Ravensthorpe Gold Project

Dieback Management Plan

June 2019

Project Number: TE19017

DOCUMENT CONTROL

Version	Description	Date	Author	Reviewer
0	Draft for DWER	November 2018	APM	APM
0a	Internal Review	07/06/19	SS	GB
1a	Released to Client and DWER	07/06/19	SS	GB

Signature
 for P. Bennett, ACH Minerals Pty Ltd

Summary

Title of Proposal	Ravensthorpe Gold Project
Proponent Name	ACH Minerals Pty Ltd (ACH)
Ministerial Statement No.	Not applicable
Purpose of EMP	Requirement of Environmental Scoping Document (Item 11)
Key environmental factor	Dieback
Condition clause(s)	Not applicable
Key provisions (targets)	• A new dieback survey prior to the commencement of construction and annual monitoring thereafter (No dieback spread throughout the Project). • Provision of wash down facilities (No dieback spread throughout the Project). • Restrictions on movement of vehicles outside of main access roads (No dieback spread throughout the Project). • Use of a Ground Disturbance Permit system to highlight dieback management requirements when land clearing is being undertaken (No dieback spread throughout the Project).

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 Context, Scope and Rationale

1.1 Proposal

ACH Minerals Pty Ltd (ACH) proposes to develop the Ravensthorpe Gold Project (the Project), located within the Fitzgerald subregion of the Esperance bioregion, as defined by the Interim Biogeographic Regionalisation for Australia. The Project is situated approximately 550 kilometres (km) southeast of Perth, and 17 km southeast of the town of Ravensthorpe, as shown in **Figure 1-1**.

The Project has an expected life of mine (LOM) of approximately 8 years and will comprise:

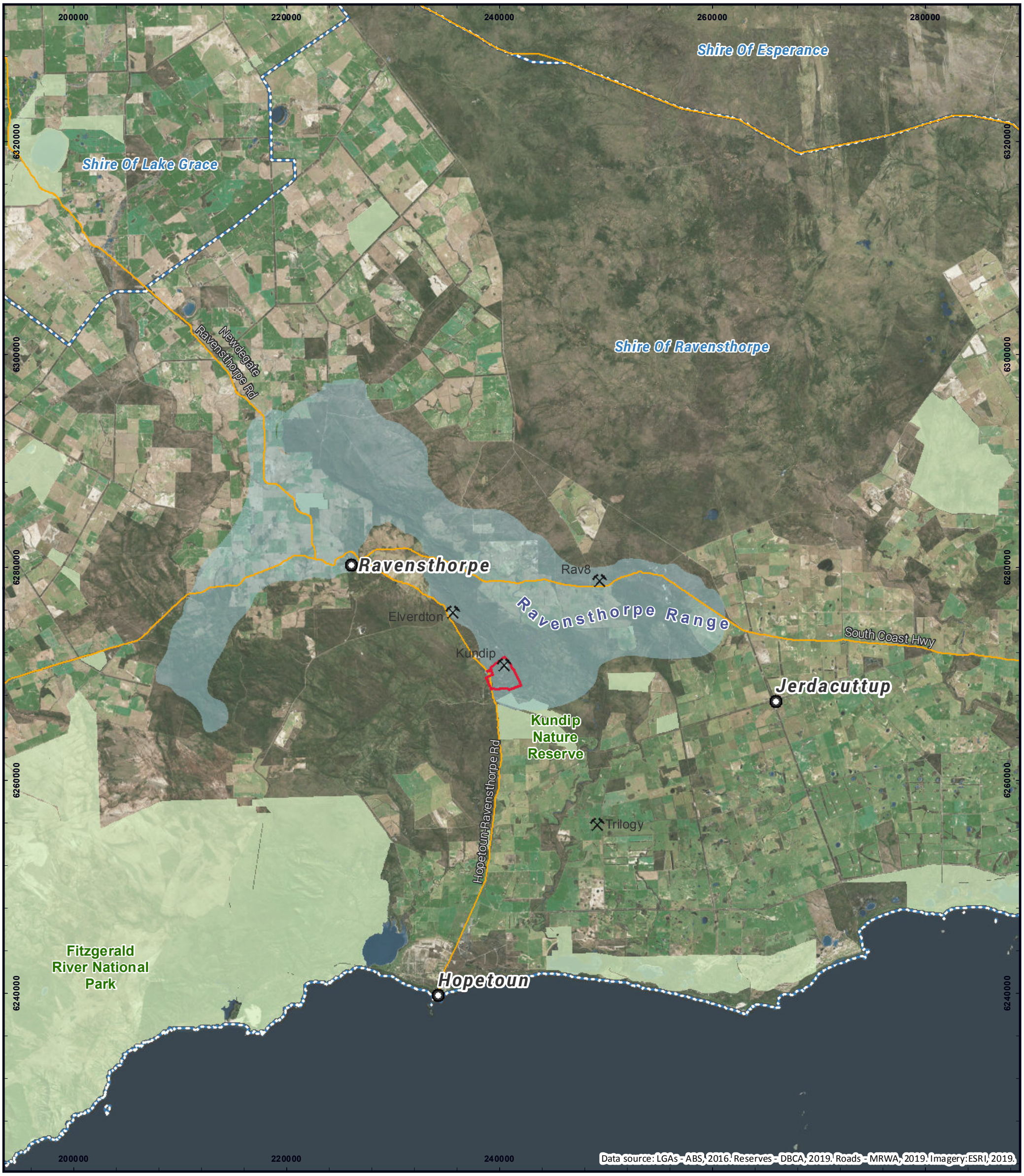
- Open pit and underground mining;
- Storage of waste rock in two permanent landforms;
- Processing of ore and storage of tailings in a permanent landform;
- Mine dewatering; and
- Supporting infrastructure.

Disturbance of 244.7 ha including additional native vegetation clearing of 195.4 ha within a Development Envelope of 428.4 ha.

The Project expects to produce almost 0.5 million ounces of gold, 0.4 million ounces of silver and over 11,300 tonnes (t) of copper.

The Project area contains both high quality native vegetation and historic mining legacies. Upon completion of the Project, it is proposed that the disturbed area, including the historic legacies, will be rehabilitated to native vegetation (apart from the pits, which will remain as voids).

P: PO Box 454, Leederville WA 6903 | A: Level 1 660 Newcastle St, Leederville WA 6007 | T: 1300 251 070 | W: www.talisconsultants.com.au



Ravensthorpe Gold Project Area

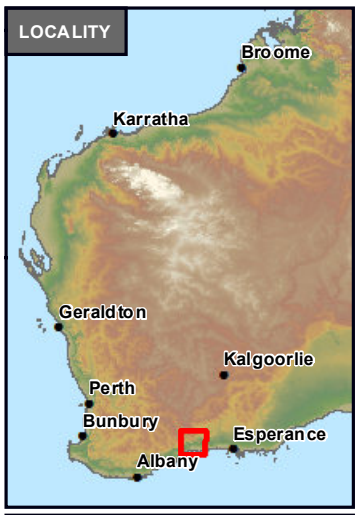
Local Government Area Boundary

Mine Site

DBCA Managed Lands

Townsite

Major Road



REGIONAL LOCATION

Ravensthorpe Gold Project ERD

ACH Minerals Pty Ltd

N

0 5 10 15 20 Km

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator, Datum: GDA 1994
Scale @ A3: 1:350,000

Prepared:	F Walker
Reviewed:	G Barrett
Checked:	A Mack
Project No:	TE19017
Revision:	A
Date:	24/05/2019

Figure 1-1

ACHMINERALS

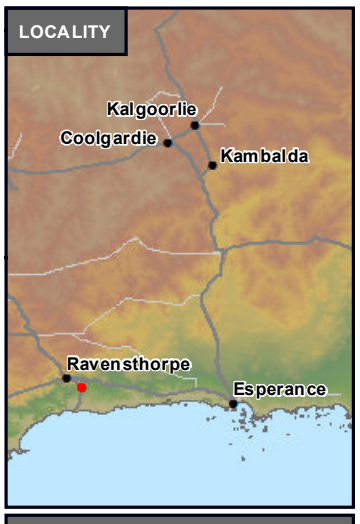
Document Path: \\server\Talis\SECTIONS\Environment\Projects\TE2019\TE19017 - Ravensthorpe Gold Project\GIS\Maps\ERD\TE19017_1-1_RegionalLocation_RevA.mxd

P: PO Box 454, Leederville WA 6903 | A: Level 1 660 Newcastle St, Leederville WA 6007 | T: 1300 251 070 | W: www.talisconsultants.com.au

- Ravensthorpe Gold Project Area
- RGP Development Envelope

RGP Mine Activities

- Offices
- Site Support
- Magazine
- Mine Pit (Kaolin)
- Mine Pit (Harbour View)
- Mine Pit (Flag East)
- Mine Pit (Flag West)
- Waste Rock Landform (North)
- Waste Rock Landform (South)
- Topsoil Stockpile
- Fire Break
- Processing Plant Area
- Run-of-Mine
- Tailings Storage Facility
- Roads
- Water Storage Facility
- Water Transfer Facility



MINING ACT TENURE, DEVELOPMENT ENVELOPE AND DISTURBANCE FOOTPRINT

Ravensthorpe Gold Project ERD
ACH Minerals Pty Ltd

N
0 150 300 450 600 metres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator, Datum: GDA 1994
Scale @ A3: 1:12,000

Prepared:	F Walker
Reviewed:	G Barrett
Checked:	A Mack
Project No:	TE19017
Revision:	A
Date:	24/05/2019

Figure 1-2

ACHMINERALS

Document Path: \\server\Talis\SECTIONS\Environment\Projects\TE2019\TE19017 - Ravensthorpe Gold Project\GIS\Maps\ERD\TE19017_2-1_RGPLayout_RevA.mxd

1.2 Key Environmental Factors

The environmental factor potentially impacted by the Project and the possible direct and indirect impacts of this factor, are listed in **Table 1-1**.

Table 1-1: Ravensthorpe Gold Project environmental factors and potential impacts

Environmental Factor	Potential Impact
Flora and Vegetation	Loss of condition or death of native vegetation and impacts to Priority flora due to the introduction and/or spread of *Phytophthora cinnamoni* (dieback) via: • Machinery movement during construction including topsoil and waste rock stripping, movement and storage; • Run-off of water from the surface of internal roads into uninfested areas; • Movement of vehicles off-road or on undefined tracks, outside of mining areas (e.g. for sampling purposes); and • Visitors to the Project bringing in dieback-infested soil and/or plant material e.g. on tyres/ vehicles or footwear.

Other aspects of flora and vegetation management are covered in a separate Flora and Vegetation Management Plan.

1.3 Condition Requirements

This Dieback Management Plan (**DMP**) is a requirement of an Environmental Scoping Document and has been produced for the purpose of impact assessment. It has not been prepared to meet the requirements of any Ministerial Statement condition requirements.

1.4 Rationale and Approach

1.4.1 Survey and study findings

In WA, dieback is a significant environmental issue for areas ranging between Geraldton in the Midwest and Esperance on the South Coast. Dieback is particularly common in the south west of Western Australia. The easternmost extent of the disease is recorded past Esperance and has been recorded in the Ravensthorpe area.

Dieback has been recorded in the Fitzgerald River National Park, although there has been no positive records of the disease closest to the Project in the eastern end of the Fitzgerald River National Park (DPAW, 2012). Dieback is known to occur along and within the native vegetation adjoining the Springdale Road and Masons Bay Road, south east of the Project.

Dieback is often spread and persistent during consistent favourable temperature conditions (15 – 30 °C) and moisture conditions (>80% ambient soil moisture under aerobic conditions). The disease naturally spreads freely in water, through the soil (root to root contact) or through the transport of soil on vehicles and footwear etc.

Dieback assessments of the Project Area were undertaken by various consultants between 2006 and 2012 (**Table 1-2**). A typical dieback study will map the following vegetation assessment types:

- Infested vegetation – Dieback present;
- Uninfested vegetation – Dieback free;
- Unmappable – Areas that had been significantly disturbed either through clearing or recent fires; and
- Uninterpretable[1] – Areas of vegetation communities that are naturally devoid of plant indicator species.

Table 1-2: RGP Project Area – list of surveys under taken for dieback

Report Title	Report Author	Year
Dieback assessment of Tectonic Resources NL, Kundip, Trilogy and Rav8 sites.	Glevan Consulting	2006
Survey for Dieback Disease caused by Phytophthora cinnamomi on Mining Leases within the Kundip Mining Centre Spring 2010	NRG Consultancy	2011
Kundip Mining Centre and Proposed Kundip – RAV8 Haul Road. Phytophthora Dieback Assessment	Terratree Pty Ltd	2013

The Project has a long history of mining and disturbance which has resulted in areas being devoid of vegetation due to clearing and hence mapped as 'unmappable'. Most of the proposed mining areas were surrounded by 'Uninterpretable' which means that the area is devoid of plant species that would indicate the presence of the disease. An amalgamation of the results of the three dieback studies, as interpreted by Terratree (2013), is shown in **Figure 1-3**.

While dieback has not been suspected or recorded in the Project Area, two positive samples for different *Phytophthora* species have been recorded at an access road. While other species of *Phytophthora* are not as detrimental as *P. cinnamomi,* they still require the same management measures and controls.

[1] Uninterpretable vegetation - whilst these areas will not display the symptoms of the disease, the pathogen may still be present.

P: PO Box 454, Leederville WA 6903 | A: Level 1 660 Newcastle St, Leederville WA 6007 | T: 1300 251 070 | W: www.talisconsultants.com.au

239000 240000 241000 242000

6272000 6271000 6270000 6269000 6268000

Data source: Imagery: Landgate, 2016. Dieback Assessment: Terratree, 2013.

Ravensthorpe Gold Project

Unmappable

Infested

Uninfested

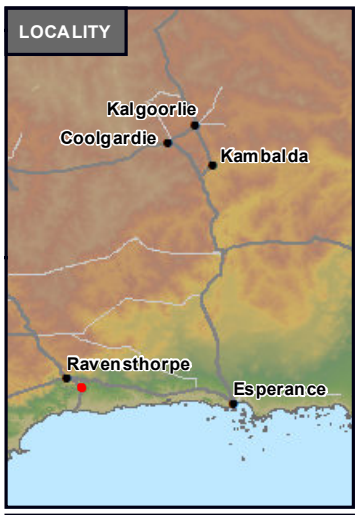
Uninterpretable

Sample Locations

Negative

Positive

LOCALITY



DIEBACK ASSESSMENT

Ravensthorpe Gold Project ERD

ACH Minerals Pty Ltd

N

0 200 400 600 800 metres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator, Datum: GDA 1994
Scale @ A3: 1:15,000

Prepared:	F Walker
Reviewed:	G Barrett
Checked:	A Mack
Project No:	TE19017
Revision:	A
Date:	24/05/2019

Figure 1-3

ACHMINERALS

Document Path: \\server\Talis\SECTIONS\Environment\Projects\TE2019\TE19017 - Ravensthorpe Gold Project\GIS\Maps\ERD\TE19017_4-15_DiebackAssessment_RevA.mxd

Potential impacts

The likelihood of dieback introduction and spread will be highest during construction, although it will still need to be carefully managed during operations and rehabilitation. The likelihood of the spread of dieback is highest during the following activities:

- Machinery movement during construction including topsoil and waste rock stripping, movement and storage;
- Run-off of water from the surface of internal roads into uninfested areas;
- Movement of vehicles off-road or on undefined tracks, outside of mining areas (e.g. for sampling purposes); and
- Visitors to the Project bringing in Dieback infested soil and/ or plant material e.g. on tyres/ vehicles or footwear.

Dieback introduction to uninfested areas at the Project could cause the death of vegetation, a decline in vegetation health and an adverse impact on the success of rehabilitation. Dieback could spread into surrounding undisturbed vegetation putting currently 'Excellent' condition vegetation at risk. The likelihood of Phytophthora colonisation is only moderate, however, for the following reasons:

- The Project is located on the fringe of the *Phytophthora* pathogen's environmental needs for soil moisture content and temperature; and
- Approximately one third of the Project Area is classified as 'Uninterpretable' as the plant species present are not conducive to contamination from the disease.

While two thirds of the Project Area is classified as Uninfested or Uninterpretable, moisture retaining areas (e.g. drainage lines and damplands) would be more susceptible to the dieback pathogen. Dieback management protocols are therefore required to prevent spread of the disease into these areas.

1.4.2 Key assumptions and uncertainties

The following key assumption underlies this plan:

- While the last assessment was undertaken in 2013, that assessment is a likely reflection of the current situation with regards to dieback, but does not preclude the requirements for further survey.

The assumption is also the uncertainty whereby:

- Should the project be approved, a confirmatory survey is required prior to the commencement of any substantial earthmoving operations.

1.4.3 Management approach

The management provisions set out in this document are based and developed around the mitigation hierarchy of avoid, minimise and rehabilitate to ensure impacts to flora and vegetation as a consequence of dieback infection have been avoided or reduced to as low as reasonably practicable.

Many of the management provisions are commonly used in mine sites across Western Australia where dieback is or potentially is a risk. Other provisions are tailored for the particular circumstances that occur at RGP.

1.4.4 Rationale of choice of provisions

The management targets are based off of the identified potential impacts. The potential impacts is the death of native vegetation due to infestation and spread of *Phytophthora cinnamomi.* Management provisions are focused on prevention of dieback vectors crossing:

1. From dieback-infested areas to dieback-free or uninterpretable areas; or
2. From uninterpretable areas into dieback-free areas; and
3. Earth/soil material entering the Project area from outside of the project.

Appropriate management actions considers the three stages: construction, operations, closure and rehabilitation.

In addition to these three stages, this EMP identifies and describes the proposed monitoring and management actions to be undertaken and specifies contingency measures to be undertaken in the event that a dieback infestation occurs.

The Project area will be apportioned into the following management zones as shown in **Figure 1-3**:

- Infested;
- Uninfested;
- Uninterpretable; and
- Unmappable.

Provisions have been chosen to mitigate the key identified potential impacts and reduce the risk that the specified outcomes for Flora and Vegetation will not be achieved.

Measurable, management targets were developed that would facilitate management of environmental performance. Provisions were then developed with the aim of achieving those targets. A necessary feature of each provision is that it aims to achieve a management target that can be monitored and reported against in a structured manner.

The management provisions will be applied to the entire Project and most aspects are manageable with the exception of outside of external environmental conditions e.g. rainfall, temperature. All mitigation strategies will be in place and will take effect prior to any works being undertaken

2 EMP Provisions

This section sets out management-based provisions for identified environmental factors in tabulated form. The Provisions are detailed in **Table 2-1**.

Table 2-1: Provisions to meet objectives for Flora and Vegetation

Flora and Vegetation			
Environmental Factor: Flora and Vegetation (dieback) **EPA Objective:** To protect flora and vegetation so that biological diversity and ecological integrity are maintained. **Outcome:** The Project remains dieback-free. **Key environmental values:** • Priority Ecological Communities and Priority flora • Conservation significant fauna habitat • Carnaby's Cockatoo potential foraging vegetation **Key impacts and risks:** • Death of native vegetation due to infestation and spread of *P. cinnamomi* (dieback) or related species and subsequent changes in the dynamic of vegetation causing impacts to other species.			
Management-based Provisions			
Management actions	**Management targets**	**Monitoring**	**Reporting**
Studies and monitoring • A new dieback survey will be undertaken prior to construction to update the mapping of the dieback zones • Annual dieback monitoring will be undertaken by an accredited person annually during August – October and will include visual (photo) evidence and laboratory testing • Quarterly (and opportunistic) visual monitoring of vegetation adjacent to roads/drains and infrastructure	No dieback being introduced into the Project No dieback spread throughout the Project	Dieback survey reports and monitoring reports/record keeping	Annual Environmental Reports (DMIRS) Compliance Annual Report (DWER) Internal record keeping and reporting Laboratory analysis reports Survey/monitoring reports
Construction of Project in accordance with approved design • Wash down facilities will be in areas not conducive to dieback • Surface water travelling along the main access road will be diverted to avoid ponding that may facilitate the spread of dieback • Surface water will also avoid being drained into dieback-free areas and area susceptible to dieback • Any tracks not in use will be blocked to reduce unnecessary traffic through vegetated areas		Survey data and aerial imagery	Annual Environmental Reports (DMIRS) Mine Rehabilitation Fund (DMIRS) Compliance Annual Report (DWER) Internal record keeping
Material use/movement • Contaminated or potentially materials will not be brought into the site. Outside materials will be assessed as being free of dieback by a suitably trained and competent consultant • Borrow pits assessed to be dieback free prior to use • All topsoil, borrow material and subsoil from these zones will be stockpiled within the same dieback zone it was removed from • During clearing and construction, the boundaries of the different dieback zones will be clearly delineated to ensure vehicles do not inadvertently cross from one zone into another without vehicle cleaning • Water used for construction/operation will be from dieback free sources only		Internal record keeping of external 'fill' material purchases and certification reports Vehicle inspection forms Log books maintained in vehicles to record wash down.	Annual Environmental Reports (DMIRS) Compliance Annual Report (DWER) Internal record keeping
Vehicle movement • All contractor vehicles will arrive at the site in a clean condition. • Environmental Officer to inspect vehicles prior to mobilisation • Construction only be undertaken during dry soil conditions and vehicles will be cleaned (dry brushing) and inspected prior to re-entering dieback free zone areas • Maintenance and grading roads may occur under damp conditions, but not wet and boundaries of dieback zones are not be crossed without cleaning • Where machinery is required to be moved between sites, they will be washed down and inspected for soil and vegetative material prior to commissioning. • Light vehicles exiting the main mine site area onto monitoring tracks will be washed down prior to leaving the main mine site area.			

Flora and Vegetation			
Ground Disturbance Permit (GDP) • GDP process includes dieback assessment by approving Environmental Officer • Environmental Officer to monitor clearing in any dieback areas • Guidance, zone maps and strategies provided within GDP process	No dieback being introduced into the Project No dieback spread throughout the Project	Internal GDP register	Annual Environmental Reports (DMIRS) Mining Rehabilitation Fund (DMIRS) Internal record keeping
Vehicle hygiene and washbay use • Cleaning of all vehicles and machinery will be undertaken as per washdown procedures • Water from wash down bays will be directed into a sump for sediment separation and oily water separator before being directed into a dam for use in processing. • The use of phytoclean® (or similar) will be used for the wash down facilities and wheel baths to kill *Phytophthora*		Regular documented maintenance of washdown bay Internal audits and inspections	Annual Environmental Reports (DWER/DMIRS) Annual Compliance Report (CAR) Internal record keeping
Contractor management and education • Inductions will include education about dieback and keeping to established tracks • Regular toolbox meetings about dieback management • All staff and contractors will be trained in all hygiene measures required at the site including vehicle and machinery clean-down specifications and educated on the regional important of preventing the spread of dieback		Internal induction register Vehicle inspections Log books	Annual Environmental Reports (DMIRS) Annual Compliance Report (CAR) Internal record keeping
Infrastructure maintenance • Sufficient freeboard maintained on all culverts and surface water management structures. • All culverts will be regularly maintained to ensure that water flow does not encroach onto road surfaces. • All sumps will be cleared of sediment at the end of summer after drying out.		Regular inspections of surface water management structures, particularly during and following periods of rainfall.	
Signage • The boundaries of the different dieback zones will be clearly delineated. • Signage will notify all personnel they are entering a dieback-free zone, in order to promote best-practice activities whilst within the zone. • Any suspected occurrence of dieback will be clearly demarcated in the field, signs erected, and barriers installed to prevent vehicle access. The locations of any infestation will be recorded, and the details made accessible to mine and environmental staff.		Internal audits and inspections.	Internal record keeping
Rehabilitation • Topsoil will be returned to the dieback zone it was removed from. Topsoil from the dieback free zones may be used anywhere. • Prior to closure, it will be determined which roads may be required for monitoring and contingency purposes. These will be rehabilitated last to prevent vehicles going off-road. • All final landform designs will include drainage that prevents runoff draining into dieback-free zones from dieback susceptible zones, where possible	No dieback spread throughout the Project	Internal audits and inspections.	Internal record keeping and reporting. Annual government reporting. Mine Closure Plan.

3 Adaptive Management and Review of the Dieback Management Plan

Given the potential for the introduction and spread of dieback it is important that the management approach remain adaptive. The dieback management plan will be reviewed and revised under the following conditions:

- If monitoring results indicate that management targets are not being achieved;
- If new information is discovered during construction, operations or closure;
- Where any significant changes to project design or operation have occurred; and
- Where it has been longer than 12 months since the last revision.

4 References

Department of Parks and Wildlife (2013). Dieback Management Plan. November 2013 South Coast Region Department of Parks and Wildlife. https://www.dpaw.wa.gov.au/images/documents/parks/parksforpeople/fitzgerald_river_national_park_coastal_walk_trails_-_dieback_management_plan_2013.pdf

Dieback Working Group (2015) Managing Phytophthora Dieback in Bushland. A Guide for Landholders and Community Conservation Groups. https://www.dwg.org.au/wp-content/uploads/dlm_uploads/2018/08/DWG-Managing-Phytophthora-Dieback-in-Bushland-Ed-7-2015.pdf

Glevan Consulting (2006). Dieback Assessment. Unpublished report for ACH.

NRG Consultancy (2011), Survey for Dieback Disease caused by *Phytophthora cinnamomi* on Mining Leases within the Southern Ravensthorpe Range known as the Kundip Mining Centre Spring 2010 for Tectonic Resources N.L. Unpublished report for Tectonic Resources NL.

Terratree Pty Ltd (2013), Kundip Mining Centre and Proposed Kundip – RAV 8 Haul Road. Phytophthora Dieback Assessment. Unpublished report for Silver Lake Resources NL.