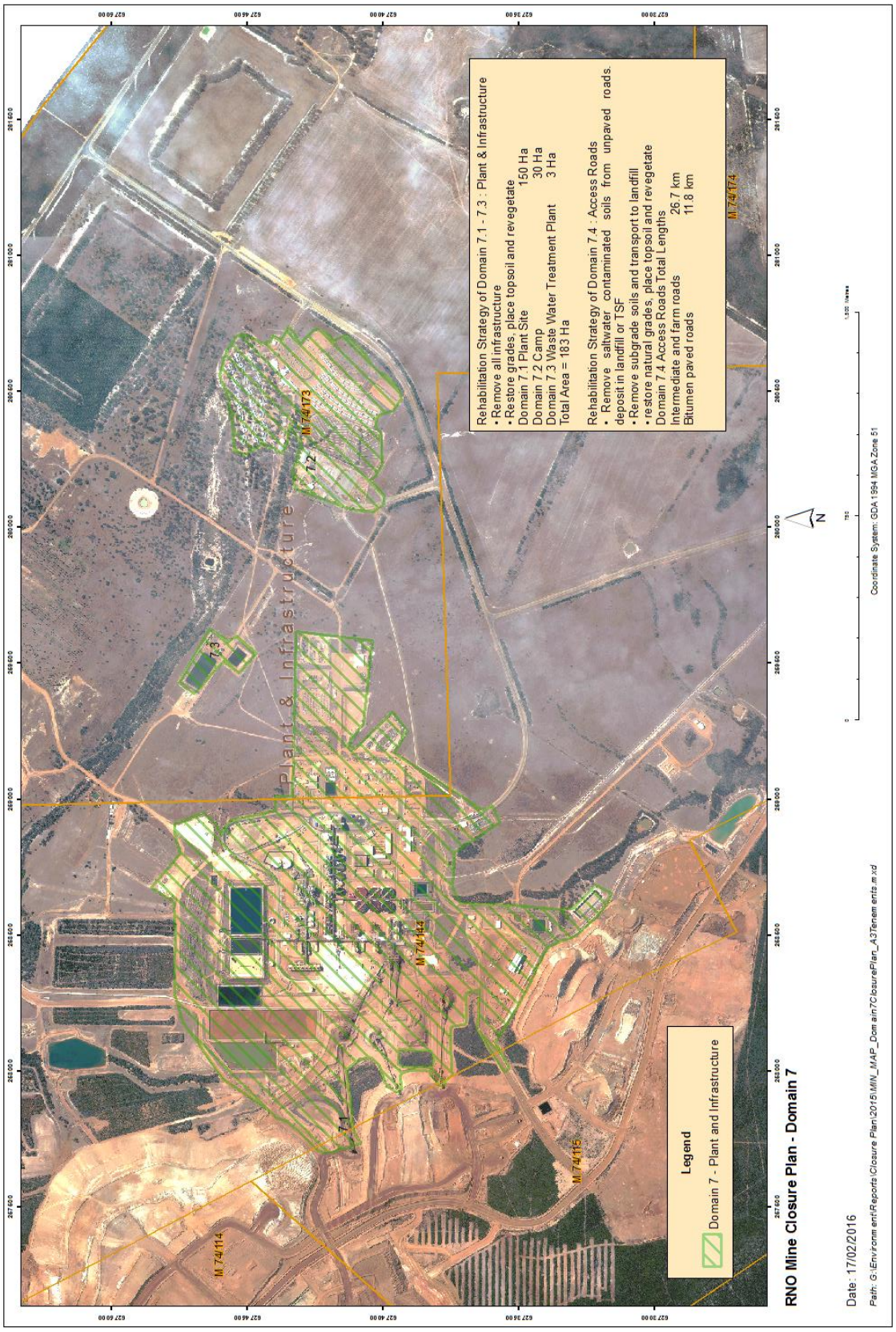
Engineering Works

a) Decommission plant, pipes and services.
b) Remove above-ground pipework services, and pipework and services located at less than 0.5 m below the surface, and dispose of at appropriate waste disposal site.
c) Leave pipes and services buried at greater than 0.5 m depth in place.
d) Remove and salvage plant.
e) Demolish concrete slabs and dispose of concrete at appropriate waste disposal site.
f) Remove concrete footings down to 0.5 m below natural ground level. Demolish and dispose of at appropriate waste disposal site. Concrete footings below 0.5 m depth can be left in place.
g) Prior to surface treatments, inspect affected areas and remove all rubbish and debris to appropriate waste disposal site.
h) Remove concrete footings down to 0.5 m below natural ground level. Concrete footings below this level can be left in place.

Environmental Works

a) Bury any concrete footings/foundations remaining at greater than 0.5 m below ground.
b) Grade surface profile as required to blend with surrounding landscape and create free-draining, stable landform.
c) Spread topsoil over disturbed area.
d) Contour rip to a depth of approximately 300 mm at a maximum spacing of 3 m.
e) Seed with local provenance species to blend with surrounding habitat.

Figure 17 RNO Mine Closure Plan – Domain 7



9.2.8 Seawater Pipeline and Infrastructure – Domain 8

Requirements

- Department of Environmental Protection, Works Approval No. 3911.
- Notice of Intent for the Construction of a Nickel Processing Plant and Project Infrastructure for the Ravensthorpe Nickel Project (NOI 4394), February 2004.
- Notice of Intent for the Construction of Seawater Supply Infrastructure Part B: Seawater Pipeline and Power Line (NOI 5140), September 2005.

Earthworks – drainage, rip, contour and rehabilitate	N/A
Area to scarify and seed	Subject to inspection (not all areas)
Oxide rock capping slopes and top surface (1000 mm depth)	N/A
Caprock coverage (500 mm depth)	N/A
Topsoil coverage (150 mm depth)	Subject to inspection (not all areas)
Infrastructure to be retained	Pipes below 1 metre – Yes Observation ports – No – backfilled and removed

CLOSURE ACTIVITIES

Description	Pipeline, Pumping Infrastructure and Holding Pond	**Area (ha)** **Length (km)**	25.33 ha 40.2km of pipe

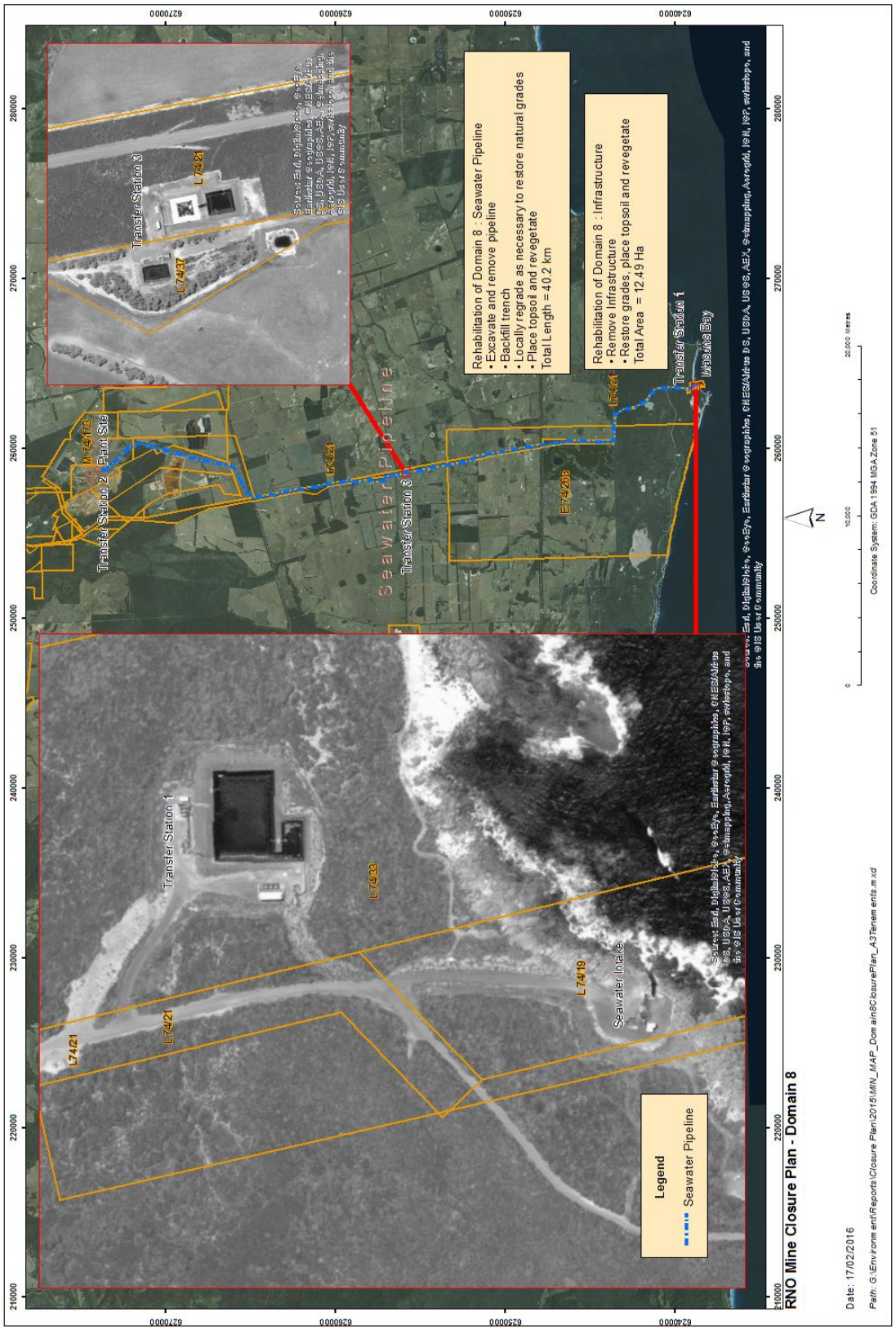
Engineering Works

a) Pump out water or allow water to evaporate.
b) Remove liner from holding ponds and dispose of onsite.
c) Decommission tanks and pipelines.
d) Drain any tanks, demolish and remove debris.
e) Break up the pipeline and dispose of at appropriate waste disposal site.
f) Leave any services buried at greater than 1.0 m depth in place.
g) Prior to surface treatments, inspect area and remove all rubbish and debris to an appropriate waste disposal site.

Environmental Works

a) Backfill and re-contour dams using the embankment materials used in their construction. Grade to reinstate original local drainage or create new free-draining, stable landform, using additional crushed rock fill as required.
b) Spread topsoil over surfaces of in-filled dams and surrounding cleared areas.
c) Contour rip and seed with local provenance species to blend with surrounding habitat.

Figure 18 RNO Mine Closure Plan – Domain 8



9.2.9 Tamarine Limestone Quarry – Domain 9

Requirements

- Department of Environmental Protection, Works Approval No. 3911.
- Notice of Intent for the Construction of a Nickel Processing Plant and Project Infrastructure for the Ravensthorpe Nickel Project (NOI 4394), February 2004.
- Mining Proposal Tamarine Limestone Quarry (NOI5642), Ravensthorpe Nickel Operation, January 2007.

Earthworks – drainage, rip, contour and rehabilitate	Yes
Area to rip and seed	Yes
Oxide rock capping slopes and top surface	No
Caprock coverage	No
Topsoil coverage (100 mm depth)	Yes

CLOSURE ACTIVITIES			
Description	Tamarine Limestone Quarry	**Area (ha)**	28.77

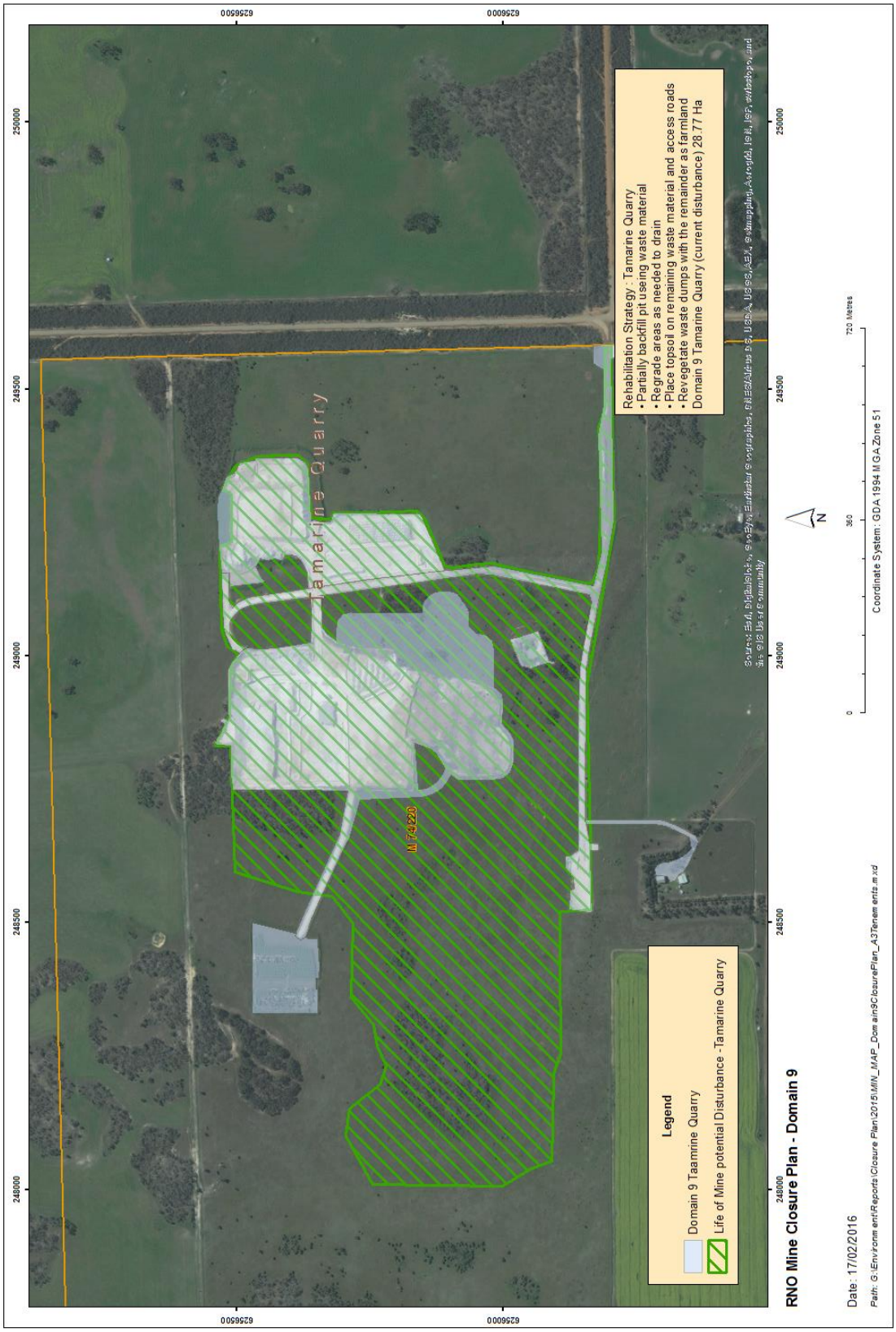
Engineering Works

a) Alternative productive uses to be investigated
b) Dispose of all waste/debris.

Environmental Works

a) Spread available topsoil to over entire area. If topsoil is not available use caprock.
b) Re-contour by grading over entire area to reinstate drainage suitable for farm dam and establish additional drainage where required in the final stages of land profiling.
c) Contour rip (generally to compacted areas) to minimum of 0.5 m depth at maximum spacing of 3 m to maximise infiltration.
d) Prior to seeding, inspect area and remove all rubbish and debris.
e) Return the area to a condition that is suitable for farmland – pasture.
f) Batter upper pit walls for safe access and to create shallow areas.

Figure 19 RNO Mine Closure Plan – Domain 9



9.2.10 Conservation Areas – Domain 10

Requirements

Ministerial Statement 633

– Schedule 2, No.1 - Purchase approximately 660 ha of uncleared land (part of Location 1399) and preserve for conservation purposes

– Schedule 2, No.15 - Conserve in situ populations of Kunzea similis on Hale-Bopp deposit (currently estimated at 40% of known population), with a buffer zone of no less than 50 metres.

Conservation Covenant 776 – Section 46 Change	**Area (m^2)**
Community Conservation Areas (CCA): • *Kunzea similis* subsp. *mediterranea* CCA; • *Eucalyptus purpurata* CCA; • Halleys West Heath on Komatiite CCA; • Halleys North Heath on Komatiite CCA; and • *Hibbertia abyssa* CCA.	 747,489 m^2 752,928 m^2 340,098 m^2 139,893 m^2 394,359 m^2

Topic	Conservation offsets
Action	• Purchase approximately 660 ha of uncleared land (part of Location 1399) and preserve for conservation purposes. • In addition to the in situ conservation of *Kunzea similis* subsp. mediterranea (Schedule 2, No. 15) conserve flora and vegetation residing within RNO Community Conservation Areas (CCA).
Objective	Offset clearing associated with project development within the Bandalup Corridor
Compliance Criteria	Undisturbed native vegetation
Timing	To be completed prior to the completion of closure activities
Advice	DCLM (DEC)

CLOSURE ACTIVITIES

Description	Conservation Offsets (undisturbed vegetation)	**Area (ha)**	1109.5

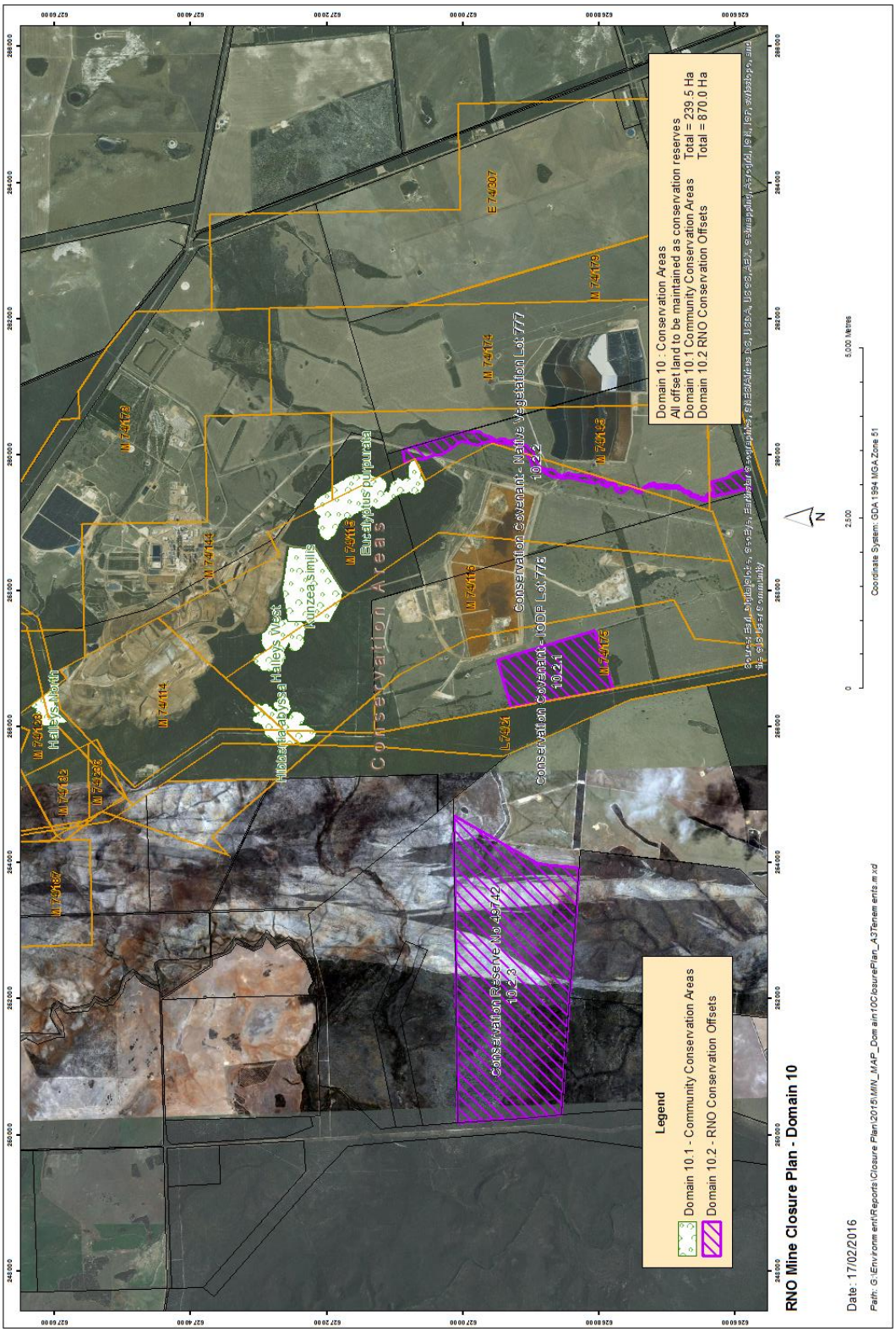
Engineering Works

a) None

Environmental Works

a) None

Figure 20 RNO Mine Closure Plan – Domain 10



9.2.11 Sands Rejects Storage Facility – Domain 11

Requirements

- Department of Environmental Protection, Works Approval No. 4873/2011/1
-

Earthworks – drainage, rip, contour and rehabilitate	Yes
Area to rip and seed	Yes
Oxide rock capping slopes and top surface	No
Caprock coverage	No
Topsoil coverage (100 mm depth)	Yes

CLOSURE ACTIVITIES

Description	Sands Rejects Storage Facility	**Area (ha)**	99.43

Engineering Works

h) Pump out water or allow water to evaporate.
i) Remove liner from holding ponds and dispose of onsite.
j) Decommission tanks and pipelines.
k) Drain any tanks, demolish and remove debris.
l) Break up the pipeline and dispose of at appropriate waste disposal site.
m) Leave any services buried at greater than 1.0 m depth in place.
n) Prior to surface treatments, inspect area and remove all rubbish and debris to an appropriate waste disposal site.

Environmental Works

d) Backfill and re-contour dams using the embankment materials used in their construction. Grade to reinstate original local drainage or create new free-draining, stable landform, using additional crushed rock fill as required.
e) Spread topsoil over surfaces of in-filled dams and surrounding cleared areas.

Contour rip and seed with local provenance species to blend with surrounding habitat.

Figure 21 Sands Rejects Storage Facility – Domain 11

9.2.12 Other Areas: Production Bores and Gravel Pits – Domain 12

Requirements

CLOSURE ACTIVITIES			
Description	Bores – RWB01, RWB02, RWB03, RWB04, RWB05, RWB06, RWB07, RWB08 and RWC34.	**Area (ha)**	N/A

Demolition Works

a) Remove bore headworks and fencing.
b) Remove all bores and rehabilitate.

Civil Works

a) Grout and cap bores.
b) Remove any aggregate on the access road (to depth of approx. 150 mm).
c) Fill-in trench, rip pipeline easement and access road.
d) Re-contour by grading over entire area to reinstate local existing drainage and establish additional drainage where required in the final stages of land profiling.
e) Spread available topsoil then rip and seed with species that depict the surrounding habitat.

CLOSURE ACTIVITIES			
Description	Gravel Pits	**Area (ha)**	54.57

Engineering Works

a) Dispose of all waste/debris.

Environmental Works

a) Spread available topsoil over entire area. If topsoil is not available use caprock.
b) Re-contour by grading over entire area to reinstate drainage suitable for wetland environment and establish additional drainage where required in the final stages of land profiling.
c) Contour rip (generally to compacted areas) to minimum of 0.5 m depth at maximum spacing of 3 m to maximise infiltration.
d) Prior to seeding, inspect area and remove all rubbish and debris.
e) Scarify/seed with local provenance species to blend with surrounding habitat units.

9.3 Research and Rehabilitation Trial Activities

Since the commencement of the RNO mine there have been a small limited number of rehabilitation trials due to the early stages of mine development. These activities are summarised below.

9.3.1 Research, investigation and trials

Gravel Borrow Pit – Rehabilitation Research Trial

In conjunction with RNO and the DEC, the University of Western Australia have carried out a rehabilitation research trial on part of an exhausted gravel borrow pit approximately 6 ha in area.

Activities completed during 2006 included species establishment, preliminary monitoring and weed control spraying.

Translocation Trial – Stachystemon vinosus

A total of 288 *Stachystemon vinosus* species have been collected from a population adjacent to a waste dump clearing envelope east of the Halley's Pit in April 2006 as part of a translocation program (Landcare Services, 2006) involving whole plant transplanting, topsoil stripping and direct return placement. From this program;

- 182 individuals were transplanted into the *Eucalyptus stoatei* Nature Reserve (Reserve number 43060, an 'Other Than A Class Reserve' vested with the Conservation Commission of Western Australia).
- 106 individuals were taken for ex-situ cultivation in Perth.
- 59 individual species have been collected to provide cuttings for propagation trials at the Botanic Parks and Gardens Authority Science Research Laboratories at King's Park in Perth.
- Translocation of approximately 3.6 ha of topsoil from an area containing a population of *S. vinosus* to an equivalent size area of former gravel pit adjacent to the Gravel Borrow Pit – Rehabilitation Trial.

Trial Mining Area - Rehabilitation Plots

Monitoring of the mining rehabilitation trial (Western Botanical, 2005a) was undertaken between 2003 and 2005. As this monitoring trial area is now part of the operational pit no further monitoring was conducted beyond 2006 when the area was cleared again.

Closure Workshop

In July 2012 an environment workshop was held at the mine inviting professionals and researchers with historic working knowledge of RNO to attend. The purpose of the workshop was to inform attendees of the current activities of RNO under the ownership of FQMAN. A site inspection was conducted and discussions were held to investigate opportunities for future research and environment management at RNO. The outcome from this workshop is summarised in Appendix Six: Identified Research and Environment Management Actions.

9.4 Progressive Rehabilitation Activities

Progressive rehabilitation activities at RNO have been set out in Sections 9.4.1 to 9.4.2 and are considered relevant for consideration in closure planning, as they provide an indication of RNO's ability to meet rehabilitation commitments.

9.4.1 Seed Collection

Seed collection activities have been undertaken for the Halley's Pit and Waste Dump area since the commencement of initial clearing activities.

In 2014 seed collection activities were undertaken by Greening Australia, in the Hale Bopp Pit Area. More seed collection is planned from this area in 2016.

Current stocks of native seed are approximately 550kg which is stored on site in a temperature controlled room.

9.4.2 Mason Bay Road Pipeline and Power line Route

Construction of the seawater pipeline and power line from Mason Point to the Project site involved the clearing of a 21.4 km long corridor through road reserve vegetation which varied in width from 4m to 15 m. Prior to the commencement of construction RNO commissioned seed collection along the route from October 2005 to January 2006. The pipeline corridor route has been rehabilitated with native seed.

9.4.3 Progressive Rehabilitation during the period

Areas considered for rehabilitation during the current Closure Plan period are identified in section 10.2.4 (Rehabilitation Offsets). There are three (3) stages of work identified – Domain 4.1 – Stage 1 (104.9 ha), Domain 4.2 – Stage 2 (327 ha), and Domain 4.3 – Stage 3 (180.6 ha) – to be rehabilitated. The emphasis will be to utilise native seed (RNO seed inventory) to help create a native vegetation corridor that will promote future native fauna habitat. While all 3 stages have been identified it is uncertain at this time the extent of completing the 612 ha of area set out in this plan.

Progressive Waste Rock Landform rehabilitation has occurred along the western edge of the waste dump and are outlined in Figure 22 below. Figures 23 to 26 provide point of view photographs of the rehabilitation from the photo points indicated in Figure 22.

9.4.4 2013 Rehabilitation Trial

This area comprises 6 ha split into various treatments. The establishment of the trial was conducted by Piacentini and Son. Rehabilitation and trial establishment was conducted in April and May 2013. The trial objectives included:

- Establish vegetation similar to MHD habitat area;
- Investigate the efficacy of 3 different rates of seed mix application (0 kg/ha; 3 kg/ha; 6

kg/ha);

- Investigate the efficacy of 3 different rates of tree mulch (brushwood or tritter) application (10%; 20%; 40% cover); and
- Investigate the efficacy of 2 different rates of fertiliser (Horticulture Special) application (0 kg/ha; 100 kg/ha).

Topsoil and mulch collected from the MHD habitat area was chosen as this habitat area commonly occupies the slopes of the Bandalup Hill and surrounds and therefore is expected to survive on the slopes of the Waste Dump landform.

Figure 22: 2013 Rehabilitation Trial (MHD habitat area)

Landform

A conceptual waste dump landform design was prepared by FQM and the rehabilitated portion of the landform was constructed in accordance with this design to ensure that the area performs consistently with the long term concept with regard to stability and hydrological characteristics. At the commencement of the construction of the trial, the Halleys Waste Dump consisted of two lifts of rejects material sitting at angle of repose. The two lifts were battered into one linear slope at an average of 12 degrees with an overall average slope length of 100 m. The rejects material has a typical particle size analysis of 40% gravel, 30% sand and 30% silt with pH 6-8 and high salinity

(1:2 paste EC 7600 uS/cm). Subsoil waste rock material then spread on the slope to a depth of 3m to provide a suitable soil profile substrate between the topsoil and rejects to assist support vegetation establishment and survival.

Topsoil and Mulch

Topsoil sourced from stockpiles of material was spread utilising a truck and dozer operation over the subsoil waste rock material at 150 mm depth. The topsoil had been stockpiled since 2007 in low mounds less than 2 m in height to protect biological activity and seed viability within the resource. Following topsoil spreading, mulch material stored around the edges of the topsoil stockpiles was spread across the surface to add carbon, minimise surface erosion and create micro-habitats for seed capture and establishment.

Ripping, Fertiliser and Seeding

Ripping and application of both seed and fertiliser was conducted concurrently using a single piece of machinery called a Nurally Seeder attached to the back of a D9N multi-shank dozer. Ripping was conducted on contour at approximately 500 mm 1m spacing and 1 m depth using winged tynes. A 32-species seed mix for the MHD habitat area was used by Piacentini on advice from RNO environmental staff from their seed store which is stocked from seeds collected prior to clearing on the mine site from 2006 until present.

Additional Habitat Enhancement

Following ripping and seeding large rocks were added to the finished landform to increase surface stability and provide micro-habitats and also as piles of rocks with potential fauna habitat values. The piles of rock were placed randomly through the rehabilitation, but tended to be located close to the edges of the current rehabilitation

Figure 23: Rock pile for fauna habitat, base of 2013 rehabilitation landform

9.4.5 2014 Rehabilitation Trial

This area comprises 9 ha and was designed specifically to attempt to recreate initiate rehabilitation of the SST habitat area that supports the Threatened taxon Kunzea similis subsp. mediterranea. This area is located just to the south-east of the 2013 trial area as shown on Figure 23.

The rehabilitation construction followed the methods laid out previously for the 2013 rehabilitation trial, and only differed in the use of direct returned topsoil sourced from an area cleared for mining The SST vegetation association typically inhabits the upper-slopes and crests of hills in the Ravensthorpe range and surrounds and as such is not typically found on the bases of slopes, however the trial was established to determine the potential to create this community in rehabilitation, and should it prove successful this community type will be targeted to more typical landform locations in future once they become available.

Following completion of the rehabilitation trial in 2014 additional small trial areas were established within it to investigate field survival rates of nursery propagated Threatened taxa Kunzea similis subsp. mediterranea and Eucalyptus purpurata. 3386 and 648 seedlings of Kunzea similis subsp. mediterranea and Eucalyptus purpurata respectively were planted in this 2014 rehabilitation area within discrete blocks.

Figure 24: 2014 rehabilitation area

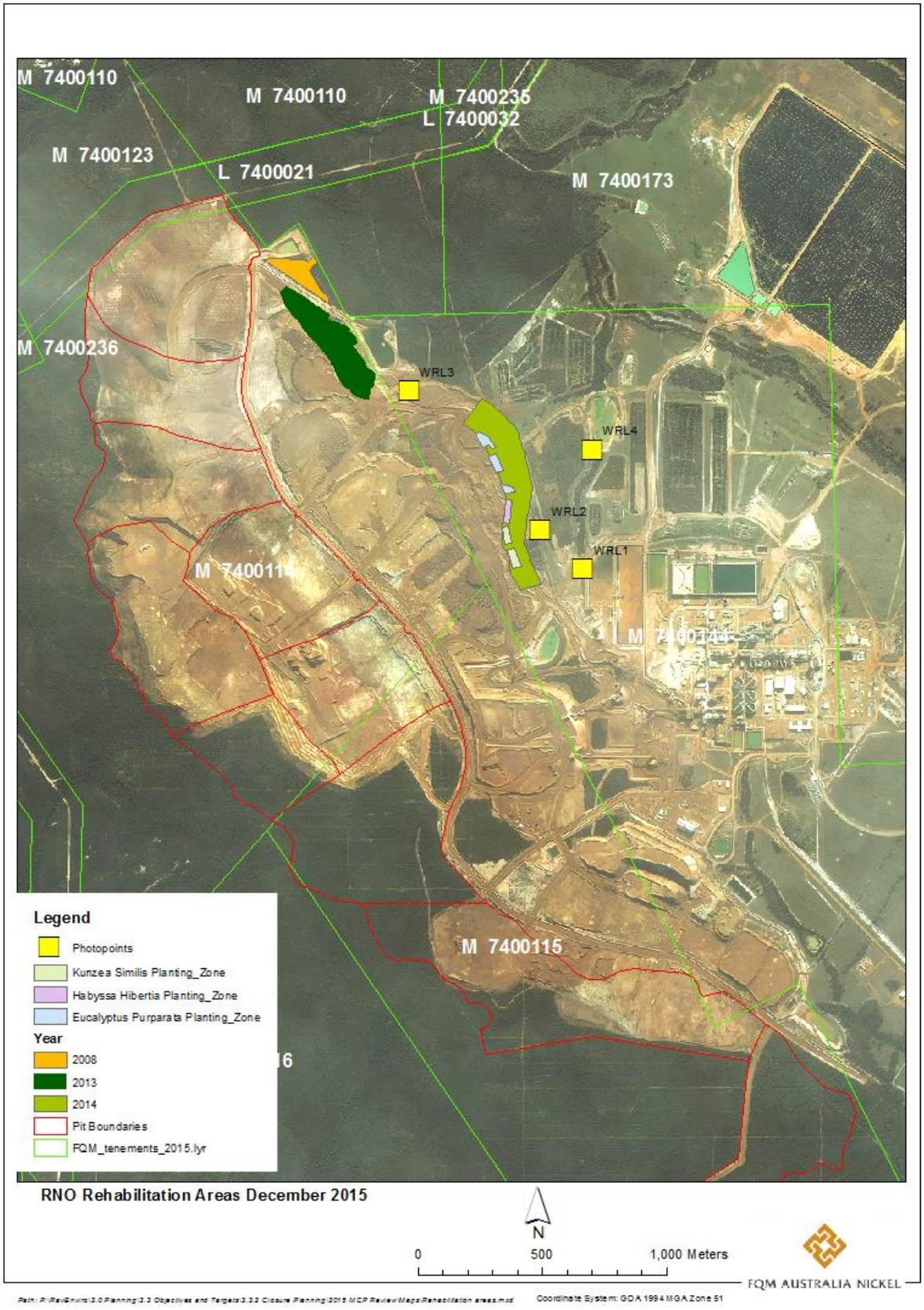


Figure 25 Rehabilitation Activities

Figure 26 Photo point WRL 1

Figure 27 Photo point WRL 2

Figure 28 Photo point WRL 3

Figure 29 Photo point WRL 4

9.5 Premature Closure – permanent closure or suspended operations under care and maintenance

There are various corporate strategies to consider prior to mine closure. Placing the mine in a care and maintenance operation would be a strategy for a period of time before any permanent closure and disposal of assets. A Care and Maintenance Plan would be submitted within 3 months of the event of premature closure.

The consideration of alternate closure scenarios within closure planning activities is a specific requirement of the Strategic Framework for Mine Closure (ANZMEC/MCA, 2000).

At the time of this mine closure plan the work program activities would be reviewed as part of a pre-closure phase prior to any premature permanent closure of the mine.

9.5.1 Halley's Pit and Waste Dumps

Currently only the Halley's Pit is being mined. Both Hale Bopp and Shoemaker levy have not been stripped of vegetation apart from a small section of the Hale Bopp Pit. Therefore in terms of premature closure the two key components are the Halley's Pit and Waste dumps, and the TSF and Evaporation Ponds.

Figure 8 illustrates a conceptual landform(s) that may exist if the mine were to close earlier than planned. This scenario would result in partial backfilling of the Halley's Pit.

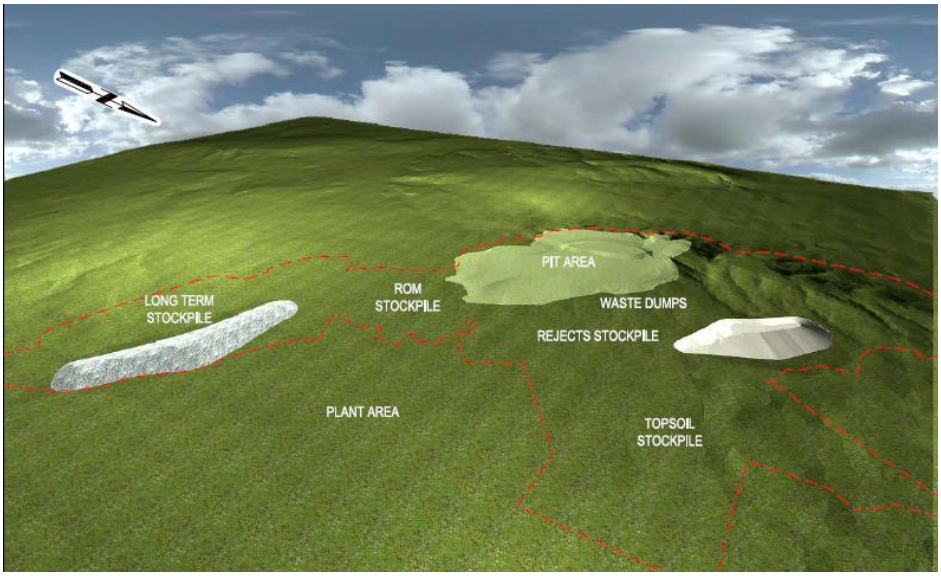


Figure 8 Partial Backfilling of Halley's Pit

9.5.2 Tailings Storage Facilities and Evaporation Ponds

In the event that it is necessary to decommission the TSFs prior to achieving its full capacity, a pre-decommissioning review of the TSFs will be conducted and a specific closure plan would be developed in consideration of the stage of development of the TSFs. Due to the inherent complexities associated with the removal of hypersaline water accumulated in the EPs,as well as the anticipated slow rate of consolidation of the nickel laterite tailings, several conceptual alternatives for closure of the TSFs and EPs have been assessed. The following three options were considered for closure of these areas:

Option A – Development of the final landform containing tailings and salts in the TSF Area

This option included the following components:

- Concentrate salts in the evaporation ponds followed by disposal in the TSFs
- Remove Evaporation Ponds and use a portion of the high density polyethylene geomembrane liner as part of the TSF cover system
- Re-locate saline contaminated soils underlying the ponds in the TSFs
- Mound the tailings, contaminated soils underlying the ponds in the TSFs

Option B – Development of the final landform containing tailings and salts in the Pit area

- Concentrate salts in the Evaporation Ponds followed by disposal in the TSFs (similar to Option A)
- Reconstitute tailings to a slurry using solution obtained from the Evaporation Ponds and disposal tailings slurry in the pit
- Remove evaporation ponds and dispose the HDPE geomembrane liners and the sakine contaminates soils underlying the ponds to Halley's Pit (mine area)
- Place waste dump and stockpile the maters in the pit above the tailings to develop a closure landform that mimics pre-mining topography.

Option C – Development of the final landform containing tailings and salts in the EPs Area.

- Re-slurry tailings into a portion of the geomembrane linded evaporation ponds
- Encapsulate and cover the tailings using geomembrane liner from the decommissioned evaporations ponds
- Construct a closure cover over the tailings

9.6 Schedule of Decommissioning Activities

Detailed closure planning should commence no later than five years prior to the expected time of closure. The critical path for closure is shown in Figure 30 RNO Closure Timeline The closure execution phase shall begin with the shutdown of the proposed Shoemaker open cut pit. The post-closure management, maintenance and monitoring phase (refer to Section 10) will continue for five years after all closure activities have been completed. The critical path shows the order in which key closure activities should occur due to their dependencies on each other.

9.7 Schedule of Closure Performance Monitoring and Maintenance Activities

There is information that is required within the Closure Work Program tables (refer to Section 9.2) that will need to be populated with greater detail in the lead up to closure and will need to be updated accordingly prior to the next iteration of this closure plan.

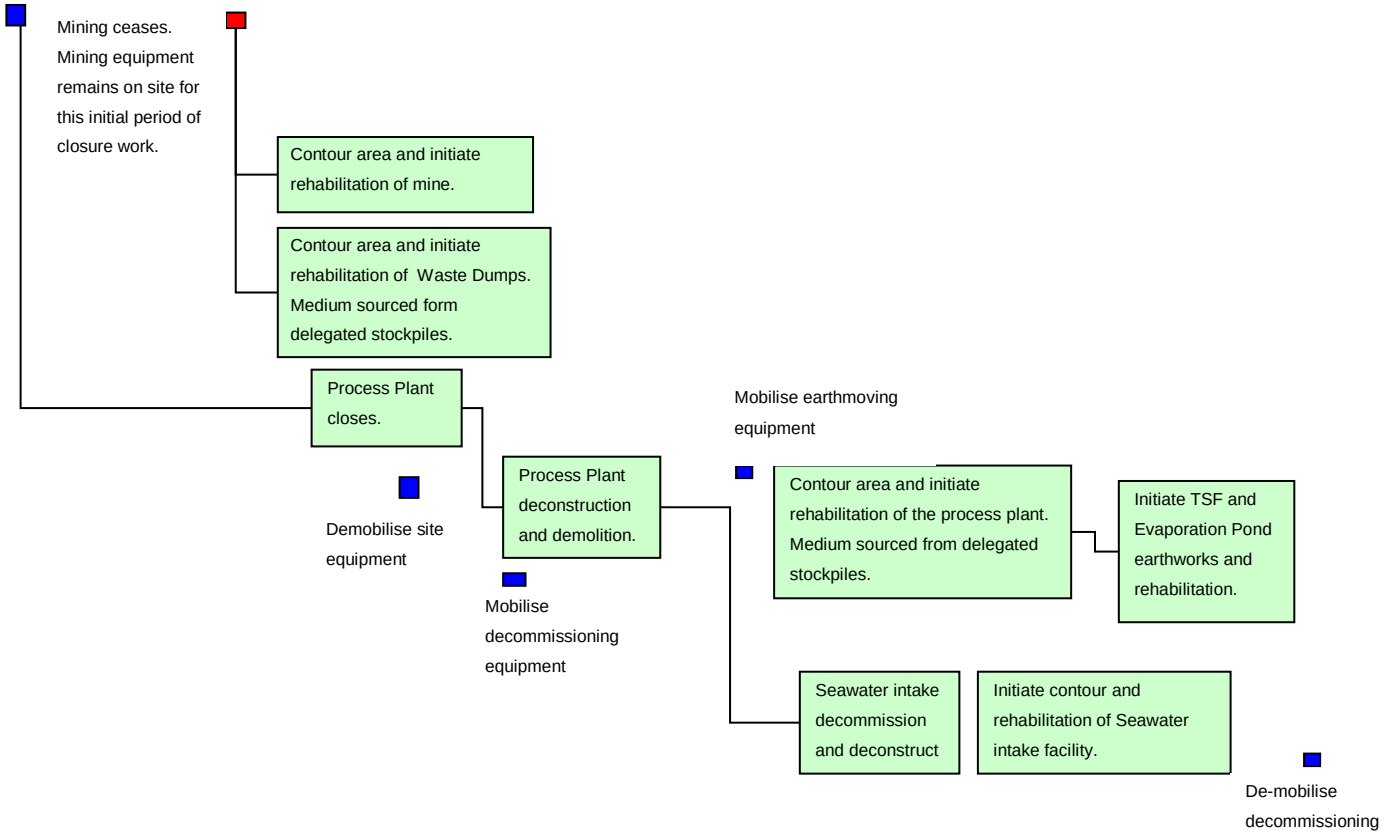


Figure 30 RNO Closure Timeline

10. Closure Monitoring and Maintenance

This section of the Closure Plan describes conceptual monitoring and maintenance activities that will be undertaken post closure.

The post-closure phase commences upon completion of the decommissioning and closure phase. During post-closure, monitoring will be conducted to assess whether the closure objectives and criteria are being met, while maintenance will be undertaken to address those areas where closure objectives and criteria are not being successfully met. At this stage, the identified monitoring and maintenance activities are conceptual and will need to be refined as the Closure Plan develops in the future. The conceptual monitoring and maintenance activities for RNO are presented below.

Upon completion of closure activities, maintenance and monitoring will be conducted at various intervals over a period of five years.

Post closure monitoring plans would be confirmed with relevant government authorities (e.g. DER, DMP) through the stakeholder engagement process (refer to Section 5.28.3).

10.1 Monitoring

Upon the completion of operations, the DER will substitute the Operating Licence for a closure notice, which will apply for the duration of post closure monitoring.

Future iterations of this closure plan will need to specify monitoring requirements for each closure area. At the current stage of closure planning, the closure financial provisions have only provided an estimated cost for the types of monitoring to be carried out across the site (determined as a percent (6%) of the total decommissioning and closure phase). The types of monitoring at post closure include:

- Rehabilitation / vegetation monitoring;
- Fauna monitoring;
- Surface water monitoring and drainage;
- Groundwater monitoring and analysis;
- Geotechnical Monitoring;
- Soil Testing;
- TSF Monitoring;

- Post Closure Monitoring for remediation; and
- Weed/feral animal control & inspect.

Other types of monitoring that may need to be considered for post closure include:

- Dust Monitoring and Analyses; and
- Die-back Monitoring and Testing.

Monitoring methods will be in accordance with recognised standards and/or methodologies and in compliance with regulatory requirements.

10.2 Maintenance

Maintenance will encompass post closure monitoring to identify areas requiring maintenance, and identify and address deviations from the expected outcomes upon closure. The monitoring will be conducted annually during the first five years after closure.

Maintenance activities would include the maintenance of new vegetation (e.g. addition of fertiliser, re-planting of significant areas of failed vegetation) prior to its establishment within the ecosystem; upkeep of water management structures; regular checking, replacement and probable repairs, where necessary, to newly fenced areas and signage in the event they become compromised after closure.

10.3 Future recommended actions

Recommendations for improving closure management systems are as follows:

LTR 1 As the site moves toward closure, more detailed monitoring plans should be developed including monitoring locations and methods including frequency of sampling, and the analyses to be conducted to demonstrate that the site meets closure criteria. Post-closure monitoring requirements should be agreed with local stakeholders and regulators.

LTR 2 A schedule should be developed for reviewing post-closure monitoring data to assess rehabilitation success against closure criteria and determine if remedial actions are to be taken.

11. Financial Provision for Closure

11.1 Closure Plan Review process

The Closure Plan will be reviewed in accordance with the process shown in Figure 10. In general, the Closure Plan will be reviewed annually, or whenever there is a significant change to the operation's future. The Closure Plan will be fully reassessed and updated every three years to take account of new information, technology and changes to operations. Audits of the Closure Plan and the closure planning process will be undertaken, as required.

The closure concepts presented in this plan will evolve over time to reflect the most up to date circumstances. More detailed closure plans will be developed closer to the date of closure.

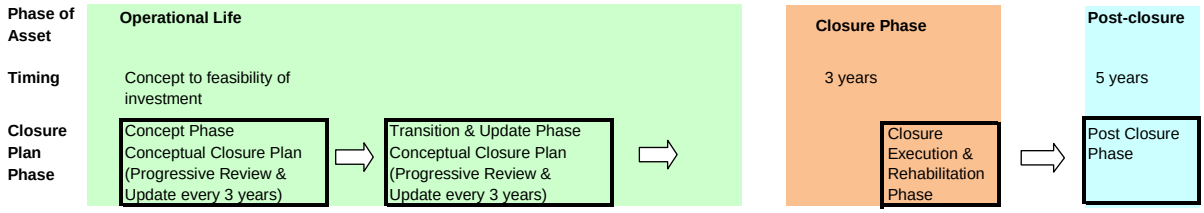


Figure 31 Lifecycle of Closure Planning and Execution Process

11.2 Domain Costings

There are 12 domains identified for the disturbance areas of RNO. The specific works for each domain are identified in detail in Section 9.2. Appendix Five: Assumptions and Qualifications discusses specific assumptions and qualifications for the costs set out in the listed domains. Table 9 sets out the indicative closure cost estimate for each domain. Additional mine closure costs are required for:

- Maintenance and monitoring programs including the post closure phase;
- Closure project management costs (administration, legal requirements, and specialist and consultant fees);
- Provision for unexpected closure or temporary closure (care and maintenance);
- Provision for installing additional infrastructure if required for the agreed land uses; and
- Provision for potential delays, extreme events or other external factors relevant to closure.

Table 9: Domain Costings

12. Management of Information and Data

12.1 Management Strategies for Retention of Mine Records

FQMAN mine records for the mine closure plan are stored in an electronic database and some earlier records are stored in a hard copy filing system. He electronic versions of records are stored in a system that is structured for the operational Environmental Management System. This system is backed up regularly. There are no current plans to archive information relating to closure.

Disclaimer

The final version of this document supersedes previous versions, arrangements, correspondence and communications (whether oral or in writing) between FQMAN and the Government of Western Australia Department of Mines and Petroleum. Unless FQMAN expressly reconfirms the validity of the contents of this document, the contents are to the best of our knowledge and based on our current assumptions correct as at the date hereof. FQMAN is not in a position to, and does not, verify the accuracy of, or adopt as its own, the information and data supplied by others.

This disclaimer must accompany every copy of this document, which is an integral document and must be read in its entirety.

References

ANZMEC (2000) *Strategic Framework for Mine Closure*. Australian and New Zealand Minerals and Energy Council.

Atkinson, S. (2009) Summary of Seed Collection Works at Ravensthorpe Nickel Operations 2001 to 2009. Consultants report for Ravensthorpe Nickel Operations Pty Ltd. Ref: LCS 590;

Biota Environmental Sciences (2000). Ravensthorpe Nickel Project Fauna Survey. Unpublished Report, RNO document 7-1009.

Biota Environmental Sciences (2001). Review of the RNO Fauna Monitoring Program. Unpublished Report, RNO document 7-1139.

Coakes Consulting Pty Ltd (July 2006). Developing an Effective Community Relations Strategy.

Cockerton, G. (2006). A Review of the Flora, Vegetation and Habitats of the Halleys Orebody and Associated Areas for the Halleys Notice of Intent, January 2006. Consultants report for Ravensthorpe Nickel Operations Pty Ltd. Ref: WB 328;

Cockerton, G. (2006a). An initial assessment of vegetation strategies and likely recalcitrant species of the flora of the RNO orebodies and associated distribution area. Consultants report for Ravensthorpe Nickel Operations Pty Ltd. Ref: WB 332;

Cockerton, G. and Evelegh, N. (2005). Habitats, Vegetation and Flora of the RNP Tenements. Consultants report for Ravensthorpe Nickel Operations Pty Ltd. Ref: LCS 181 Revision D1;

Cockerton, G. Evelegh, N., Mappin, K., Ang, L. and Atkinson, J. (2005). Flora and Vegetation Assessments Mason Bay Road Pipeline Alignment Ravensthorpe Nickel Operations, 2004 – 2005. Consultants report for Ravensthorpe Nickel Operations Pty Ltd. Ref: WB 257

Cockerton, G., Evelegh, N., Mappin, K., Ang, L. and Atkinson, J. (2005) Vegetation mapping and Significant Flora of the Mason Point to Bandalup Hill Seawater Pipeline Alignment, Consultants report, Reference WB 257.

Craig, G. F. and Chapman, A. (1998). Vegetation, Flora and Fauna Survey. Consultants report for Ravensthorpe Nickel Project Joint Venture.

Department of Environment and Conservation (2010) Priority Ecological Communities for Western Australia Version 15. Species and Communities Branch, Department of Environment and Conservation.

Department of Environment and Regulation (2013). EP Act Part V Operating Licence L8008/2004/4 for RNO, issued 1 May 2013.

Department of Mines and Petroleum (May 2015). Guidelines for Preparing Mine Closure Plans.

DITR (2006) Mine Closure and Completion, Leading Practice Sustainable Development for the Mining Industry. Commonwealth Department of Industry, Tourism and Resources.

Donaldson, H. et. al. (2000) *Ravensthorpe Shire Cultural Plan.* Shire of Ravensthorpe.

Florabase, Department of Environment and Conservation, available at http://florabase.dec.wa.gov.au/ [accessed December 2015]

Glevan Consulting (2010) *Pytophthora* Dieback occurrence assessment – Report prepared for FQM Australia Nickel – Ravensthorpe Nickel Operations

Haberkorn, G, Charalambou, C, Kelson, S, & Webb, T. (2003). Wellbeing indicators and service access: A report prepared for the Department of Transport and Regional Services (DoTaRS), Canberra: Bureau of Rural Sciences

Landcare Services (2006) Report on the translocation program for *Stachystemon vinosus* (Euphorbiaceae) DRF, population No 6c

Minister for the Environment (5th September 2003). Statement to amend conditions applying to a proposal: Ravensthorpe Nickel Project, Bandalup Hill Shire of Ravensthorpe. Statement No 000633.

RNO (2007) Ravensthorpe Nickel Operations Mining Proposal Tamarine Limestone Quarry, Ravensthorpe Nickel Operation, January 2007.

RNO (2006) Ravensthorpe Nickel Operations Notice of Intent, Halley's Open Cut Pit Ravensthorpe Nickel Project (NOI 5232), February, 2006.

RNO (2005) Ravensthorpe Nickel Operations Notice of Intent for the Construction of Seawater Supply Infrastructure Part B: Seawater Pipeline and Power Line (NOI 5140), September 2005.

RNO (2005) Ravensthorpe Nickel Project Supplementary Notice of Intent for the Construction of Tailings and Evaporation Ponds (NOI 5136) September 2005.

RNO (2004) Ravensthorpe Nickel Operations - Notice of Intent for the Construction of a Nickel Processing Plant and Project Infrastructure.

SMEC (2002) Ravensthorpe/Esperance & Jerramungup Blueprint for the Future SMEC Australia Pty Ltd. Perth

Western Australian Planning Commission, 2000 Goldfields – Esperance Regional Planning Strategy. WAPC

Western Botanical (2005) Flora and Vegetation Assessments, Mason Bay Road Pipeline Alignment November 2004 – September 2005

Western Botanical (2005a) Annual Monitoring of Rehabilitation Trial, Halleys Trial Pit, Laydown and Stockpile Areas - 23 Month Monitoring

Appendix One: Tenement Disturbance Table

TENID	Area (ha)	MRF_Category	Mine Activity Reference	Rehab Liability category	Closure_Domain (internal)
L 74/19	0.24	Plant site	Seawater Intake Facility	B	Domain 8 – Seawater Pipeline and Infrastructure
L 74/21	1.42	Dam - saline water or process liquor	Seawater pumping station 3	A	Domain 8 – Seawater Pipeline and Infrastructure
L 74/21	13.44	Transport or service infrastructure corridor	Roads/Tracks	C	Domain 7 – Plant and Infrastructure
L 74/33	1.29	Dam - saline water or process liquor	Seawater intake dams	A	Domain 8 – Seawater Pipeline and Infrastructure
L 74/36	3.47	Transport or service infrastructure corridor	Seawater pipeline	C	Domain 8 – Seawater Pipeline and Infrastructure
L 74/37	3.74	Dam - saline water or process liquor	Seawater Intake Facility	A	Domain 8 – Seawater Pipeline and Infrastructure
M 74/108	4.55	Core yard	Shoe-Maker Exploration	C	Domain 1 – Halley's
M 74/114	4.97	Core yard	West of Halleys	C	Domain 1 – Halley's
M 74/114	1.63	Dam - fresh water	Northern Sediment Pond	C	Domain 1 – Halley's
M 74/114	10.83	Mining void (>5 meters) agwl	Halleys Pit	C	Domain 1 – Halley's
M 74/114	75.84	Waste dump or overburden stockpile (class 1)	Halleys Overburden Storage	B	Domain 1 – Halley's
M 74/114	165.42	Mining void (>5 meters) agwl	Halleys Pit	C	Domain 1 – Halley's
M 74/114	0.22	Transport or service infrastructure corridor	Roads/Tracks	C	Domain 1 – Halley's
M 74/114	0.04	Transport or service infrastructure corridor	Roads/Tracks	C	Domain 7 – Plant and Infrastructure
M 74/114	0.29	Core yard	West of Halleys	D	Domain 1 – Halley's
M 74/114	3.91	Mining viold (>5 meters) agwl	Halleys Pit	C	Domain 1 – Halley's
M 74/114	4.36	Transport or service infrastructure corridor	Roads/Tracks	C	Domain 7 – Plant and Infrastructure
M	58.31	Tailings or residue	TSF 2	A	Domain 5 – Tailings

74/115		facility (class 1)			Storage Facility
M 74/115	1.92	Dam - fresh water	Mine Dam 6	B	Domain 1 – Halley's
M 74/115	0.57	Plant Site	Main Processing Plant	B	Domain 1 – Halley's
M 74/115	22.49	Run-of-mine pad	ROM	C	Domain 1 – Halley's
M 74/115	0.33	Plant Site	Crusher & Conveyor	B	Domain 1 – Halley's
M 74/115	28.64	Mining void (>5 meters) agwl	Halleys Pit	C	Domain 1 – Halley's
M 74/115	7.26	Land disturbed by exp operations	Hale Bopp Drilling	D	Domain 2 – Hale Bopp
M 74/115	79.03	Land disturbed by exp operations	Hale Bopp Drilling	D	Domain 2 – Hale Bopp
M 74/115	0.31	Dam - fresh water	Dam east of TSF 2	C	Domain 5 – Tailings Storage Facility
M 74/115	6.81	Land that is cleared of vegetation not described	Adjacent to LGO stockpiles	C	Domain 1 – Halley's
M 74/115	2.56	Mining void (>5 meters) agwl	Halleys Pit	C	Domain 1 – Halley's
M 74/115	38.51	Waste dump or overburden stockpile (class 1)	Hale Bopp Pit	B	Domain 2 – Hale Bopp
M 74/115	14.24	Mining void (>5 meters) agwl	Halleys Pit	C	Domain 1 – Halley's
M 74/115	0.05	Borefield	Production Bore	C	Domain 7 – Plant and Infrastructure
M 74/115	70.28	Tailings or residue facility (class 1)	TSF 1	A	Domain 5 – Tailings Storage Facility
M 74/115	42.44	Transport or service infrastructure corridor	Roads/Tracks	C	Domain 7 – Plant and Infrastructure
M 74/115	0.74	Land that is cleared of vegetation not described	Adjacent to LGO stockpiles	C	Domain 1 – Halley's
M 74/115	15.73	Waste dump or overburden stockpile (class 1)	Halleys Overburden Storage	B	Domain 1 – Halley's
M 74/115	16.59	Waste dump or overburden stockpile (class 1)	Halleys Overburden Storage	B	Domain 1 – Halley's
M 74/115	2.82	Waste dump or overburden stockpile (class 1)	Halleys Overburden Storage	B	Domain 1 – Halley's
M 74/116	140.49	Tailings or residue facility (class 1)	TSF 2	A	Domain 5 – Tailings Storage Facility
M 74/116	3.04	Borrow Pit or shallow surface	Borrow Pit South of TSF 2	C	Domain 12 – Production Bores and

		excavation			Gravel Pits
M 74/116	37.02	Borrow Pit or shallow surface excavation	Borrow Pit North of TSF 2	C	Domain 12 – Production Bores and Gravel Pits
M 74/116	8.97	Borrow Pit or shallow surface excavation	Borrow Pit South of TSF 2	C	Domain 12 – Production Bores and Gravel Pits
M 74/116	5.54	Borrow Pit or shallow surface excavation	Borrow Pit South of TSF 2	C	Domain 12 – Production Bores and Gravel Pits
M 74/116	3.65	Land disturbed by exp operations	Hale Bopp Drilling	D	Domain 2 – Hale Bopp
M 74/116	141.09	Tailings or residue facility (class 1)	TSF 1	A	Domain 5 – Tailings Storage Facility
M 74/116	37.70	Transport or service infrastructure corridor	Roads/Tracks	C	Domain 7 – Plant and Infrastructure
M 74/116	0.62	Transport or service infrastructure corridor	Roads/Tracks	C	Domain 7 – Plant and Infrastructure
M 74/144	1.70	Dam - fresh water	Mine Dam 6	B	Domain 1 – Halley's
M 74/144	52.71	Plant Site	Main Processing Plant	B	Domain 7 – Plant and Infrastructure
M 74/144	0.53	Building or campsite	Magazine	C	Domain 7 – Plant and Infrastructure
M 74/144	1.04	Building or campsite	Anfo Storage	C	Domain 7 – Plant and Infrastructure
M 74/144	11.10	Topsoil stockpile	Topsoil Stockpile	E	Domain 7 – Plant and Infrastructure
M 74/144	1.97	Run-of-mine pad	ROM	C	Domain 1 – Halley's
M 74/144	14.86	Plant Site	Crusher & Conveyor	B	Domain 7 – Plant and Infrastructure
M 74/144	7.04	Dam - fresh water	Sands Reject Storage	B	Domain 11 – Sands Reject Storage Facility
M 74/144	3.57	Dam - saline water or process liquor	North Standpipe dam	A	Domain 1 – Halley's
M 74/144	58.66	Topsoil stockpile	Topsoil Stockpile	E	Domain 7 – Plant and Infrastructure
M 74/144	57.66	Waste dump or overburden stockpile (class 1)	Halleys Overburden Storage	B	Domain 1 – Halley's
M 74/144	0.56	Topsoil stockpile	Topsoil Stockpile	E	Domain 7 – Plant and Infrastructure
M 74/144	0.38	Topsoil stockpile	Topsoil Stockpile	E	Domain 7 – Plant and Infrastructure
M 74/144	20.66	Transport or service infrastructure corridor	Roads/Tracks	C	Domain 7 – Plant and Infrastructure

M 74/144	1.40	Dam - fresh water	Dam at end of creek	B	Domain 1 – Halley's
M 74/144	14.05	Dam - saline water or process liquor	Buffer Ponds	A	Domain 7 – Plant and Infrastructure
M 74/144	9.32	Dam - saline water or process liquor	Desal Dams	A	Domain 7 – Plant and Infrastructure
M 74/144	3.42	Plant Site	Acid Plant	B	Domain 7 – Plant and Infrastructure
M 74/144	4.82	Plant Site	Plant & Laydown	B	Domain 7 – Plant and Infrastructure
M 74/144	6.75	Plant Site	Maintenance and workshops	B	Domain 7 – Plant and Infrastructure
M 74/144	2.40	Plant Site	Turbines & Generators	B	Domain 7 – Plant and Infrastructure
M 74/144	5.89	Plant Site	Beneficiation	B	Domain 7 – Plant and Infrastructure
M 74/144	8.03	Plant Site	Beneficiation	B	Domain 7 – Plant and Infrastructure
M 74/144	2.88	Plant Site	Desalination	B	Domain 7 – Plant and Infrastructure
M 74/144	2.04	Waste dump or overburden stockpile (class 1)	Hale Bopp Pit	B	Domain 2 – Hale Bopp
M 74/145	1.67	Dam - fresh water	Dam south of Evap Ponds	B	Domain 6 – Evaporation Ponds
M 74/145	0.19	Dam - fresh water	Sediment pond	C	Domain 5 – Tailings Storage Facility
M 74/145	0.03	Land disturbed by exp operations	Hale Bopp Drilling	D	Domain 2 – Hale Bopp
M 74/145	1.26	Land disturbed by exp operations	Hale Bopp Drilling	D	Domain 2 – Hale Bopp
M 74/145	98.22	Dam - saline or process water	Evaporation Ponds	A	Domain 6 – Evaporation Ponds
M 74/145	14.56	Transport or service infrastructure corridor	Roads/Tracks	C	Domain 7 – Plant and Infrastructure
M 74/173	20.69	Plant Site	Main Processing Plant	B	Domain 7 – Plant and Infrastructure
M 74/173	4.53	Borrow Pit or shallow surface excavation	Borrow adjacent to SRSF	C	Domain 11 – Sands Reject Storage Facility
M 74/173	4.58	Borrow Pit or shallow surface excavation	Borrow pit SE of SRSF	C	Domain 11 – Sands Reject Storage Facility
M 74/173	2.06	Topsoil stockpile	Topsoil Stockpile	E	Domain 7 – Plant and Infrastructure
M 74/173	24.32	Building or campsite	Camp	C	Domain 7 – Plant and Infrastructure
M 74/173	2.92	Sewage Pond	Waste Water Treatment Plant	C	Domain 7 – Plant and Infrastructure

M 74/173	83.29	Dam - fresh water	Sands Reject Storage	B	Domain 11 – Sands Reject Storage Facility
M 74/173	5.48	Laydown or hardstand area	Old contruction camp	C	Domain 7 – Plant and Infrastructure
M 74/173	25.98	Transport or service infrastructure corridor	Roads/Tracks	C	Domain 7 – Plant and Infrastructure
M 74/174	1.86	Dam - saline water or process liquor	Evap Pond Sediment Dam	A	Domain 6 – Evaporation Ponds
M 74/174	132.33	Dam - saline or process water	Evaporation Ponds	A	Domain 6 – Evaporation Ponds
M 74/174	6.21	Transport or service infrastructure corridor	Roads/Tracks	C	Domain 7 – Plant and Infrastructure
M 74/174	34.43	Dam - saline or process water	Evaporation Ponds	A	Domain 6 – Evaporation Ponds
M 74/175	26.16	Tailings or residue facility (class 1)	TSF 2	A	Domain 5 – Tailings Storage Facility
M 74/175	2.32	Dam - saline water or process liquor	Seawater intake dam	A	Domain 8 – Seawater Pipeline and Infrastructure
M 74/175	26.35	Tailings or residue facility (class 1)	TSF 1	A	Domain 5 – Tailings Storage Facility
M 74/175	25.49	Transport or service infrastructure corridor	Roads/Tracks	C	Domain 7 – Plant and Infrastructure
M 74/220	3.96	Transport or service infrastructure corridor	Roads at Tamarine Quarry	C	Domain 9 – Tamarine Quarry
M 74/220	6.24	Mining viold (>5 meters) agwl	Tamarin Pit	C	Domain 9 – Tamarine Quarry
M 74/220	16.34	Mining viold (>5 meters) agwl	Tamarine Pit	C	Domain 9 – Tamarine Quarry
M 74/220	0.35	Dam - fresh water	Tamarine Dam	C	Domain 9 – Tamarine Quarry
M 74/220	1.55	Topsoil stockpile	Tamarine topsoil	E	Domain 9 – Tamarine Quarry

Appendix Two: Legal Obligations Register

RNO Legal Compliance Register
Relevant DMP Tenement Conditions

Tenement No.	Closure Conditions
L74/19	All topsoil that may be removed ahead of pipelaying operations to be stockpiled for replacement in accordance with the directions of the Inspector.
L74/20	Tailings dams, disposal areas and dumps being sited so as to pose no threat to water course stability or to groundwater and surface water quality, and being constructed so as to be stable on decommissioning.
L74/22 L74/33 L74/36 L74/37 L74/43 L74/19 L74/21 L74/20	On the completion of the life of mining operations in connection with this licence the holder shall:- remove all installations constructed pursuant to this licence; and cover over all wells and holes in the ground to such degree of safety as shall be determined by the Inspector. on such areas cleared of natural growth by the holder or any of its agents, the holder shall plant trees and/or shrubs and/or any other plant as shall conform to the general pattern and type of growth in the area and as directed by the Inspector and properly maintain same until the Inspector advises regrowth is self supporting; Unless the Mining Registrar or Minister for Mines orders or consents otherwise.
L74/36	All rigs, vehicles, tools and equipment being cleaned to prevent the transporting of plant diseases or weed seeds into or between sites within the operation area.
L74/36 L74/37 L74/43	All necessary precautions being taken to prevent: destruction or damage to native vegetation, major damage to the natural soil surface, or an increase in the risk or soil erosion; and complying with all reasonable requests of the local Shire Engineer to rehabilitate or restore vegetation or soil disturbed by the activities.
L74/36 L74/43	Taking all necessary precautions to ensure public safety while conducting activities on road verges.
L74/36	At the cessation of operations, the operator notifying the local Shire Engineer, arranging an inspection as required, and complying with any reasonable requirements to leave the operation sites in a clean condition

Tenement No.	Closure Conditions
M74/108 M74/142	**Consent to mine on Water Reserve 39171 granted by the Minister for Mines subject to the following conditions:** § No activity being carried out that will alter, interfere or pollute any drain, watercourse, excavation, swamp, marsh, stream, bore, well spring, lake or lagoon. § No activity being carried out that will interfere with the drainage within the area. § Riverine vegetation not being disturbed or removed. § No activity being carried out that will adversely affect groundwater or surface water quality or quantity. § Tailings dams, disposal areas and dumps being sited so as to pose no threat to water course stability or to groundwater and surface water quality, and being constructed so as to be stable on decommissioning. § Measures such as effective sediment traps and stormwater retention facilities being implemented to preserve the natural values of receiving catchments and those of adjacent areas of native vegetation.
M74/114 M74/116 M74/144 M74/173 M74/175 M74/174	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 State Mining Engineer.
M74/114 M74/115 M74/116 M74/144 M74/145	At the completion of operations or progressively where possible, waste dump outslopes being battered down, covered with topsoil, deep ripped on the contour and revegetated with local native grasses, shrubs and trees to form a safe, stable landform to the satisfaction of the State Mining Engineer.
M74/114 M74/115 M74/144 M74/145 M74/174 M74/175 M74/116	Where saline water is used for dust suppression, all reasonable measures being taken to avoid any detrimental effects to surrounding vegetation and all topsoil stockpiles.
M74/114 M74/115 M74/116 M74/173	At the completion of operations, all buildings and structures being removed from site or demolished and buried to the satisfaction of the State Mining Engineer.

Tenement No.	Closure Conditions
M74/115 M74/116 M74/173 M74/174 M74/174 M74/175	The construction and operation of the project and measures to protect the environment being carried out generally in accordance with the document titled: * "Ravensthorpe Nickel Project - Addendum Notice of Intent 3867" dated 6 october 2003 (NOI 4394) and signed by Mr Darryl Sampson and retained on Department of Industry and Resources File No. 2472/99. * "Notice of Intent for the Construction of a Nickel Processing Plant and Project Infrastructure for the Ravensthorpe Nickel Project" dated 26 February 2004 technically certified by Mr Darryl Murphy and corporately endorsed by mr Ken Hellsten, President and Chief Operating Office, and retained on Department of Industry and Resources File No. E0075/200401. * "Ravensthorpe Nickel NOI Addendum" dated 10 June 2004 and signed by Mr Adrian Lee HSE Manager (NOI 4700) and retained on Department of Industry and Resources File No. E0075/200402. * "Addendum Notice of Intent for a Change to the Clearing Area of the Mine Services Area" (NOI 4920) dated 31 January 2005, corporately endorsed by Mr Ken Hellsten and retained on Department of Industry and Resources File No. E0075/200403. * "Notice of Intent for the Construction of Seawater Supply Infrastructure Part B: Seawater Pipeline and Power Line" (NOI 5140) dated September 2005, corporately endorsed by Mr Adrian Lee and retained on Department of Industry and Resources File No. E0075/200404; and * Letter to Mr Norm Caporn (CALM) from Ravensthorpe Nickel titled Ravensthorpe Nickel Project - Supplementary Notice of Intent: Seaswater Supply Pipeline dated 21 October 2005 and signed by Mr Adrian Lee and retained on Department of Industry and Resources File No. E0075/200404 * "Ravensthorpe Nickel Project - Halleys Open Cut Pit Notice of Intent" (NOI 5232) dated 3 February 2006 and corporately endorsed by Adrian Lee, Manager health, Safety and Environment and retained on Department of Industry and Resources File No. E0075/200410 * "Ravensthorpe Nickel Project Supplementary Notice of Intent for the Construction of Tailings and Evaporation Ponds" (NOI 5136) dated 23 september 2005 and signed by Mr Adrian Lee, HSE Manager and retained on Department of Industry and Resources File No. E0075/20040; * "Ravensthorpe Nickel Project - Tailings Storage Facility (TSF) Amendments Mining Proposal Addendum and Works Approval Application M74/115, M74/116, M74/144, M74/145 and M74/175" (Reg ID 28393) dated 10 September 2010 signed by Rudi Badenhorst and retained on Department of Mines and Petroleum File No. E0341/201001; * Email titled: "FQM Australia Nickel Pty Ltd - TSF Modifications additional information" dated 2 November 2010 signed by Mark Dawson and retained on Department of Mines and Petroleum File No. e0341/201001

Tenement No.	Closure Conditions
M74/115 M74/116 M74/175 M74/144	At the time of decommissioning of the tailings storage facility and prior to rehabilitation, a further review report by a geotechnical or engineering specialist will be required by the Director, Environment, DoIR. This report should review the status of the structure and its contained tailings, examine and address the implications of the physical and chemical characteristics of the materials, and present and review the results of all environmental monitoring. The rehabilitation stabilisation works proposed and any on-going remedial requirements should also be addressed.
M74/116 M74/144 M74/145 M74/173 M74/174 M74/175 M74/115	The development and operation of the project being carried out in such a manner so as to create the minimum practicable disturbance to the existing vegetation and natural landform.
M74/143 M74/145	**In respect to the area designated as FNA 5294 in TENGRAPH, the following shall apply:** This program to include: ... techniques, prescriptions, and timetable for rehabilitation of all proposed disturbances; undertaking for corrective measures for failed rehabilitation...
M74/144	Wastes from ancilliary facilities such as maintenance workshops and laboratories being managed in a manner which minimises their detrimental effect on the surrounding environment. Practical measures such as protective bunding, skimmers, silt traps, neutralisation pits and petrol/oil traps being provided and maintained as appropriate.
M74/144, M74/115 and M74/114	Placement of waste material must be such that the final footprint after rehabilitation will not be impacted upon by pit wall subsidence and zone of instability
M74/144, M74/116, M74/145, M74/145, M74/173, M74/174, M74/115, M74/144, M74/114 and M74/175	All topsoil and vegetation being removed ahead of all mining operations and being stockpiled appropriately for later respreading or immediately respread as rehabilitation progresses.

Tenement No.	Closure Conditions
M74/174 M74/175 M74/145	Prior to accessing the lease area, the lessee shall consult with the Regional Environmental Officer, Department of Industry and Resources (DOIR), and ensure that where required all vehicles and equipment entering the designated area are washed down to remove soil and plant propagules and adhering to such conditions specified for the prevention of the spread of soil-borne diseases.
M74/179	In areas of native vegetation within the tenement, no exploration activities commencing until the licencee provides a plan of management to prevent the spread of dieback disease (Phytophthera sp) to the State Mining Engineer for assessment and until his written approval has been received. All exploration activities shall then comply with the commitments made in the management plan
M74/115	On the completion of operations or progressively when possible, all waste dumps, tailings storage facilities, stockpiles or other mining related landforms must be rehabilitated to form safe, stable, non-polluting structures which are integrated with the surrounding landscape and support self-sustaining, functional ecosystems comprising suitable, local provenance species or an alternative agreed outcome to the satisfaction of an Environmental Officer, DMP.
M74/115 M74/116 M74/175	Placement of waste material must be such that the final footprint after rehabilitation will not be impacted upon by pit wall subsidence or be within the zone of pit instability.
All Tenements	"A Mine Closure Plan is to be submitted in the Annual Environmental Reporting month specified in tenement conditions in the year specified below, unless otherwise directed by an Environmental Officer, DMP. The Mine Closure Plan is to be prepared in accordance with the "Guidelines for Preparing Mine Closure Plans" available on DMP's website" § 2012

Appendix Three: RNO Environmental Reports

RNO Environmental Reports

Title	Subtitle/Location	Author	Date
Air Quality Management Plan	Draft	RNO Report	Jun-05
Air Quality Assessment	Final	Sinclair Knight Merz	Dec-00
Greenhouse Study	Final	Sinclair Knight Merz	Dec-00
Acoustic Assessment	RNO	Herring Storer Acoustics	Dec-00
Air Quality Assessment	Draft	Sinclair Knight Merz	Apr-01
Potential Atmospheric Impacts on Vegetation	Final Report	Sinclair Knight Merz	Oct-02
Air Quality Assessment	Final	Sinclair Knight Merz	Oct-03
Dust Management Plan	Revision 4	Sinclair Knight Merz	Oct-03
Air Quality Assessment	Community Summary	Outback Ecology	Feb-04
Approved Methods	For the Modelling and Assessment of Air Pollutants in New South Wales	Department of Environment and Conservation, NSW	Aug-05
Noise and Vibration Management Plan	Draft (incomplete)	RNO Report	Sep-06
Dust Management Plan	Final	RNO Report	Nov-06
Technical Report	Noise Survey near Accommodation Village	VIPAC Engineers and Scientists	Mar-07
Technical Report	Noise Survey near Farmhouse	VIPAC Engineers and Scientists	Apr-07
Technical Report	Noise Survey near Williams Farm	VIPAC Engineers and Scientists	Apr-07
Energy and Greenhouse Gas Management Plan	Final	Kewan Bond Pty Ltd	Jun-07
TAPM Dispersion Modelling	Addendum to 2003 Modelling Report	Sinclair Knight Merz	Jul-07
Compliance-Boilers	Nov-07	ECS	Nov-07
Energy and Greenhouse Gas Management Plan	Final	RNO Report	Dec-07
Atmospheric Leach Stack Emission Sampling Program	Nov-07	ECS	Jan-08
Secondary Neutralisation Stack Emission Sampling Program	Nov-07	ECS	Jan-08
Sulphuric Acid Plant Main Stack Compliance Program	Nov-07	ECS	Jan-08

Title	Subtitle/Location	Author	Date
Blast Monitoring Report for Tamarine Quarry	BHPB RNP Blast 055-002 fired 24 June 08	Saros Group	Jun-08
Compliance-Boilers	Jun-08	ECS	Jun-08
Blast Monitoring Report for Tamarine Quarry	BHPB RNP Blast 058-003 fired 8 July 08	Saros Group	Jul-08
Blast Monitoring Report for Tamarine Quarry	BHPB RNP Blast 058-004 fired 30 July 08	Saros Group	Jul-08
Sulphuric Acid Plant Drying Tower Outlet	Nov-07	ECS	Jul-08
Sulphuric Acid Plant Main Stack Compliance Program	Dec 07 Revised	ECS	Jul-08
Atmospheric Leach Program	Jun-08	ECS	Jul-08
Atmospheric Leach Program	Jun 08 Revision A	ECS	Jul-08
Pressure Acid Leach Program	Jun-08	ECS	Jul-08
Secondary Neutralisation Stack Emission Sampling Program	Jun-08	ECS	Jul-08
Sulphuric Acid Plant Main Stack Compliance Program	Jun 08 Revision A	ECS	Jul-08
Compliance-Boilers	Dec-08	ECS	Feb-09
Atmospheric Leach Program	Dec-08	ECS	Feb-09
Sulphuric Acid Plant Stack Compliance Program	Dec-08	ECS	Feb-09
South Coast Regional Land and Water Care Strategy	the Fitzgerald Biosphere Sub- Region	RAP and SCRIPT	Mar-97
Preliminary Review of Water Supply Options for the R.N.L.P.	Final Report- For Comet Resources NL	Dames and Moore	Oct-98
RNO Water Sampling	Water Sampling and Analyses for RO Plant Design	Sinclair Knight Merz	Jan-01
Surface Water Management Plan	Final	Sinclair Knight Merz	Apr-01
Jerdacuttup Rainfall	1981-2002	Compilation of local farmers data	2002
Jerdacuttup River Action Plan	Draft	Water and Rivers Commission	2002
Baseline Hydrogeology Report		Aquaterra	Dec-03

Title	Subtitle/Location	Author	Date
Jerdacuttup RNO Working Group	Baseline Study of Drinking Water on properties in the Region of the RNO	Outback Ecology	Sep-04
Ravensthorpe Nickel Project	Site Surface Water Management Preliminary Design	Knight Piesold Consulting	Dec-04
Waste Water Treatment Plant No. 1	Nutrient and Irrigation Management Plan	URS	Feb-05
Surface Hydrology Baseline Study	RNP- Report	URS	Aug-05
Surface Water Management Plan	RNP- Draft Report	URS	Oct-05
Storm Water Management Plan	Draft	URS	Oct-05
Jerdacuttup RNO Working Group	Baseline Study of Drinking Water on properties in the Region of the RNO- Second year of Monitoring	Outback Ecology	Dec-05
Water Management	Draft (incomplete)	RNO Report	Sep-06
Jerdacuttup RNO Working Group	Baseline Study of Drinking Water on properties in the Region of the RNO- Third Monitoring	Outback Ecology	Jan-07
Flood Risk Assessment	RNP Drain Pond No. 2 Report	GHD	Aug-07
Surface Water Management	Draft	RNO Report	Oct-08
Groundwater Impact Study	Final	Sinclair Knight Merz	Dec-00
Ravensthorpe Nickel Project Groundwater Investigations 1998	Final	Woodward Clyde	Mar-99
Front End Engineering Design Phase	Construction Water Supply - Stage 1 Investigations Final	Steve Collett Groundwater Consultant	Jan-01
Groundwater Impact Study	Final	Sinclair Knight Merz	Apr-01
Assessment of Evaporation Pond Seepage on Groundwater	Draft	Cymod Systems	Nov-01
Groundwater Management Plan	Final	Sinclair Knight Merz	Dec-01

Title	Subtitle/Location	Author	Date
Groundwater Evaluation Study	Version 2	Steve Collett Groundwater Consultant	Dec-01
Assessment of the Impact of Evaporation Pond Seepage on Groundwater	Final	Cymod Systems	Dec-01
Baseline Hydrogeology Report		Aquaterra	Dec-03
Geotechnical Assessment of Process Plant Site Final Design Report	Revision B	Knight Piesold Consulting	May-04
Tailings Storage Facility and Evaporation Ponds Final Design	Volume 1 of 2 Final	Knight Piesold Consulting	Feb-05
Construction Borefield Augmentation	Final	Steve Collett Groundwater Consultant	Jan-06
Groundwater Management Plan	Draft	RNO Report	Feb-06
Botanical Survey of the Amalge Bore Area Ravensthorpe	Final	Western Botanical	Feb-06
Quantitative Marine Biological Survey	Final November 2000	Sinclair Knight Merz	Dec-00
Environmental Survey of Marine Habitats Near Proposed Seawater Intake in Mason Bay	Final	Bowman Bishaw Goram	Jun-02
Concept Evaluation Report	Ravensthorpe Nickel Seawater Intake	Hatch Minproc	Mar-03
Marine Befouling	RNP	DAL Science & Engineering Pty Ltd	Jun-03
Seawater Intake Constructibility Report	Seawater Intake	McConnell Dowell	Jul-04
Survey for Significant Flora	Masons Point Seawater Intake MLA 74/33	Eveleigh, N.	Aug-04
Environmental Assessment of Seawater Intake	RNP	Oceanica Marine and Estuarine Specialists	Sep-04
Seawater Intake Civil Specification	RNP	RJV	Mar-05
Mason Bay Water Intake Commissioning	Environmental Implications of Discharge of Chlorinated Water from Intake and Discharge Pipes - Memorandum	Oceanica Marine and Estuarine Specialists	Jul-06

Title	Subtitle/Location	Author	Date
Contract Specification- Seawater Intake	Mason Point Site	RJV	
Site Assessment for the Presence of *Phytophthora*	RNP Joint Venture	Glevan Dieback Consultancy Services	Nov-99
Assessment for the Presence of *Phytophthora cinnomomi*		Glevan Dieback Consultancy Services	Sep-00
Assessment for the Presence of *Phytophthora cinnomomi*		Glevan Dieback Consultancy Services	Nov-01
A Preliminary Assessment of the Soil Landscapes of the Ravensthorpe Nickel Operation Tenements	With reference to Rehabilitation Requirements	D.C. Blandford and Associates Pty Ltd	Aug-02
Assessment for the Presence of *Phytophthora cinnomomi*		Glevan Dieback Consultancy Services	Oct-02
Geochemical Characterisation of Laterite Nickel Tailings from the RNP	Draft	Environmental Geochemistry International Pty Ltd	May-03
Contaminated Sites Management Series	Assessment Levels for Soil, Sediment and Water- Draft for Public Comment	Department of Environment	Nov-03
Baseline Studies of Soil and Vegetation in the Jerdacuttup District		Outback Ecology	Dec-03
Assessment for the Presence of *Phytophthora cinnomomi*		Glevan Dieback Consultancy Services	Jan-04
Best Practice Guidelines for the Management of *Phytophthora cinnomomi*	Public Consultation Draft	Department of CALM	Mar-04
Rehabilitation Program for Laydown and Stockpile Areas of the RNP	Bandelup Hill Trial Pit- Initial Monitoring, April/ May 2004	Eveleigh, N., Ang, L.	Jul-04
Contaminated Sites Management Series	Bioremediation of Hydrocarbon-contaminated Soil in Western Australia	Department of Environment	Oct-04
Assessment for the Presence of *Phytophthora cinnomomi*		Glevan Dieback Consultancy Services	Jan-05
Dieback Recommendations for the Clearing and Grubbing Contract of Halleys Pit on Bandalup Hill	RNO	RNO	Mar-05

Title	Subtitle/Location	Author	Date
Seawater Pipeline Construction and Maintenance Dieback Management Plan 1		RNP Report	May-05
Soil Characteristics and Management at the RNO	Final Draft	Outback Ecology	Jun-05
Clearing and Topsoil Stripping for 2006 Operations		Snowden	Aug-05
Review of Leading Practice in Topsoil and Vegetation Handling	RNO	Outback Ecology	Dec-05
Contract Specifications for Clearing and Stockpiling of Vegetation and Topsoil		Ravensthorpe Nickel	Jan-06
Neutron Probe Soil Water Assessment	Inception Report	Outback Ecology	Apr-06
Soil Water Assessment of Conservation Areas Quarterly Report	Draft	Outback Ecology	May-06
Soil Water Assessment of Conservation Areas Quarterly Report	Draft	Outback Ecology	Aug-06
Dieback Management Plan		RNO Report	Nov-06
Soil Water Assessment of Conservation Areas Quarterly Report	Draft	Outback Ecology	Dec-06
Soil Water Assessment of Conservation Areas Yearly Report	Draft Only Dec 08	Outback Ecology	Jul-09
Dieback Management, Mason Bay Road		Glevan Dieback Consultancy Services	
Ravensthorpe Nickel Project, Comet Resources NL	Vegetation, Flora and Fauna Survey	Craig, G., Chapman, A.	Apr-98
Report and Recommendations of the Environmental Protection Authority		Environmental Protection Authority	Mar-99
Ravensthorpe Nickel Project Commet Resources N L Mason Bay Road North Vegetation and Flora Survey	Final	GF Craig Environmental Services	May-99
Statement that a Proposal May be Implemented	Bandelup Hill	Minister for the Environment; Labour Relations	Jun-99
Vegetation and Flora Survey	Shoemaker Levy	Craig, G.	Dec-99

Title	Subtitle/Location	Author	Date
Vegetation Monitoring Strategy	Draft	Craig, G.	Feb-00
Ravensthorpe Nickel Operations Priority Flora		GF Craig Environmental Services	Oct-00
Clearing of Native Vegetation on Kent Location 1766	Needilup Road North and Townsend Road, Shire of Kent	EPA	Dec-00
Flora and Vegetation Surveying for Ravensthorpe Nickel Project	September- October 2000	Cockerton, G., Craig, G.	Dec-00
RNO Seed Collection Program	Summer 2000 - 2002	Landcare Services	2001
Establishment of a Pilot Environmental Impact Assessment for RNP		Landcare Services	Feb-01
Declared Rare and Priority Flora List	For Western Australia	Department of CALM	Aug-01
Regional Surveys for *Kunzea similis, Eucalyptus purpurascens* ms, Spring 2000	Options for Establishment Trials and Genetic Delineation of Provenance	Cockerton, G., Craig, G.	Aug-01
Eucalyptus purpurata ms Seedling Plating at Bandalup Gravel Pits	Sep-01	Landcare Services	Oct-01
Flora and Vegetation Surveys October-November 2001	Ravensthorpe Region - Draft	Cockerton, G., Craig, G.	Dec-01
Flora and Vegetation Surveys October-November 2001	Ravensthorpe Region - Final	Cockerton, G., Craig, G.	Feb-02
Population Genetic Analyses of *Kunzea similis* Toelken (Myrtaceae)	A Report Commissioned by Landcare Services	Botanic Gardens and Parks Authority	Feb-02
Terrestrial Biological Surveys as an Element of Biodiversity Protection	Position Statement No. 3	EPA	Mar-02
Vegetation Mapping and Flora Survey E74/208 Shoemaker-Levy South Extension	Apr-02 Draft	Landcare Services	Apr-02
Oldfield Catchment Biological Survey		Natural Heritage Trust & National Trust of Australia	May-02
Section 46 Review	EPA Assessment Number 1199 and Ministerial Statement Number 509	Ravensthorpe Nickel Operations	Jun-02
The Effects of Atmospheric Emissions on Vegetation	A Literary Review- Final Revision 0	Sinclair Knight Merz	Oct-02

Title	Subtitle/Location	Author	Date
CALM Priority Flora List		CALM	Apr-03
Ravensthorpe Nickel Project, Changes to Environmental Conditions	Section 46 Review and Recommendations of the Environmental Protection Authority	Environmental Protection Authority	Apr-03
A Baseline Quantitative Vegetation Assessment and Investigation of Fire Regeneration Strategies	Within the Vegetation Associations of the RNP August-September 2002	Eveleigh, N., Cockerton, G.	May-03
A Comprehensive Survey for Potential Pollinators of *Kunzea similis*	2001-2002	Eveleigh, N., Cockerton, G.	May-03
Flowering Foodplants for Small Marsupials and Birds at Bandalup Hill	Ravensthorpe Nickel Project	Craig, G.F., Eveleigh, N., Cockerton, G.	Jul-03
Potential Atmospheric Impacts on Vegetation	RNP- Revised Report: Draft	SKM	Jul-03
Shadehouse Propogation Trial from Topsoil Samples	for *Kunzea similis*	Eveleigh, N., Cockerton, G.	Jul-03
Translocation Program for *Kunzea similis* (P2) and *Eucalyptus purpurata* (P1)	Planning and Implementation April 2002 - July 2003	Eveleigh, N., Cockerton, G.	Jul-03
Reasons for Richness- The Nature of the Fitzgearld Biosphere Flora	Fitzgerald River National Park Tour	McQuoid, N.	Sep-03
Translocation Program for *Kunzea similis* (P2) and *Eucalyptus purpurata* (P1) Bandalup Gravel Pits	March 2004 Monitoring	Western Botanical	Mar-04
Preliminary Permeability Study Significant Flora and Vegetation Community Conservation Areas for RNP	Apr-04	Western Botanical	Jun-04
Regional Surveys for Significant Flora of the RNP	2003-2004	Eveleigh, N., Cockerton, G.	Jun-04
Survey for Significant Flora- Great Southern Highway and Jerdacuttup North Road	Road Verges May 2004	Eveleigh, N., Cockerton, G.	Jun-04
Survey for Significant Flora Mason Point Seawater Intake MLA 74/33	Ravensthorpe Nickel Project July 2004	Western Botanical	Aug-04
Seed Collection Report Ravensthorpe Nickel Operations Gravel Pit Area, HalleysOre Body Area and Hale Bopp Ore Body Area	November - December 2004	Landcare Services	Jan-05
Management Issues, RNP and Masons Bay Road Flora Survey #2	Letter to Adrian Lee	Western Botanical	Jan-05

Title	Subtitle/Location	Author	Date
Flora and Vegetation Assessment For Notice of Intent Proposed Exension to Mine Services Area	Ravensthorpe Nickel Operations	Western Botanical	
Habitats, Vegetation and Flora of the Ravensthorpe Nickel Operation Tenements		Western Botanical	Jan-05
Summary of Environmental Monitoring, Operational Seed Collection for Revegetation		Cockerton, G	Mar-05
Landcare Services Seed Collection Report Ravensthorpe Nickel Operations Halleys Ore Body Area and Waste Dump Area	October 2005 Draft	Landcare Services	Jun-05
Ravensthorpe Nickel Operations Mason Bay Road Proposed Pipeline Alignment	Botanical Survey Findings May 2005 Phase 3	Western Botanical	Jun-05
Remnant Vegetation Assessment, July 2005	TSF 1: Letter to Adrian Lee	Western Botanical	Aug-05
Flora and Vegetation Assessments Masons Bay Road Pipeline Alignment	November 2004- September 2005	Western Botanical	Sep-05
Landcare Services Seed Collection Report	RNO- Halleys Ore Body Area and Waste Dump Area April-May 2005	Atkinson, S., McLean, B.,	Oct-05
Translocation Trial (Bandalup Gravel Pits) April 2005 Monitoring	Kunzea similis (P2, proposed DRF) and Eucalyptus purpurata (P1, proposed DRF)	Western Botanical	Nov-05
Observations on the inadvertent clearing of *Statchystemon vinosus* (P1) population on Mason Bay Road, November 2005		Cockerton, G., Ang, L.	Nov-05
A Review of Vegetation and Flora Impacts, Mason Bay Road Seawater Intake Pipeline	December 2005 Amendment	Western Botanical	Dec-05
Statchystemon vinosus	Draft Interim Recovery Plan 2005-2009	Western Botanical	Dec-05
UWA PhD Study	The Phenology and Germination Ecology: Selected Priority Flora of Bandalup Hill & Jerd. Plain		2005-2006
A Review of the Flora, Vegetation and Habitats of the Halleys Orebody and Associated Areas	Halleys Notice of Intent	Cockerton, G.	Jan-06
Beyeria sp. Bandalup (G.Cockerton7553), *Eucalyptus purpurata* Nicolle and *Kunzea similis* Toelken	Draft Recovery Plan 2006-16	Western Botanical	Jan-06

Title	Subtitle/Location	Author	Date
Landcare Services Seed Collection Report Ravensthorpe Nickel Operations Halleys Ore Body Area and Waste Dump Area/Mason Bay Road	January 2006 Draft Report	Landcare Services	Jan-06
Botanical Survey of the Amalge Bore Area	Ravensthorpe, February 2006 V2	Western Botanical	Feb-06
Surveys for *Astartea sp*. Hopetoun (A.S. George 10594) and *Astartea sp.* Jerdacuttup (A Strid 21898)	Jan-06	Western Botanical	Feb-06
Translocation Proposal for *Stachystemon vinosus* (Euphoribiaceae) P1	Population # c6		Feb-06
Alternative Site for Turkey's Nest, Amalg Bore Site	Letter to Adrian Lee	Cockerton, G.	Mar-06
Astartea sp. Hopetoun area (AS George 10594) Regional Survey	Munglinup, Esperance and Fitzgerald River National Park Populations	Craig, G.	Mar-06
Ravensthorpe Nickel Significant Species	Conditions Assessment Program Interim Report- Oct to Dec 2005	Western Botanical	Mar-06
Condition Assessment Program Significant Species and Vegetation Communities	October 05 - July 06	Western Botanical	Feb-08
Management Plan for Priority Flora and Significant Vegetation Communities		RNO Report	Mar-06
Botanical Survey of Proposed Seawater Drain Ponds	Mason Bay Road, Ravensthorpe May 06 V2	Western Botanical	May-06
Landcare Services Final Seed Collection Report	RNO Mason Bay Road and TSF	Western Botanical	May-06
Landcare Services Seed Collection Report Ravensthorpe Nickel Operations Mason Bay Road and Tailings Storage Facility	May-06	Landcare Services	May-06
Amendment to Botanical Survey of Proposed Seawater Drain Ponds Mason Bay Road, Ravensthrope (Report WB 361)	Letter to Martin Smith	Western Botanical	Jun-06
Report on the Translocation Program for *Stachystemon vinosus* (Euphorbiaceae) DRF, population #6c		Atkinson, S.	Jun-06
Statchystemon vinosus Interim Recovery Plan	2006-2010	Cockerton, G. and Brown, A.	Jul-06
Baseline Vegetation Assessments 2001-2006	BHP Billiton Ravensthorpe Nickel DRAFT	Western Botanical	Jul-06

Title	Subtitle/Location	Author	Date
Botanical Survey for Relocation Option of Seawater Drain Pond 2 Mason Bay Road, Ravensthorpe	Sep-06	Harris, A.	Sep-06
Report on the Seed Collection Program for *Eremophila densifolia* ssp. Bandelup Hill (F. Lullfitz 5890)	Apr-06	Cockerton, G., Atkinson, S.	Sep-06
Exotic Flora and Fauna Management Procedure	Draft	RNO Report	Nov-06
Monitoring of *Stachystemon vinosus* (DRF)	Translocated Populations	Atkinson, S.	Jan-07
Weed Control Program (2006) and Recommendations for Future Weed Management at Ravensthorpe Nickel		Atkinson, S.	Jan-07
Ravensthorpe Regional Flora Survey	Species Action for: *Beyeria, Eucalyptus x stoataptera, Goodenia phillipsiae, Stachystemon vinosus, Kunzea similis*	Department of Environment and Conservation	Feb-07
Review of Genetic Analyses, *Allocasuarina sceroclada* subsp. Bandalup (G Cockerton 7773) P3 and *Stachystemon vinosus* DRF	2004-2005 samples	Rea, A., Cockerton, G.	Apr-07
Weeds Survey Report from Borrow Pit 4 and Mason Bay Road	Inspection Conducted 11th April 2007	Andrew Heinrich, Quality Agronomics	Apr-07
Botanical Survey for proposed Seawater Drain Pond	Mason Bay Road, Ravensthorpe May 06 V2	Western Botanical	Apr-07
Ravensthorpe Regional Flora Conservation Survey	Annual Operational Program	Department of Environment and Conservation	Dec-07
Review of Significant Flora and their Regional Distributions	Consolidated Data of 2001 - 2006 for Ravensthorpe Nickel Project	Western Botanical	Feb-08
Advice on potential impacts by proposed remedial works within remnant vegetation adjacent to Rejects Stockpile	RNO investigated 27.2.80	Western Botanical	Feb-08
Landcare Services Seed Collection Report - Hale Bopp	RNO November 07 - Mar 08	Western Botanical	Aug-08
Monitoring of Stachystemon vinosus, Priority 4 Translocated Populations	Apr-08	Landcare Services	Aug-08
Weed Control Works at Ravensthorpe Nickel	Jul-08	Landcare Services	Aug-08

Title	Subtitle/Location	Author	Date
Ravensthorpe Nickel Ravensthorpe Regional Priority Flora	Seed Collection	Department of Environment and Conservation	Sep-08
Weed Control Works at Ravensthorpe Nickel	Sep-08	Landcare Services	Sep-08
Summary of Seed Collection Works at Ravensthorpe Nickel Operations	2001 -2009	Landcare Services	Jun-09
Weed Control Works at Ravensthorpe Nickel	Feb-09	Landcare Services	Mar-09
Weed Control Works at Ravensthorpe Nickel	May-09	Landcare Services	Jun-09
Fauna Management Plan	Year One 1999-2000	Chapman, A.	Mar-00
Fauna Survey	2000	Sinclair Knight Merz	Dec-00
Stygofauna Investigation in the Tamarine and Springdale Limestone Deposits for RNO		Sinclair Knight Merz	Apr-01
Review of the RNO Fauna Monitoring Program	Management Plan Review	Biota Environmental Sciences Pty Ltd	Jun-01
Stygofauna Investigation	Phase 2	Sinclair Knight Merz	Aug-01
Subterranean Biotas in Western Australia	Report for the EPA	Playford, P.	Sep-01
Vertebrate Fauna of the Southern Central Coast Region of Western Australia		Chapman, A., Harold, G., Saunders, A., Teale, R.	Apr-03
Fauna Management Plan		RNO Report	Mar-04
The Status and Ecology of the *Pseudomys shortridgei* (Heath Mouse) in South Western Australia		CALM, Murdoch University and Government of WA	Sep-05
Fauna Trapping Program	2005	Biota Environmental Sciences Pty Ltd	Oct-05
RNO Heath Mouse and Western Whipbird Management Plan		RNO Report	Nov-06
Bee Scoping Study		Pharmco WA Pty Ltd	Dec-06
Terrestrial Vertebrate Fauna Risk Assessment for the Shoemaker-Levy Ore Body,	Ravensthorpe Nickel Operations	Coffey Environments	Apr-09

Title	Subtitle/Location	Author	Date
Conservation and Management of the Heath Mouse	Research Proposal	CALM, Murdoch University and Government of WA	
Social Impact Study	Final 2	Sinclair Knight Merz	Oct-00
Rehabilitation Management Plan Ravensthorpe Nickel Operation	Halleys, Hale-Bopp and Shoemaker-Levy Deposits Draft 1	Landcare Services	Mar-01
Audit of Progress Towards Closure and Rehabilitation of BHP Billitons Beenup Minesite	Volume I: Audit Report	Beenup Consultative Group	Feb-02
Audit of Progress Towards Closure and Rehabilitation of BHP Billitons Beenup Minesite	Volume II: Appendices	Beenup Consultative Group	Feb-02
Rehabilitation Program for Laydown and Stockpile Areas	Bandalup Hill Trial Pit, Planning and Preliminary Monitoring, July 2003	Western Botanical	Jul-03
Rehabilitation Program for Laydown and Stockpile Areas	Bandalup Hill Trial Pit, Planning and Preliminary Monitoring, April/May 2004	Western Botanical	Jul-04
Closure Cost Estimate	June 2005: Letter to Victor Maccarone	Adrian Lee	Jun-05
Annual Monitoring of Rehabilitation Trial, Halleys Trial Pit	Laydown and Stockpile Areas, 23 Month Monitoring, April 2005	Western Botanical	Nov-05
Translocation Trial (Bandalup Gravel Pits) April 2005 Monitoring	Kunzea similis (P2, proposed DRF) and Eucalyptus purpurata (P1, proposed DRF)	Western Botanical	Nov-05
Closure Cost Estimate	December 2005: Letter to Duncan Yung	Adrian Lee	Dec-05
An initial assessment of regeneration strategies and likely recalcitrant species of the flora of the RNO orebodies and associated disturbance areas.	An analysis based on species noted in Habitat Mapping conducted 2000-2001	Western Botanical	Jan-06
Rehabilitation and Preliminary Closure Plan		RNO Report	Mar-06
Mason Bay Road Seed Spreading Works	Jul-06	Landcare Services	Sep-06
Scoping Study Report - Update of the Preliminary Closure Plan		URS	Mar-07
Closure Plan 2007	Ravensthorpe Nickel	RNO Report	Jun-07

Title	Subtitle/Location	Author	Date
Closure Plan 2008	Ravensthorpe Nickel	RNO Report	May-08
Buffer Zone Management Options - Stage 1 Report	Final	Outback Ecology	May-08
Report on Seed Spreading at the Northern Saline Dam Rehabilitation Site		Landcare Services	Jun-08
Rehabilitation Plan and Preliminary Cost Estimate for the Ravensthorpe Nickel Future Options Selection Study	Revision 2	Landcare Services	Apr-09
Landfill Waste Classification and Waste Definitions		Department of Environmental Protection, WA	Sep-96
Approved Criteria for Classifying Hazardous Substances		National Occupational Health & Safety Commission	Apr-99
Guidance Summary Chemical Profile	for QN Ravensthorpe Intermediate	QNI Pty Ltd	Jan-00
Guidelines for Acceptance of Solid Waste to Landfill	Draft for Comment	Department of Environmental Protection, WA	Mar-00
Waste Management Study	Final	Sinclair Knight Merz	Oct-00
Geochemical Testing of Oversize and Underflow Samples	Implications for Material Management	Graeme Campbell and Associates Pty Ltd	Jan-01
Control of Major Hazard Facilities	National Standard and National Code of Practice	National Occupational Health & Safety Commission	Oct-02
Mine Waste and Plant Rejects Handling Management	Letter to Adrian Lee: Project Plan	Snowden Mining Industry Consultants	Feb-04
Waste Management Strategy	Part 1	Shire of Ravensthorpe	Feb-04
Explosives and Dangerous Goods Management Strategy	A Review and Update	Systems and Risk Solutions	Aug-06
Waste Management Manual	Draft	RNO Report	Sep-06
Hazardous Materials Management Plan	Draft	RNO Report	Nov-06

Title	Subtitle/Location	Author	Date
Bunding Conditions in Environmental Works Approval	Environmental Works Approval-Advice	Freehills	May-07
BHP Billiton Ravensthorpe Landfill Report	Final	Transpacific Industries Group	Jul-07
Waste Management Plan	Final	RNO Report	Oct-07
Waste Disposal Summary Report	Draft	Otek	Oct-07
Report for Dangerous Goods Audit	Corrosive Audit	GHD	Mar-08
Report for Dangerous Goods Compliance Audit	Diesel Storage	GHD	Mar-08
Report for Dangerous Goods Storage Audit for Miscellaneous DG Storage Facilities		GHD	Mar-08
Report for Dangerous Goods Storage Licence Audit	Warehouse Storage Area	GHD	Mar-08
Report for Licensing of Dangerous Goods		GHD	Jul-09
Central Discharge Tailings Storage Facility	WMC Resources Ltd Mt Keith Nickel Operation	Robinson, J.	Mar-95
Geochemical Testing of Process- Residue Samples	Implications for Residue Management	Australian Tailings Consultants	Jan-01
Tailings Management Options Study	RNP	Australian Tailings Consultants	Feb-01
Tailings Storage Facility	Design Report	Australian Tailings Consultants	Apr-01
Tailings Storage Facility	Risk Assessment	Australian Tailings Consultants	Apr-01
Tailings Storage and Evaporation Pond Facility	Analyses of Seepage from Evaporation Pond	Australian Tailings Consultants	Dec-01
Tailings Storage and Evaporation Pond Facility	Analyses of Seepage from Evaporation Pond	Australian Tailings Consultants	Jun-02
Modeling of Acidic Seepage from the Propose Tailings Storage Facility	RNP	Cymod Systems	Aug-02
Modeling of Acidic Seepage from the Propose Tailings Storage Facility	RNP Draft	Cymod Systems	Aug-02

Title	Subtitle/Location	Author	Date
Tailings Storage Facility	Recalculation of Storage Requirements	Australian Tailings Consultants	Aug-02
Geochemical Assessment of Laterite Nickel Tailings from the Gag Island Nickel Project	Implications for Disposal- Draft	Environmental Geochemistry International Pty Ltd	Feb-03
Geotechnical Assessment of the Process Plant Site	Final Design Report	Knight Piesold Consulting	Sep-03
Geochemical Assessment of Laterite Nickel Tailings from the Gag Island Nickel Project	Implications for Disposal- Document	Environmental Geochemistry International Pty Ltd	Oct-03
Geochemical Characteristics of Laterite Nickel Tailings from the Ravensthorpe Nickel Project and Implications for Disposal		Environmental Geochemistry International Pty Ltd	Oct-03
Kinetic Testing of a Pilot Plant Laterite Nickel Tailings Sample	RNP	Environmental Geochemistry International Pty Ltd	Nov-03
Conceptual Closure Plan	Tailings Storage Facility and Evaporation Ponds	Knight Piesold Consulting	Feb-04
Closure Standard	Issue 1.0	BHP Billiton	Jul-04
Tailings Storage Facility and Evaporation Ponds	Final Design Concept	Knight Piesold Consulting	Dec-04
Tailings Storage Facility and Evaporation Ponds Final Design	Vol 1 of 2	Knight Piesold Consulting	Feb-05
Tailings Storage Facility and Evaporation Ponds Final Design	Vol 2 of 2	Knight Piesold Consulting	Feb-05
Proposed Tailings Storage and Evaporation Facilities a RNO	Independent Review Report	Jerdacuttup Working Group	Nov-05
Proximity of RNO Tailings Storage Facilities and Evaporation Ponds to Known Fault Lines	Discussion Paper	Jerdacuttup Working Group	Nov-05
Tailings Storage Facility and Evaporation Ponds Stage 1	Operating Manual	Knight Piesold Consulting	Dec-06
Plantwide Permeability Testing for Tanks	Ravensthorpe Nickel Operations	Hatch	Jun-07

Title	Subtitle/Location	Author	Date
Mason Bay Road North	Vegetation and Flora Survey: Final Report	Craig, G.	May-99
Desalination and Seawater Supplies Project: Burrup Peninsula	Report and Recommendations of the EPA	Water Corporation	May-01
Proposal, Scope and Revised Budget for Characterisation and Mapping of Vegetation	Within Mason Bay Road Seawater Pipeline Alignment	Cockerton, G., Eveleigh, N.	Nov-04
Flora Surveys and Vegetation Mapping for the Masons Bay Road Pipeline Alignment	RNP, November-December 2004	Eveleigh, N., Mappin, K., Ang, L., Atkinson, J.	Dec-04
HDPE Seawater Pipeline	Rev B	RJV	Dec-04
Flora and Vegetation Assessments, Mason Bay Road Pipeline Alignment	November 2004- September 2005	Cockerton, G., Eveleigh, N., Mappin, K., Ang, L.	Mar-05
Seawater Supply Infrastructure Environmental Management Plan	Final	RNP Report	Mar-05
Environmental management Plan for Construction of Seawater Supply System	Draft	Outback Ecology	Mar-05
Seawater Pipeline Dieback Management Plan	Final	RNP Report	May-05
Seawater Pipeline Dieback Management Plan	Final	RNO Report	May-05
Mason Bay Road Proposed Pipeline Alignment	Botanical Survey Findings Phase 3	Western Botanical	Jun-05
Seawater Supply Infrastructure Environmental Management Plan	Revision 1	RNP Report	Aug-05
Flora and Vegetation Assessments Masons Bay Road Pipeline Alignment	November 2004- September 2005	Western Botanical	Sep-05
Masons Bay Road Pipeline Alignment	Part II Appendices, November 2004-September 2005	Western Botanical	Sep-05
Environmental Management Plan for Seawater Pipeline	Final	Ertech Pty Ltd	Dec-05
Botanical Survey Seawater Drain	Version 1 Revision 1	Western Botanical	Apr-07
Flood Risk Assessment - RNP Drain Pond No. 2 Report		GHD	May-07

Title	Subtitle/Location	Author	Date
Buffer Zone Management Options: Stage 1 Report	Final	Outback Ecology	Jul-07
Botanical Survey for Relocation Option of Seawater Drain Pond 2, Mason Bay Road	Final	Western Botanical	Sep-06
Review of Flora & Vegetation Survey Conservation	Final	Outback Ecology	Jul-07
Ravensthorpe Regional Flora Survey	Annual Operational Review	DEC	Jan-08
Review of Flora & Vegetation Survey Conservation Hale – Bopp South Extension	Final	Woodman Enviro-mental consulting	Mar-2014
BHP Billiton Ravensthorpe Nickel Operations Fauna Trapping Program 2005	Final	Biota Environmental Sciences Pty Ltd	Oct-2005
Fauna Monitoring Ravensthorpe Nickel Operations	Final	Coffey Environments	Jan-2010
Conservation Significant Vertebrate Fauna Monitoring for Ravensthorpe Nickel Operations	Draft	Terrestrial Ecosystems	Oct-2014
Targeted Rare & Priority Flora Survey: Hale Bopp Waste Dump Area Vegetation Remnants	Final	Nathan Mcquoid	July-2013

Appendix Four: Closure Risk Assessment (Enterprise Wide Risk Methodology)

Closure Risk Methodology (Enterprise Wide Risk Methodology)

					Gross Exposure - Inherent Risk													Controls		Residual Risk										
					EWRM Rating Severity							Likelihood								EWRM Rating Severity							Likelihood				
Risk No.	Risk ID	Description / Causes	Impacts	Severity comment	Financial	H&S	Environment	Social	Reputation	Legal	Max Severity	Severity Level	EWRM Likelihood Factor	EWRM Probability	Shewhart	EWRM Likelihood Factor Kent	EWRM Risk Rating	Existing Controls Preventative (P) and Reactive (R)	Future Tasks Preventative (P) and Reactive.(R)	Financial	H&S	Environment	Social	Reputation	Legal	Max Severity	Severity Level	EWRM Likelihood Factor	EWRM Probability	Shewhart	EWRM Likelihood Factor Kent	EWRM Risk Rating	Comments
G7-Spread of dieback during & after closure.	G	Inadequate vehicle hygiene procedures in place for earthmoving equipment during closure. An area has been affected during operations and runoff from site or vehicle movements from infected to non-infected areas transport infectio	Dieback could prevent closure criteria from being achieved and could impact on the biodiversity of surrounding areas. If dieback was identified, some rework of infected area would be required, potentially including the installation of drainage measures. RNO may be required to rehabilitate offset areas to mitigate areas affected by dieback.	Reputation damage with regulators has the potential to hinder future FQMAN mining approvals and could lead to long term monitoring and remediation requirements for diseased areas.	4	0	5	0	4	2	5	100	1	3	3	100%	300	Hygiene program in place to prevent the spread of dieback from adjacent diseased areas and eliminate contamination within conservation and rehabilitation areas.(P)	None	4	0	5	0	4	2	5	100	0.3	1	0.3	10%	30	0
G1-Spread of weeds to the mine area impacts on rehabilitation success.	G	Machinery entering onto site Airborne transfer of weeds.	Weeds contaminate topsoil stockpiles and may result in inability to meet rehabilitation criteria.	Inability to meet rehabilitation criteria may result in legal action and reputation impacts. Affected areas may require rework and weed control. It should be noted however, that experience with RAV8 minesite nearby is that weed spread is low.	3	0	0	0	3	2	3	10	3	3	9	100%	90	Weed spraying of topsoil stockpiles and mine boundaries.(P) Controlling weeds in adjacent farmland.(R)	None	3	0	0	0	3	2	3	10	1	0.3	0.3	40%	3	0
H&S1-Injury to workforce during decommissioning closure	H&S	lack of sufficient controls/management of risk. Activities involved that FQMAN is not accustomed to managing. Use of non-specialised labour is a risk. Demolition incidents more frequent than in construction.	0	0	0	3	0	0	2	4	4	30	3	3	9	80%	90	0	Contractor selection process, ensure contractor has adequate safety management/ controls/ processes/ systems in place	0	2	0	0	2	3	3	10	0.3	0.3	0.09	80%	0.9	0
G3-Salinisation surface water	G	Seepage arising from saline material placed in the waste dump. Dust suppression. Saline run-off from rejects stockpiles. Aerosol from evaporation	Cost of remediation of affected areas. Affected areas not identified prior to rehabilitation to have the potential to contaminate topsoil and compromise the achievement of rehabilitation criteria. Inability to meet rehabilitation criteria could result in the requirement to rework rehabilitation, reputation damage and inability to reclaim bonds. Offsite discharge could affect the surrounding environment.	The site does not currently have any operational history. It has been constructed with bunding to contain spills and leaks. Therefore, there are currently no specific areas of concern with respect to contamination, however, it is considered likely that some contamination will occur over the life of the facility. Reputation damage may influence FQMAN ability to obtain approvals for future projects.	0	0	4	0	3	2	4	30	1	1	1	70%	90	Surface drainage - network of saline drains.(P) and clean up of saline spills during operations(R.)	Incorporate the requirement to remediate saline affected areas into the closure plan (R).	0	0	4	0	3	2	4	30	0.3	0.3	0.09	10%	2.7	0
G4-Community socio economic impact	G	Mine closes and income and jobs associated with the mine disappear. Community does not have the capacity to deal with the mine closure.	Impacts on community services and maintenance of infrastructure. Lack of employment and associated social issues.	Given that the site has not yet started operating, there is little experience of the operational socio-economic impacts. At this stage, we are assuming that there will be a high impact associated with closure, but further work will be needed as the life of the mine progresses to asess this.	0	0	0	4	0	0	4	30	0.1	10	1	100%	30	None	Community Development program.(P)	0	0	0	4	0	0	4	30	0.1	10	1	100%	30	The residual risk is the same as the inherent risk at this point because there is currently no program to predict impacts at closure and put in place measures to address them.
G6-Closure criteria set by regulators are not achievable	G	Insufficient availability of rehabiltiation materials. Innability to re-establish vegetation. Introduction of weeds and pests. Introduction of dieback.	Vegetation rework will be required for areas that don't meet regulator expectations for reinbursment of bonds. Rehabilitation of offset areas to mitigate sub-standard rehabilitated areas may also be required. Cost of remediation of affected areas.	Reputation damage with regulators has the potential to hinder future FQMAN mining approvals. Further rehabilitation works could extend the planned RNO closure timeframe.	4	0	3	0	2	3	4	30	0.3	3	0.9	80%	27	Materials handling procedure.(P) Topsoil has been surveyed, quantiied and stored in stockpiles.(P) Seed collection is carried out prior to mining.(P) Progressive research being carried out to determine best practice rehabilitation for the local environemnt.(P) and (.R)	Involve regulators in development of closure criteria. Sequential rehabilitation Develop a research rehabilitation management plan	4	0	3	0	2	3	4	30	0.3	3	0.9	10%	27	0
G2-Soil and Groundwater contamination requires remediation at closure.	G	Process Area: Spills from acid, diesel and reagent storage areas. Mine Area: Spills from lube area and fuel stores, evaporation cells and leaks in the pipelines between the TSF and process plant seawater holding pond and pipeline infrastructure. Leaks from hydraulic equipment failure.	Costs of remediating impacted areas. Salt affected areas may compromise the ability to meet long term rehabilitation criteria in localised areas. Inability to meet rehabilitation criteria could result in the requirement to rework rehabilitation, reputation damage and inability to reclaim bonds.	The site does not curently have any operational history. It has been constructed with bunding to contain spills and leaks. Therefore, there are currently no specific areas of concern with respect to contamination, however, it is considered likely that some contamination will occur over the life of the facility.	3	0	0	0	0	0	3	10	1	1	1	70%	10	Bunding and pipeline maintenance and inspections.(P) Inventory reconciliation.(R) Vehicle inspections.(P) Groundwater monitoring and implementation of remediation measures during operations.(R) Clean up of areas affected by spills during operations. (R)	None	3	0	0	0	0	0	3	10	0.3	1	0.3	50%	3	0
H&S4-Community injury post closure	H&S	Innadequate rehabilitation of site including demarcation, signage, restricted access etc.	Exposure of community to hazardous materials injury from fall/trip hazard	0	0	3	0	0	2	3	3	10	3	0.3	0.9	80%	9	0	Restrict access where necessary (eg fencing), remove/eliminate hazards and contamination from site, signage	0	2	0	0	2	2	2	3	0.3	0.1	0.03	80%	0.09	0
TSF3-Seepage restricts closure	TSF	Inadequate TSF cover permits infiltration through jarosite that results in acid seepage.	Poor quality acid seepage. Cost of rehabilitation to address cover issues.	0	0	4	0	0	2	4	4	30	0.3	1	0.3	0%	9	Research	Laboratory trials Field trials and sequential tailings rehab	0	4	0	0	2	4	4	30	0.1	1	0.3	40%	9	0
G5-Workforce retrenchments	G	Workforce retrenchments as closure progresses	Socio-economic impacts on the workforce and their families. Loss of intellectual property and knowledge of operational history in the lead up to closure execution.	Emloyees may require significant adjustment depending on the length of time they (and their families) have been resident. Inability to retain key staff or inneficient handover of operational knowledge could impair the efficient use of resources during closure and delay relinquishment of leases.	2	0	0	2	0	0	2	3	0.3	3	0.9	60%	2.7	None	Workforce outplacement program. Implementation of knowledge management system. Workforce retention program.	2	0	0	1	0	0	2	3	0.3	1	0.3	50%	0.9	0
Mine1-Final Void changes local hydrological balance.	Mine	Surface water diversion and final void at Shoemaker.	Halleys and Hale Bopp mining pits are backfilled. Shoemaker has the potential to effect surface water flows.	xx	3	0	2	0	2	0	3	10	0.1	1	0.1	0%	1	None	Incorporate surfacewater impacts and the subsequent control measures identified for Shoemaker into the closure plan once the NOI is accepted.(P)	3	0	2	0	2	0	3	10	0.1	0.3	0.03	0%	0.3	0
Mine3-Reputation Release of mineral fibres	Mine	Mineral fibres are not detected and are placed on the outside of the dump where they may become exposed.	Potential damage to reputation and legal action by regulators. Exposed area of the waste dump would require capping. Potential to impact the health of local residents	There is the potential for fibrous materials to be present in the ore and waste rock associated with the site, however, should some material be placed on the outside of the dump, it should be covered with topsoil. Exposure should be minimial and detection by others before RNO identified it as an issue and addressed it is considered unlikely.	0	0	0	0	3	2	3	10	0.1	1	0.1	10%	1	Materials handling is managed for worst case scenario (i.e. assume that all rocks potentially containing fibrous materials are a potential issue) and is reflected within the current handling procedure.(P)	0	0	0	0	0	3	2	3	10	0.1	0.3	0.03	5%	0.3	0
TSF1-Contamination from the TSF	TSF	Seepage through walls or floor of TSF.	Salinity and metals could be expressed at the surface and impact surrounding vegetation and soils and/or could enter the local groundwater. Seepage of the TSF could also raise the local watertable, thereby impacting vegetation.	At this stage operations have not commenced and there is no seepage from the TSF. The groundwater at the site is brackish to saline. Groundwater flow is believed to be restricted. Seepage from the TSF may require the installation of pump back systems. The likelihood of their being issues with the TSF at closure is considered to be limited as the TSF is designed to be constructed in 3 cells. Each cell wil be rehabilitated as the next is started. There will, therefore, be operating experience of the TSFs which can be addressed before the next cell is constructed and rehabilitated.	3	0	0	0	0	2	3	10	0.1	1	0.1	20%	1	Engineering / best practice is incorporated into design.	Dams are being built sequentially so that monitoring can be carried out and design/infrastructure ammended according to findings.(P)	3	0	0	0	0	2	3	10	0.1	1	0.1	20%	1	0
TSF2-Disposal of residual process liquors	TSF	Innability to evaporate off liquors at closure (Evaporation rate at RNO has been estimated at 1.5m/yr. There is the potential for total volume of liquors at closure to be 150,000 - 200,000 m3)	Closure completion date could be extended to incorporate length of time for evaporation. Their may be a requriement for a treatment facility to be constructed onsite.	At this stage, the disposal of process liquors is not considered to be a material risk as it was considered that delays to rehabilitation would be minimal.	0	0	0	0	0	0	0	0	0	0	0	0%	0	None	None	0	0	0	0	0	0	0	0	0	0	0	0%	0	0

Appendix Five: Assumptions and Qualifications

Assumptions and Qualifications

The assumptions applied to all sites, areas or elements defined within this Closure Plan are listed below in Appendix 5 Table 1. Assumptions specific to a site, area or element are included within Appendix 5 Table 2.

Appendix 5 Table 1: Closure Assumptions across all Department Areas

1.	The Closure Plan and cost estimates are based on disturbances likely to occur within the next reporting period (3years). E.g. it is very unlikely that any mining will take place at Shoe Maker Levy, therefore these costs are zero. Future iterations of the MCP will include disturbances likely to occur in the future reporting period.
2.	Closure execution is assumed to occur in 2036.
3.	All costs are based on existing and currently approved LOA plan and only take into account those developments that form part of the approved strategic plan for the site at the time of the Closure Plan review.
4.	Assumed that the rehabilitation already completed is as per the Closure Plan requirements.
5.	Existing machinery will not be available at the site for use by the demolition or civil contractors at the time of closure, thus mobilisation/demobilisation costs for contractor equipment are included.
6.	It is assumed that major drainage lines established will remain and will meet closure requirements.
7.	Assumed that all underground services and concrete greater than 1.0 metre below ground level, with the exception of contaminated lines (e.g. fuel lines), will be left in situ. If concrete less than 500mm from the surface cannot be removed, material will be added to meet the required 500mm depth requirement.
8.	All infrastructures will be decommissioned or demolished and removed from mine site areas as per FQML preferred option.
9.	RNO has no post closure responsibility for infrastructure developed within Hopetoun and Ravensthorpe as part of the RNO agreement with State and Local Government.
10.	It is assumed that all transportable buildings will be relocated by the contractor to a defined laydown area and will be the responsibility of RNO to dispose.
11.	Debris from demolition of fixed infrastructure is to be carted to an on-site waste disposal location.
12.	The budget is based on closure of the whole site as a single operation; any part done individually will incur additional overhead costs (e.g. mobilisation/demobilisation, project management, etc.).
13.	Within each of the closure areas, the total area requiring Earthworks is equivalent to the total area requiring rip and seed, oxide rock covering, caprock coverage or topsoil coverage.

14.	Assumed that Telstra facilities will be removed by Telstra.
15.	Costs associated with decommissioning of the plant including flushing of lines, depressurisation of systems and removal of hazardous materials (excluding oils and greases) and radioactive sources have not been included in the closure costs.
16.	If a site crosses lease boundaries and the leases have different conditions attached, the most stringent conditions will be applied to the whole site.
17.	Assumed that the DER Operating Licence and groundwater licences applicable to the site will apply after closure up to the end of the post closure monitoring (5 years).

Appendix 5 Table 2: RNO Area Closure Assumptions

Halleys Open Cut Mine	
Specific Closure Assumptions	RNO will progressively backfill pit voids with rejects. In previous closure plans assumptions were made that the waste dump would be moved and material carted to backfill the Halleys Open cut void. The practicalities of shifting the waste dump and mixing of rejects and clean fill material would create an unacceptable environmental impact and result in insufficient clean fill to close the open pit. The existing Halleys waste dump will continue to be shaped and remain in place at time of mine closure.

Plant and Infrastructure	
Specific Closure Assumptions	There are significant infrastructures related to camp accommodation, roads, sewage treatment plants, potable water facilities and covered buildings that are considered valuable assets that may be of benefit to the local community post closure. Such facilities have been transferred to local communities (shire) for the benefit of retirement communities and the like in other states across Australia. Discussions on the transfer of such assets will be progressed in future iterations of the mine closure plan.

Seawater Intake and Facilities	
Specific Closure Assumptions	The coastal location for the seawater intake and facilities is considered sensitive to coastal wave action and weather conditions. Every effort will be made to ensure the disturbed area will have infrastructure removed and be re-established

	to promote a stable revegetated environment. The seawater pipeline from the intake pumping station to the process plant which is buried to a depth of > 0.5 metre will not be dug up at the time of closure. All observation ports along the pipeline will be backfilled with clean material and revegetated. If there is a concern to pipe integrity FQMAN will backfill the pipe with tailings material to up to 200 metres from the coast.

Tailings Storage Facility	
Specific Closure Assumptions	The current approach for the closure of the tailings storage facility is to fill the dams, cap the tailings material and cart fill to create a water shedding surface to prevent the ingress of water and minimise seepage through the dam to the underlying groundwater table.

Evaporation Ponds	
Specific Closure Assumptions	Through discussions with government regulators and consideration of the best environment outcome for containment of contaminated salts the evaporation ponds will not be removed at the time of mine closure. Current mine closure plans have taken the approach to consolidate the contaminated salts in the existing pond structures (50% of ponds for containment) while the liners from emptied ponds will be used for creating a sealed cap which will be covered with soil media to a depth that will support the growth of native grasses and low shrubs.

Tracks and Roads	
Specific Closure Assumptions	There are a range of roads and tracks found throughout the mine lease area that are required during operation. Sealed roads have already been identified to be of benefit to the local community for access to farmland / cropping areas. Some access roads (non-sealed) also provide benefit to farmers and may be of use for fire breaks to protect native vegetation to the west of the mine areas. Further discussions will take place to determine which roads will not be closed and revegetated at the time of mine closure.

Appendix Six: Identified Research and Environment Management Actions

Table 10 Identified Research and Environment Management Actions

Item #	Item Heading	Background and reasoning
1	Conveyor line to Shoemaker-Levy (SL)	The conveyor alignment to Shoemaker levy had not been finalised. An option through the Bandalup Corridor on the western side of the Halleys ore body area was canvassed by ICF Kaiser (alignment mapped by Dr Gil Craig) and by RNO (alignment from the RNO Processing plant to the Sth Coast Hwy and then westwards to the SL deposit not assessed). The vegetation of the latter has not been assessed and will take at least 1 full year to effectively map and inventory the flora. **These actions have been completed**
2	Review of RNO Priority Flora and Significant Vegetation Community Management Plan	(a) A review of RNO Priority Flora and Significant Vegetation Community Management Plan has been flagged by RNO. This will entail a desktop review of existing documentation and adjustment based on FQML's current plans. (b) A review major adjustment to RNO's Rehabilitation and Preliminary Closure Plan is warranted given the change of ownership of the site and changed preferences for mine closure discussed at the on-site meeting in June 2012. **These actions have been completed**
3	Discussion of revised management plans with regulators	Recommended that you engage with regulators, particularly DEC, at the earliest possible time to bring them in to the process of reviewing and adjusting the management plans. I have found this process to be most beneficial and far better than putting in a lot of work and presenting revised documentation to DEC without giving them a chance to engage at the scoping phase. **These actions have been completed**
4	Review of Monocots	Monocots were not adequately dealt with during the EIA process, particularly the Cyperaceae and Restionaceae. This was due to changing taxonomy in both groups at that time. Much of this has now been resolved. A targeted assessment of Monocots is required and could commence with a review of material already held by Western Botanical, followed up by limited targeted collections as needed.
5	Monitoring of rehabilitation conducted to date	A review of rehabilitation conducted to date at RNO will give guidance on effectiveness of previous works and show development of vegetation since implementation. This will go towards establishing a rehabilitation track record for RNO and will be well received by regulators. **These actions have been completed**
6	Mason Bay Rd revegetation	The revegetation of the Mason Bay Rd pipeline alignment was a major focus for the DEC during approvals. This has not been monitored since the second pipeline installation and should at least be assessed for effective establishment rates in general terms.
7	Review of vegetation mapping west of the Halleys and Hale-Bopp ore bodies.	Some minor anomalies in vegetation mapping west of the Halleys and Hale-Bopp ore body areas were noted during the Nov 2011 works on site. These inaccuracies can lead to some difficulties in interpreting impacts on vegetation and potential habitat for significant flora. These can be readily addressed with a limited field verification and map adjustment. **These actions have been completed**
8	Rare Flora condition assessment	Condition assessments of the rare flora on site should be addressed once per year with a monitoring program developed to provide statistically valid data while meeting budgetary constraints. **These actions have been completed**
9	Seed quality assurance	A large amount of seed is held in store by Western Botanical for RNO. A routine periodic sub-sampling of representative species within groups should be assessed for viability and germination status over time with any significant depression in either being addressed by investigation of reasons for deterioration, adjustment of seed storage conditions if needed and supplementation of seed in store. All seed lots should have purity, viability and seed count data. This may not be the case at present. Note: The majority of seeds in store are expected to have long shelf lives with minimal reduction of viability. **These actions have been completed**

Item #	Item Heading	Background and reasoning
10	Monitoring of translocated populations of rare and priority flora	(i) Translocated populations of *Eucalyptus purpurata* (Rare), *Kunzea similis* subsp. *mediterranea* (Rare) at the Bandalup gravel pits; (ii) Translocated population of *Stachystemon vinosus* (P4) south-west of Bandalup Hill have not been monitored for survival, growth and reproductive status for many years. A simple task that would give DEC confidence that these populations were successfully translocated in the trials undertaken.
11	Translocation of rare flora	Implementation of translocation plans for *Eucalyptus purpurata* (Rare), *Kunzea similis* subsp. *mediterranea* into suitable habitats in the region. Requires investigation of security of tenure, conservation covenants, soil profile assessments, fencing, and direct seeding at appropriate times of year. Discussed that only *Hibbertia abyssa* and *Kunzea similis* subsp. *mediterranea* were directly impacted by mining but DPaW may want original commitment to also translocate *Eucalyptus purpurata*. **These actions have been completed**
12	Specific Flora issues	*(i)* *Thysanotus pauciflorus* "Bandalup Form" requires further taxonomic investigation, likely contains at least 2 species with the taxon present on RNO tenements being a new species with wide distribution. *(ii)* *Hibbertia* species collected during EIA process – several specimens collected were not fully identified (*H. abyssa* being a good example) and should have further taxonomic work supported by additional collection of flowering and fruiting material outside ore body areas.
13	Library of Consultants work	Develop and keep an updated library of works conducted by environmental consultants on site. **These actions have been completed**
14	Review of Rehabilitation outcomes and methods	Linked to the review of item 2(b) Rehabilitation and Preliminary Closure Plan, the need to effectively grow representative native flora on all soil types in operational rehabilitation should be investigated through: (i) Desktop review of likely contribution of topsoil (already undertaken by WB), contribution from applied seed, gap analysis to determine likely recalcitrant species, development of plan to address recalcitrant species that may be confirmed in operational rehabilitation. (ii) Rehabilitation trials using range of subsoils and topsoils present. (iii) Determination of rehabilitation targets for vegetation structure, composition and floristic representation. Particularly in relation to the various soil types that will be available for rehabilitation. (iv) Rehabilitation monitoring program supported by database for data management and statistically valid analysis, comparing outcomes to targets for floristic composition, species richness, vegetation structure. **These actions have been completed**
15	Assessment of vegetation of the Hale-Bopp south ore body area	Will be needed in support of a further development proposal of this area, requires quadrats, transects, inventory and confirmation of mapping. This is an old-growth area that is very dense but species poor due to climax vegetation. **These actions have been completed**
16	On-going seed collection	(i) BHP Plan was for 1,440 ha of native vegetation (ii) At conservative 3 kg per ha = 4,320 Kg seed (iii) Currently have 700 Kg of seed in store of approx 100 species that has been collected over 8 years from areas that were relatively unburnt. (iv) This is approx 1/6th (1/6.171) of the amount needed to re-seed 1440 ha. (v) Therefore seed collection should be annual and ongoing. (vi) Need to agree internally on acceptable provenance range for seed collection, not a simple arbitrary radius form site, will depend on pollination vectors for groups of species (e.g.: large area for bird pollinated species such as *Eucalyptus* and *Banksia*). (vii) DPaW will have an interest in this process and outcomes. (viii) Need seed collection and processing facilities re-built on site **These actions have been completed**
17	Confirmation	Review soils within topsoil stockpiles.

Item #	Item Heading	Background and reasoning
	of topsoil stockpiles	Review species presence on topsoil stockpiles and likely contribution to soil seed bank. **These actions have been completed**
18	Rehabilitation Commitment for 1.4:1 disturbance and Farm Forestry options	Develop farm forestry options for the various soil types on private land in the RNO holding. Requires a soil landscape map and limitations on various species inclusion applied based on findings. Review rehabilitation commitment to return 1.4 ha for every 1 ha of land disturbed, determine appropriate species mixes and rehabilitation methods.
19	Smoke treatment of topsoil to trigger smoke responsive species	It is noted that no *Kunzea similis* is present in topsoil stockpiles taken from the SST community. Need to verify this claim. Need to conduct glasshouse topsoil trails to determine if smoke applied to topsoil will trigger germination of *Kunzea similis* subsp. mediterranea and other smoke responsive species.
20	Surface water management	particularly from roads leading to the office and camp parking areas – these have the highest risk of introduction of Phythophthora dieback. **These actions have been completed**
21	Post-rehabilitation - saline water seepage	there is a great risk associated with saline water seepage out of the mine site and potential downstream impacts
22	Correct soils repositioned at the appropriate level in the landscap	i.e. lower slopes-plain (sandy surfaced duplex soil type) to upper slopes with laterite, and revegetation with associated plant species. **These actions have been completed**
23	Mosaics of soil-vegetation types maintained	blending of surface soils to be avoided. The natural landscape of the Ravensthorpe System typically changes its soil type and associated vegetation every 100-200 m. **These actions have been completed**
24	Management of Africa lovegrass	a fire hazard and invasive weed. Start rehab from north – seed heads tend to be blown from NW to SE in late summer. **These actions have been completed**
25	Seed mixes for rehabilitation of the agricultural areas	should include native species that produce pollen and nectar during January-March, a major “feed gap” time for native animals. Species lists with pollen & nectar availability were prepared by me for Western Botanical/ BHP Billiton and not sure if they ended up in a formal report – I can search for the raw data if required. **These actions have been completed**
26	Ongoing annual seed collections.	continue to build the site seed inventory, especially in areas which are to be cleared **These actions have been completed**
27	Mine Pit Rehabilitation Issues	1. Stability - Work with the engineers to quantify planned slope angles/lengths for rehabilitation profile. 2. Determine soil chemical and physical properties – Determine the acceptable limits of soil chemical and physical properties to maintain stability within the landform design parameters, and be capable of supporting plant growth. 3. Investigate quantities of site available material – A material balance survey to determine quantities that fit within the range of acceptable limits. Once the desired soil properties are defined and available materials quantified, you’ll have a good idea whether you have sufficient material for rehabilitation. **These actions have been completed**

Item #	Item Heading	Background and reasoning
28	Quantify the value of stored topsoil stockpiles	in terms of species that will return when you re-spread it. This is being done through an assessment of seed vs. no-seed in your farmland rehab that we'll implement this week. The key reason for doing this is that your best chance of getting back species diversity in mine pit rehabilitation is going to be through topsoil return. You could spend a lot of money collecting seed, with no guarantees that you will be able to get much to germinate when you come to use it. Quantifying the biological value of topsoil will help you to make decisions on how much effort to put into collecting more seed. **These actions have been completed**
29	Testing seed viability	BHP spent around $1M on seed collection from 2002 – 2007 so you have an excellent volume of seed material that is being stored by Western Botanical in an impressive seed storage facility. I recommend that you test the viability of this seed just to ensure that it has maintained viability over time. Testing one or two species from your main genera should be enough, maybe a $3-$4,000 investment. **These actions have been completed**
30	Seed collection	as suggested during the meeting, seed collection should also be a priority. Speaking from experience, the most important thing for you to do with seed collection is to clearly define where you want the material sourced from. The productivity differences between Halleys and Hale Bopp were vast as a result of disturbance history. It would be relatively easy to show you the areas you should focus on. One recommendation I will make with seed collection is that the best thing to do is to get people in to do just that task. It requires an enormous amount of effort and you'd be far better off getting in a dedicated team for say 4-6 weeks than spreading it out over the summer on a more ad-hoc basis **These actions have been completed**
31	Use of saline material	This is not my area of expertise, but I think that you will need to work out how to manage your saline overburden material and ensure it isn't mixed with or doesn't rise up into your plant growth medium. **These actions have been completed**
32	Cost of rehabilitation vs. rehabilitation success	I have some contacts in the rehabilitation industry who are managing to reduce seeding rates quite significantly by achieving very high germination rates, above what is normally achieved. The rationale is quite sound in that the range of species and planting methodology used are designed for a dry growing season (i.e.: plan for the 8 in 10 seasons that are dry) rather than seeding and hoping for a wet season. I would like to get these people with years of experience in farmland rehabilitation involved on your project to help you get the best return for your $$ in terms of species richness and abundance. I think this is well and truly achievable. Every kilo of seed in store has cost around $1,000 to produce, so if you can halve your seeding rates, the savings over 500+ hectares will be substantial. I'll be in touch with you separately to further develop these ideas. **These actions have been completed**
33	Management of weeds	there will be ongoing weed management required in your farmland rehabilitation areas. This will only be required in the first 2-3 years post rehabilitation, but you'll need to plan for some reasonable intensive weed control works during this period **These actions have been completed**
34	Landform overall design	height, landform slope parameters, backfill materials options, physical and chemical properties of materials to be used on surface, reconciling mining schedule with backfill options, surface water management on the landform
35	Completion criteria	defining aspects, objectives, criteria, measurement approach and quantitative standards, particularly in relation to refining target vegetation and related standards for diversity, density, cover etc
36	Landform cover design	erosion stability, water holding capacity, preventing capillary rise of salts, matching materials to veg requirements
37	Soil Management Plan	incorporating: requirements from landform and cover designs, materials inventory and reconciliation against planned requirements, surveys of areas to be cleared in future mining (opportunities to harvest quality subsoil/armouring material), characterisation of current waste stockpiles, and topsoil management (optimising use of fresh and stored topsoil)
38	Protection and monitoring of Conservation Zones in relation to mining impacts	establishment of aerial photogrammetry to define any impacts over the long term, electronic imagery for future comparisons **These actions have been completed**
39	Dieback management and controls	update of the dieback management plan and ongoing annual commitment reviews **These actions have been completed**
40	Landform rehab	field trials to investigate soil cover options, vegetation establishment and seeding rate **These actions have been completed**
41	Rejects as backfill	long-term issues from leaching of salinity, management options to leach and re-use leachate prior to covering
42	Tailings cover design	investigations and planning

Item #	Item Heading	Background and reasoning
43	Buffer zone farmland	management options, '0.4ha offset' requirement, **These actions have been completed**
44	Closure Plan for site	a well defined plan to optimise waste handling and establish final landform cover design and soil management handling practices to agreed rehabilitation closure management plan.
45	Rehabilitation strategy	establish a program for farmland rehabilitation, tailings dam revegetation and minesite rehabilitation in support of mine closure objectives and criteria **These actions have been completed**
46	Rejects handling and disposal	establish a program to backfill the mine pits as soon as possible to minimise the footprint of disturbance and potential added cost of rehandling beneficiated reject waste. **These actions have been completed**
47	Tailings dam management program	define a 5/10 year tailings management program identifying all new cells and lifts to maximise tailings storage and meet all license conditions **These actions have been completed**
48	Amended site environment license	establish an environment license that meets regulatory requirements and identifies all potential environment impacts through monitoring programs as set out in the license **These actions have been completed**
49	Detailed environment department budget	to set clear budget costs against environment targets and performance objectives **These actions have been completed**
50	Library of all consultants work	a well catalogue library to capture all previous environment work established under the previous ownership by BHPB. **These actions have been completed**
51	Approved site Management Plans (Ministerial Statement 633)	updated and approved set of management plans for mine site operations with clearly defined commitments to demonstrate sound environmental performance.
52	Fully integrated GIS database system for site	provide clear communication of environment objectives and performance through spatial information technology for reporting and monitoring purposes. **These actions have been completed**
53	Water Management Program	a well-defined water management program able to identify early any impacts associated with mining and process activities on site.
54	Environment Guidelines for Site	a set of clear working guidelines to assist in management of environment hazards, spills, and environment risk associated with mining and process activities. **These actions have been completed**
55	Vegetation Monitoring	The implementation of the High Resolution Remote Sensing Data for Vegetation Monitoring Program. This project would be a useful tool in investigation and monitoring the health of the unique vegetation on our site and across the region. **These actions have been completed**
56	Topsoil Management	for successful rehabilitation projects in future, the management (weed control, duration and edge effect) of topsoil stockpile should be a high priority. **These actions have been completed**
57	Dieback Pad	ongoing issues related with the Dieback pad flooding due to the accumulation of soil particles can have an impact of the surface and groundwater resulting to long term ecological impact on our unique Vegetation system . A specified Dieback clean-up program, in conjunction with other Departments (Utilities/ Process), should be implemented. **These actions have been completed**
58	Surface and Groundwater Monitoring	due to Environmental Incidents (spills) on site, surface and groundwater monitoring to be considered as a priority. **These actions have been completed**

Item #	Item Heading	Background and reasoning
59	Environmental Incident Management	I understand that we have a new system (In control) to effectively monitor and manage Incidents on Site. However, education and awareness programs still have to be implementing for all personals (FQM/ Contractor) on site. If we can't conduct toolbox meetings due to our commitments, let's continue posting environmental information on our Website integrated with our GIS program. **These actions have been completed**
60	Rehabilitation	more revegetation and rehabilitation programmes to be conducted on site in coming years **These actions have been completed**
61	Daily Area Inspection	more eyes should be involved to issue unnoticed issues identified **These actions have been completed**
62	Waste Disposal and Storage on site	IBC containers and other non reactive containers are still been disposed in the laydown area. Clear procedures have to written and communicated to departments on where and what to dispose to the laydown area. **These actions have been completed**
63	Integrated EMS	ensure all activities have related MPs, procedures & SWIs. **These actions have been completed**
64	Compliance Reporting	ensure all reports are completed for regulators **These actions have been completed**
65	Management Plans	complete & set all RNO environmental commitments **These actions have been completed**
66	Licence	progressively update RNO's licence through discussions with DEC to set & maintain site specific criteria for monitoring and asset management (trigger/investigation levels etc). **These actions have been completed**
67	Monitoring	develop procedures to ensure all monitoring is compliant with licence & community commitments, ensure analysis of results is undertaken in a timely manner. **These actions have been completed**
68	Mine Planning	develop a good working relationship with the mining dept to ensure environmental requirements (PoWs, Mining Proposals) are included & can be delivered according to a cohesive schedule. **These actions have been completed**
69	Process Planning	as with the mining department, ensure there is an interdepartmental plan for progressive Works Approvals/ Mining Proposals for process assets (TSF, Evaps etc). **These actions have been completed**
70	GIS	utilise asset to provide a centralised recording system for onsite activities (disturbance, survey, monitoring, incident etc). **These actions have been completed**
71	Flora	undertake surveys, translocations etc as required (I expect there will be plenty of info from the flora consultants on this topic). Also ensure progressive rehab is undertaken. **These actions have been completed**
72	Auditing	implement as part of EMS a progressive audit schedule to ensure all commitments are being met & update for any changes to licencing. **These actions have been completed**
73	Environment Department	retention of suitable staff, recruitment of a full complement of people in the Environmental Department, clearly defined roles and responsibilities, and career progression and training of our people. Without the right people, none of the below will happen in a cost effective manner for the company. We need the people with the skills, ability and passion. **These actions have been completed**
74	Dieback	establishment of a dieback control zone, and infrastructure along Mason Bay Road to reduce the spread. If we are found to have spread dieback, the costs, both through the community and as imposed by regulators, will be significant. **These actions have been completed**
75	EMS	establishment of our policies, plans and procedures. This will stop a lot of wasted time and effort, set clear guidelines for clean-up of spills, and reduce long term costs at closure. **These actions have been completed**

Item #	Item Heading	Background and reasoning
76	Weed Control	reduction of fuel loads around site, and control of weeds. This will impact on rehab costs during weed control and start providing areas for plantation screens/windbreaks for future rehab. **These actions have been completed**
77	Site Management	containment of saline material around Beneficiation plant. This will impact on closure costs if left unchecked. **These actions have been completed**
78	Landform management	handling of overburden material. This will quickly become one of several limiting factors for closure rehab. We need to maximise the amount available and identify the amount required. **These actions have been completed**
79	Rehab planning	development of a strategic plan for mine pit rehabilitation. Out of pit rehab (the 0.4 for every 1 cleared) can be planned for in the next couple of months and can incorporate a weed plan to better allocate resources/reduce costs. **These actions have been completed**
80	Dust Control	need to consider if there are impacts from mining operations (open mine areas, tailings dam etc.) that will have an affect on rehabilitation and general vegetation health. **These actions have been completed**
81	Mine Rehabilitation Design	amount of material required for profiling – mine planning needs to support mine closure in a cost effective manner **These actions have been completed**
82	Topsoil	use for rehab, amount/design(type) **These actions have been completed**
83	Seed Storage	longevity of seed held in storage. We need to look at longer term seed collection to rotate stock and to ensure viable amounts of seed in store for closure aims. **These actions have been completed**
84	Rehab	upkeep and maintenance of rehabilitation areas, particularly for the first 3 years, **These actions have been completed**
85	Rehab	site preparation for farmland rehabilitation at least 2 years prior to seeding is crucial in reducing weed seed banks, which drastically effect recruitment success, **These actions have been completed**
86	Contaminated sites	containment and clean-up of on-site spills needs to be addressed in a timely and efficient manner. **These actions have been completed**
87	Equipment	The environmental department require clear long term direction in what we will undertake, and what we will use contractors for. This will help determine what we buy, how much training our staff require (in regard to monitoring, consistency in data collection). If we decide to purchase groundwater equipment, it is imperative that staff are regularly trained and assessed, equipment maintained and suitable for the task. **These actions have been completed**