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MANDALAY RESOURCES

*Mineral Resources (Sustainable Development) Act 1990*

**Tenement Number:** MIN4644

**Plan Number:** PLN-001702

**Work Plan Variation Statutorily Endorsed**

**Signed:**

**Delegate of the Department Head**

**Date:** 28/09/2023

# Rehabilitation Plan

## Costerfield Operations

3 July 2023

| | |
|---|---|
| **Project name** | Mandalay Resources Costerfield Operations |
| **Licence nos.** | MIN4644 |
| **Licence holder** | Mandalay Resources Costerfield Operations Pty Ltd |
| **Company name** | Mandalay Resources Costerfield Operations Pty Ltd |
| **Document** | Rehabilitation Plan,<br>Costerfield Operations, AE1046.9 Version 1 |
| **Date submitted** | 4th July 2023 |
| **Contact details** | Ross Laity, Sustainability Manager<br>Mandalay Resources Costerfield Operations,<br>PO Box 667, Heathcote Vic 3523 |

# Rehabilitation Plan

## Costerfield Operations

AE1046.9_RP

July 2023

| Version 4 | | | |
|---|---|---|---|
| Issued to | | | |
| Ross Laity, Sustainability Manager, Mandalay Resources Costerfield Operations | | | |
| Prepared by | | Reviewed by | Approved by |
| Neil Wines<br>(Principal Environmental Consultant) | | Michael Cramer<br>(Director - Accent) | |
| Previous versions | | | |
| Version: | 1 | 18/10/2022 | Draft |
| | 2 | 30/10/2022 | Final Draft |
| | 3 | 06/04/2023 | Respond to ERR comments |
| | 4 | 03/07/2023 | Respond to ERR comments |

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www.accentenvironmental.com.au info@accentenvironmental.com.au

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# Contents

## Tables



## Figures

# Abbreviations

| | |
|---|---|
| ANCOLD | Australian National Committee on Large Dams |
| AHD | Australian Height Datum |
| ANZMEC | Australian and New Zealand Minerals and Energy Council |
| CEP | Community Engagement Plan |
| CRS | Community Reference Subcommittee |
| DEECA | Department of Energy, Environment and Climate Action (formerly DEWLP) |
| DELWP | former Department of Environment, Land, Water and Planning |
| EPA | Environment Protection Authority (Victoria) |
| ERC | Environmental Review Committee |
| ERS | Environmental Reference Standard |
| ERR | Earth Resources Regulation |
| GIS | geographic information system |
| ha | hectares |
| DJPR | Department of Jobs, Precincts and Regions |
| Mandalay | Mandalay Resources Australia Pty Ltd |
| MRCO | Mandalay Resources Costerfield Operations |
| km | kilometre |
| M | million |
| m | metres |
| $m^2$ | square metres |
| $m^3$ | cubic metres |
| MRSD Act | *Mineral Resources (Sustainable Development) Act 1990* |
| MRSD (MI) Regulations | Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2019 |
| ROM | run-of-mine |
| TSF | tailings storage facility |
| WP | work plan |
| WPV | work plan variation |

# 1 Introduction

## 1.1 Context

The Costerfield Operations are located within the Costerfield mining district of Central Victoria, approximately 50 km east of the City of Greater Bendigo, on Mining Licences MIN4644 and MIN5567. The licences are held by Mandalay Resources Costerfield Operations Pty Ltd (MRCO), a wholly owned subsidiary of Mandalay Resources Australia Pty Ltd (Mandalay).

Figure 1.1 shows the location of these tenements.

The Costerfield Operations are owned and operated by MRCO and comprise the underground Augusta, Cuffley, Brunswick and Youle gold and antimony mines, and associated infrastructure including the Brunswick Processing Plant, the Brunswick and Bombay tailings storage facilities (TSFs) and the Splitters Creek Evaporation Facility. The mining and processing activities are located within MIN4644, while the evaporation facility at Splitters Creek is within MIN5567. Exploration drilling activities occur within MIN4464 but also in the surrounding exploration licence areas.

The existing Rehabilitation Plan (MRCO 2019) and Closure Plan (Accent 2017) were prepared prior to the release of the current Earth Resources Regulation (ERR) guidelines *Preparation of Rehabilitation Plans Guideline for Mining & Prospecting Projects* (the Guidelines) (ERR 2020a).

MRCO has engaged Accent Environmental (Accent) to prepare an updated Rehabilitation Plan for the Costerfield Operations in accordance with the Guidelines. This report has been prepared by Accent based on discussions with and information provided by MRCO and integrates the previous rehabilitation and closure plans into a single document.

## 1.2 Scope and structure

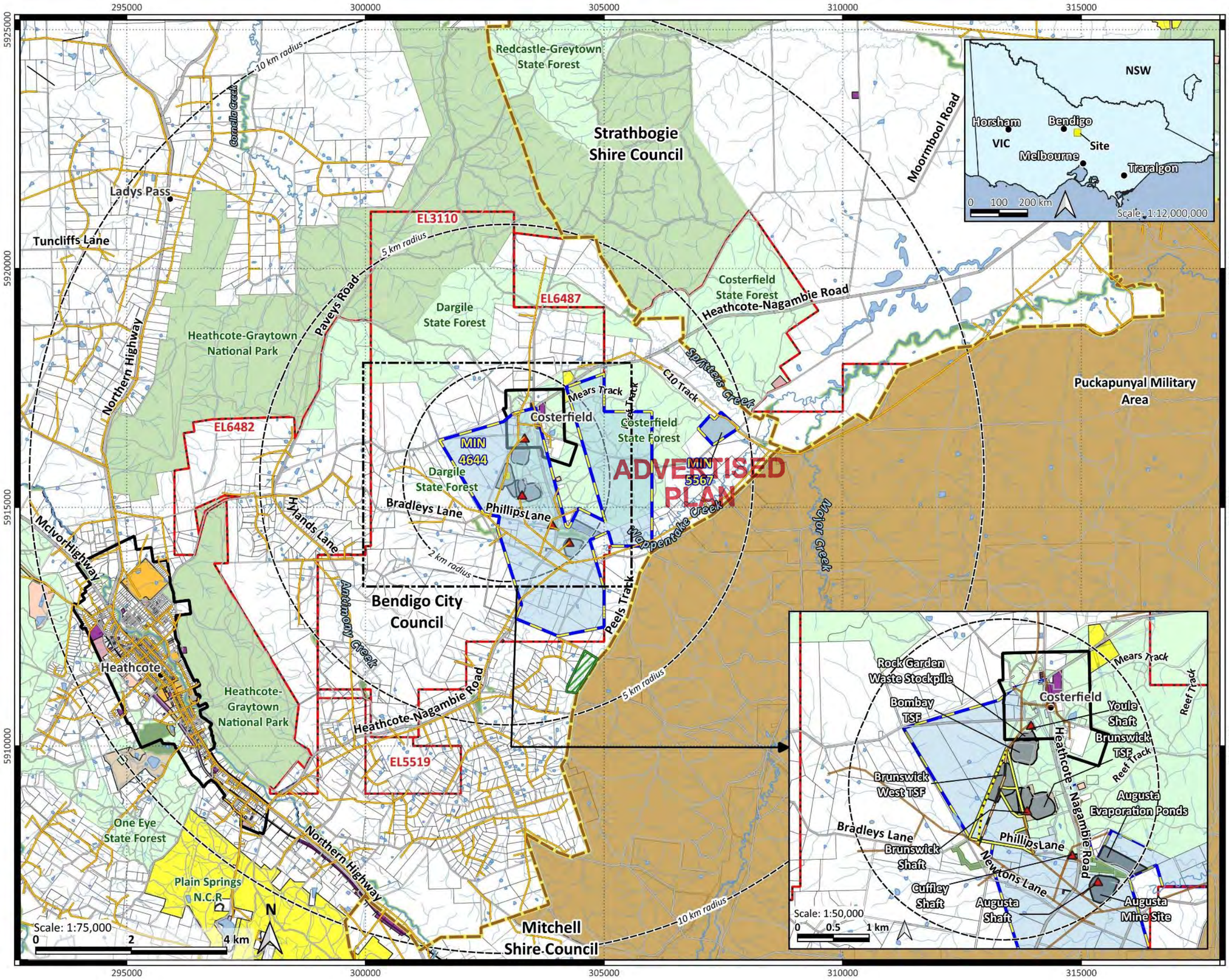
This Rehabilitation Plan covers the closure and rehabilitation activities associated with the mining, processing and supporting facilities and infrastructure within MIN4644 (only). MRCO also holds adjacent exploration licences; however these are not covered by this Rehabilitation Plan.

Consistent with the requirements of the Guidelines, the Rehabilitation Plan includes information under the following headings:

- site information and setting
- rehabilitation obligations and commitments
- stakeholder identification and community engagement
- proposed post-mining land uses and post-mining landform
- rehabilitation domains
- objectives
- criteria

- schedule for rehabilitation milestones
- post-rehabilitation risk identification and assessment
- financial costing and provision for closure
- plan review.

This Rehabilitation Plan has been revised to meet the requirements of the new Guidelines, and to incorporate the Brunswick West TSF and work plan notification for the Brunswick Portal.




**AE1046.9 Mandalay Resources - Costerfield Operation**

**Figure 1.1. Regional plan and tenements**

Created 3/11/2022 and revised 21/04/2023
CRS: GDA 20 MGA 55
Scale: 1:75,000 @ A3 (main map)
Page size: A3

- Vent shaft (inset map)
- Town
- Road
- Railway
- Main watercourse
- Watercourse - tributary
- Existing power transmission line
- Power transmission line to be relocated
- Relocated power transmission line
- Exploration Licence
- Mineral Licence
- Mine site domain
- Offset area
- Lot 2 PS404811
- Private land lot boundary
- LGA boundary
- Radius circle
- Water body

**Crown Land**

- Commonwealth Land
- Community Use Area
- Earth Resources
- Historic and Cultural Features Reserve
- National Park
- Natural Features Reserve
- Nature Conservation Reserve
- Services and Utilities
- State Forest
- Uncategorised Crown Land
- Other Crown Land

Additional data, main map: VIC_TR_TRANSPORT (Road, Rail), VIC_locality_point, VIC_PLM25, VIC_MINTEN, VIC_HY_WATERCOURSE, VIC_HY_WATERAREA, VIC_LGA_POLYGON, VIC_TOWNSHIP_POLYGON, VIC_POWERLINE, VM_PARCEL
Inset map (upper): STE_2021_AUST_GDA2020

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## 1.3 Rehabilitation plan checklist

**Error! Reference source not found.** provides a checklist of the information required to be i ncluded in a rehabilitation plan in accordance with Appendix 8.1 of the Guidelines (ERR 2020a), cross-referencing the sections within the report where the required information is provided.

*Table 1-1 Rehabilitation plan checklist*

| Information required | Section of report |
|---|---|
| Does the rehabilitation plan have a cover page? | Cover |
| **Knowledge base**<br>Does the rehabilitation plan include: | |
| • Project summary – rehabilitation specific content as well as relevant cross refences to summaries provided in the work plan? | Section 2.1 |
| • Rehabilitation obligations and commitments – a comprehensive list of all rehabilitation related obligations, conditions and commitments, and an explanation of how these obligations will be met through the proposed rehabilitation activities? | Sections 3 and 5 |
| • Environmental and social setting – a detailed description of the local and regional environmental setting and inclusion of all environmental data relevant to rehabilitation planning? | Section 2.2 |
| **Community engagement**<br>Does the rehabilitation plan detail the stakeholder engagement undertaken, and set out how community views (including views of landowners and Traditional Owners on Crown Land) have been considered in the post-mining land uses? | Section 4 |
| **Proposed post-mining land uses and landform**<br>Does the rehabilitation plan:<br>• propose post-mining land use(s)<br>• include post-mining landforms? | Section 5 |
| **Rehabilitation domains**<br>Does the rehabilitation plan include rehabilitation domains that in sum cover the whole site? | Section 6 |
| **Rehabilitation objectives**<br>Does the rehabilitation plan include a whole of site objective and objectives for each rehabilitation domain that articulate what the post-mining landform will be? | Section 7 |
| **Rehabilitation criteria**<br>Have 'SMART' closure criteria linked to the site's closure objectives been developed, and does the rehabilitation plan provide detailed information on how the criteria were developed? | Section 8 |

| Information required | Section of report |
|---|---|
| **Schedule for rehabilitation milestones** | |
| Are progressive and final rehabilitation milestones clearly outlined? Is there sufficient detail on what and how rehabilitation actions will be undertaken for each rehabilitation domain with a supporting schedule and consider unplanned and temporary closure scenarios? | Section 9 |
| **Rehabilitated land risk assessment** | |
| Does the rehabilitation plan identify and detail all risk that the rehabilitated land may pose? | Section 10 |

# 2 Site information and setting

This section provides a brief description of the operations and the site setting. More detailed information is provided, as required, in subsequent chapters.

## 2.1 Project summary

### 2.1.1 Locality

The Costerfield Operations are located within the Costerfield mining district of Central Victoria, approximately 10 km northeast of the township of Heathcote (see Figure 2.1), 50 km east of the City of Greater Bendigo and 100 km north of Melbourne.

### 2.1.2 Land ownership and tenure

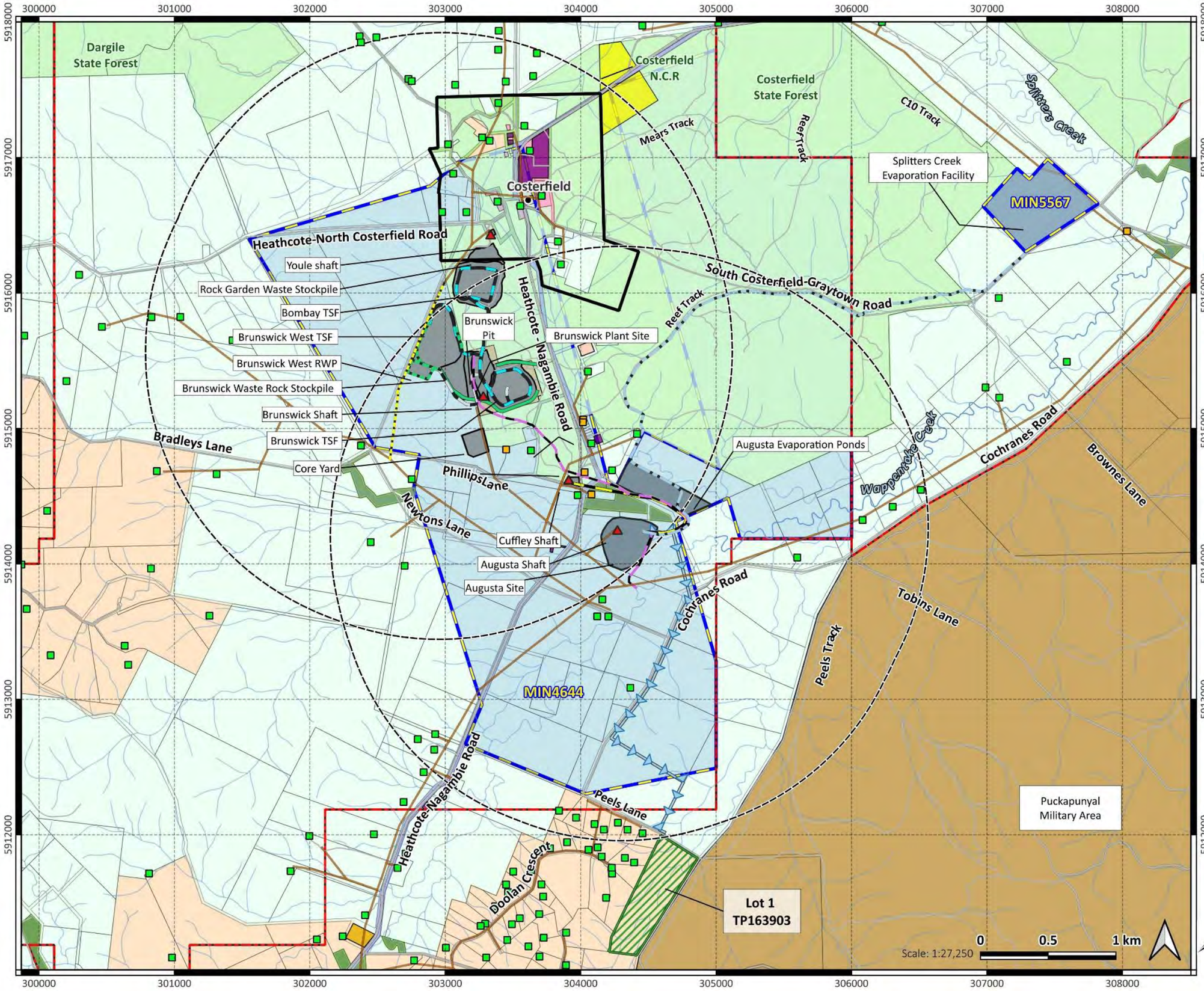
Land property descriptions for the MRCO sites are presented Table 2-1.

*Table 2-1 Operational sites and land tenure*

| Site | Lot/Plan | Tenure | Ownership/ land manager |
|---|---|---|---|
| **Augusta Infrastructure, Boxcut and waste rock storage** | (AB3, AB3G, AB3A) Lot 1 TP246611 | Freehold | Tobin Family |
| **Augusta Evaporation Ponds/Storage Dams** | Allot 8 Sec1 Parish of Costerfield | Freehold | MRCO |
| **Cuffley Ventilation Shaft and facilities** | Allot 34 Sec1 Parish of Costerfield | Freehold | MRCO |
| **Mine dewatering rising main and pipeline** | Allot 39 Sec1 Parish of Costerfield | Crown Land | DELWP |
| **Brunswick Processing Plant, Brunswick TSF and Bombay TSF** | Allot 37 Sec1 Parish of Costerfield | Crown Land | DELWP |
| **Youle ventilation shaft and rising main** | Allot 13 Sec6 Parish of Costerfield | Freehold | MRCO |
| **Brunswick Open Pit and core storage area** | Lot 1 PS404811 | Freehold | MRCO |
| **Brunswick West TSF** | Lot 2 PS404811 | Freehold | Harris Family |

**AE1046.9 Mandalay Resources - Costerfield Operation**
**Figure 2.1. Surface layout**

Created 3/11/2022 and revised 2/04/2023
CRS: GDA 20 MGA 55
Scale: 1:27,500 @ A3
Page size: A3




- Owned by Mandalay Resources
- Sensitive receptor (residence)
- Town
- Existing clean water diversion drain
- Brunswick West TSF clean water diversion drain
- Injection site
- Splitters Creek pipeline
- RO discharge pipeline
- Process water return pipeline
- Process water delivery pipeline
- Existing power transmission line
- Road
- Main watercourse
- Watercourse - tributary
- Exploration Licence
- Mining Licence
- Mine site domain
- Vegetation offset area
- Private land lot boundary
- Costerfield township
- Water body
- Radius circle - 2km

**Crown Land**

- Commonwealth Land
- Community Use Area
- Earth Resources
- Natural Features Reserve
- Nature Conservation Reserve
- Services and Utilities
- State Forest
- Uncategorised Crown Land
- Other Crown Land

Additional data: VIC_TR_ROAD, VIC_MINTEN, VIC_HY_WATERCOURSE, VIC_HY_WATER_AREA_POLYGON, V_PARCEL_MP_POLYGON, VIC_TOWNSHIP-POLYGON, VIC_POWER_LINE, PLM25_Vic_Crown_Land.

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### 2.1.3 Historic context

Gold and antimony were first discovered at Costerfield in 1860 and underground mining has taken place periodically since this time. Historic mining of the Costerfield–Bombay–Minerva complex occurred between surface level and 300 m below ground level, initially via shaft, and later in some areas as open cut mining.

The current mining operations at the site commenced in 2006. MRCO purchased the operations on December 1, 2009, from AGD Operations Pty Ltd.

### 2.1.4 Overview of operations

Costerfield operates a continuous mining operation 24 hours a day 365 days per year with a workforce of approximately 220 employees.

Mining at Costerfield targets several individual lodes (including the Youle and Shepherd lodes). Mining is currently not active at Augusta, Cuffley or Brunswick. Access to the lodes is either via the Augusta Portal or Brunswick Portal and associated declines.

Ore extraction is achieved through three different mining methods: full face development, uphole stoping and predominantly longhole cemented rock fill (CRF) stoping.

Mining at Youle follows a bottom-up sequence mining from the northern and southern extents retreating towards the central access. The practice of placing CRF in stope voids has been undertaken at Youle to improve local ground stability using waste rock from development with the addition of a cement slurry mix. Mobile equipment includes underground haulage trucks, loaders, jumbos, integrated tool carriers, cement agitator trucks, fork lifts and light vehicles.

Underground ore from the Youle and Shepherd lodes is trucked to the surface via the Brunswick Portal and placed on the Run of Mine (ROM) ore pad located adjacent to the Brunswick Processing Plant.

The ore is transferred to the Brunswick ROM pad where it is stockpiled, screened and blended prior to being fed into the Brunswick Processing Plant. The Brunswick Processing Plant throughput is typically around 13,000 tonnes/month.

The surface crushing and screening system processes underground ore down to a particle size suitable for milling through a two-stage closed circuit ball milling circuit. Centrifugal style gravity concentrators are used on the combined primary milling product and secondary mill discharge, to recover a gold rich gravity concentrate that is sold as a separate gold concentrate and sent to a local refinery.

Secondary milled products are classified by size and processed through a simple floatation circuit comprising a single stage of rougher, scavenger and cleaning. The concentrate is thickened through dewatering and filtration to produce a final antimony/gold concentrate product that is then bagged and transported to Melbourne Port for packing into shipping containers for shipment to overseas customers. The tailings is thickened before being sent to a TSF.

Tailings have been stored in the Bombay TSF and the Brunswick TSF. Once the currently active Bombay TSF is at capacity, both these facilities will be closed [ATC Williams 2022]. The Brunswick West TSF to be constructed so that it can receive tailings once existing TSF capacity has been reached.

Mine ventilation comprises fresh air being sourced from surface intakes including the Brunswick Portal, Augusta Portal, Augusta ladderway, Brunswick Fresh Air Rise and Augusta Fresh Air Rise.

Exhaust ventilation flows exit the active mine workings via two airways comprising the Youle Return Air Rise and Cuffley Return Air Rise.

Groundwater is pumped to the surface via the Cuffley rising main. Water is pumped to the Augusta Mine Dam before being distributed for re-use in mining operations as well as feed to the Reverse Osmosis (RO) Plant located at Brunswick. Permeate from the RO plant meets applicable water quality criteria and is discharged under licence to a local waterway (Wappentake Creek).

Excess water and RO brine is sent to the Splitters Creek Evaporation Facility.

### 2.1.5 Costerfield Operations components

*The surface components of the Costerfield Operations are shown in*

Figure 2.1 and located at the following three main locations:

- Augusta site
- Brunswick site
- Splitters Creek (MIN5567).

The current components of the site are shown in Figure 2.1. Approximate areas for the facilities are shown in Table 2-2.

*Table 2-2 Disturbance areas and features of MIN4644*

| Disturbance site | Area (ha) | Details |
|---|---|---|
| **Augusta site** | 21.2 | Boxcut, portal pads, offices, workshop, waste rock storage evaporation ponds, water storage and shafts |
| **Brunswick site** | 49.15 | Open pit, portal, ROM, process plant, TSFs, offices, core storage, waste rock storage and shafts |
| **Cuffley shaft** | 0.5 | Ventilation shaft |
| **Youle shaft** | <0.01 | Ventilation shaft |

#### Augusta site

The Augusta site comprises the following components (see

Figure 2.2):

- underground mine
- boxcut (including the access portal to the mine, mine workshop and refuelling bay)
- mine administration area
- crib rooms
- evaporation dams
- mine dam
- waste rock stockpile
- noise bund and bund around administration area
- switch room and compressor shed

- laydown yard and stores building
- Augusta fresh air rise ventilation shafts
- Phillips Lane (i.e. Cuffley) return air rise ventilation shaft
- Phillips Lane (i.e. Cuffley) electrical substation and infrastructure
- rising main mine dewatering pipeline
- site access roads
- pipeline to Splitters Creek
- pipeline to injection bores on Peels Lane.

The Augusta mine also provides access to the Cuffley underground workings. The only surface expression of the Cuffley workings is the Cuffley vent shaft and rising main collar.

### Brunswick site

The Brunswick site comprises the following components (see Figure 2.3):

- processing plant
- mill workshop and administration buildings
- ROM pad and crushing plant
- Brunswick Waste Rock Stockpile
- Brunswick Pit
- Brunswick Portal
- Brunswick Return Air Raise
- Youle Return Air Raise
- Brunswick TSF
- Brunswick West TSF
- Bombay TSF
- reverse osmosis water treatment plant and pipelines
- cement storage hopper
- laydown area
- exploration core shed and storage yard
- Mill Stormwater Dam
- Rock Garden Waste Stockpile.

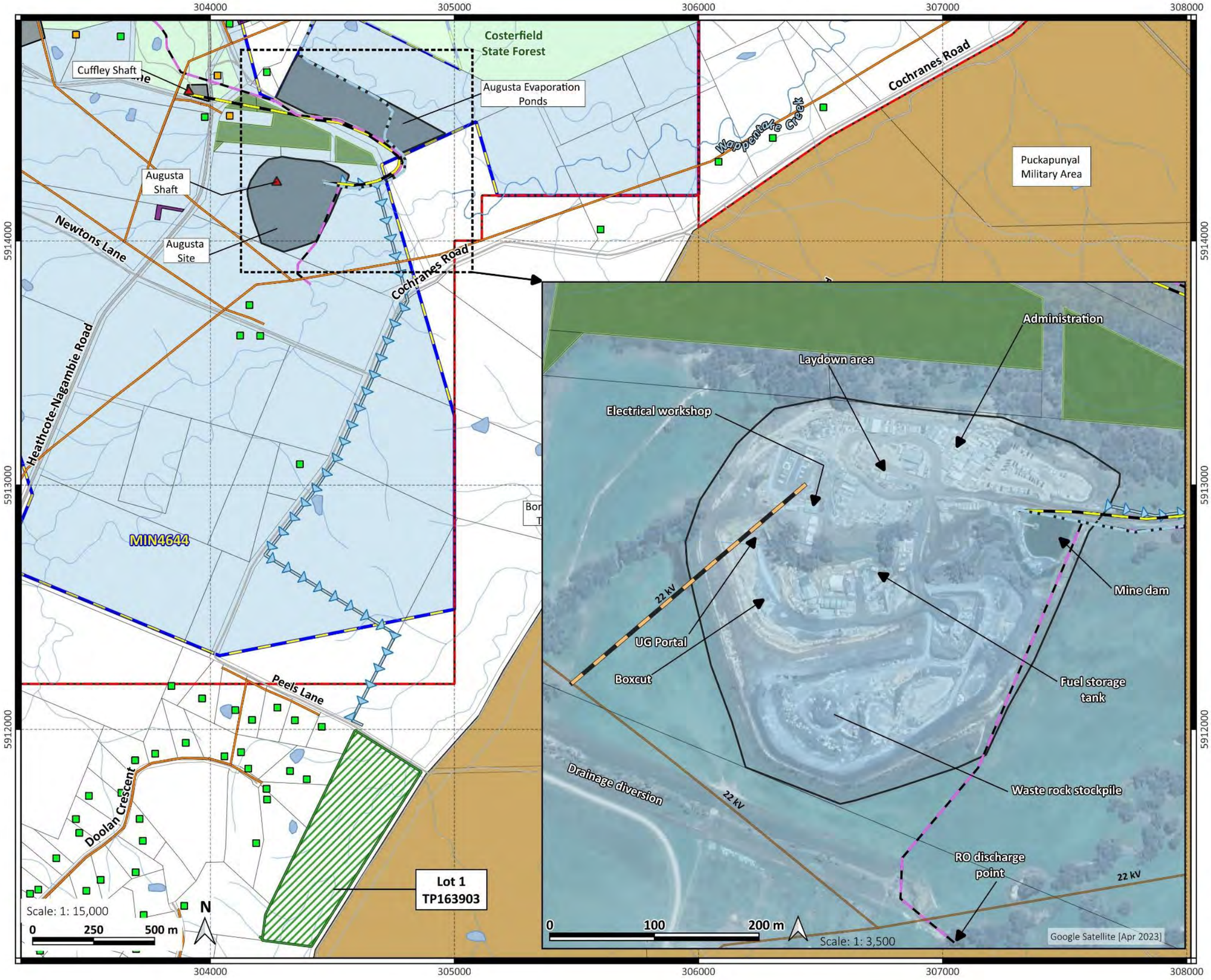


### Splitters Creek site

The Splitters Creek Evaporation Facility (MIN5567) is located approximately 2.5 km northeast of the Augusta mine and comprises a series of clay-lined evaporation terraces following the sloping contour of the land and an HDPE lined storage dam. Groundwater extracted from the mine and brine from the RO plant is

pumped to the evaporation facility for disposal by evaporation via an above-ground pipeline on an as-needs basis. MIN5567 is not covered by this Rehabilitation Plan.

**AE1046.9 Mandalay Resources - Costerfield Operation**
**Figure 2.2. Site layout - Augusta site**
Created 3/11/2022, revised 21/04/2023
CRS: GDA 20 MGA 55
Scale: 1:15,000 @ A3 (main map)
Page size: A3




Owned by Mandalay Resources
Sensitive receptor (residence)
Vent shaft
Injection site
Splitters Creek pipeline
RO discharge pipeline
Rising main pipeline
Existing power transmission line
Power transmission line to be disconnected (inset map)
Road
Main watercourse
Watercourse - tributary
Exploration Licence
Mining Licence
Mine site domain (main map)
Vegetation offset area
Private land lot boundary
Water body
Aboriginal Cultural Overlay

**Crown land (main map)**

Commonwealth Land
Natural Features Reserve
State Forest
Uncategorised Crown Land

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Additional data: VIC_TR_ROAD, VIC_MINTEN, VIC_HY_WATERCOURSE, VIC_HY_WATER_AREA_POLYGON, V_PARCEL_MP_POLYGON, VIC_POWER_LINE, PLM25_Vic_Crown_Lands.

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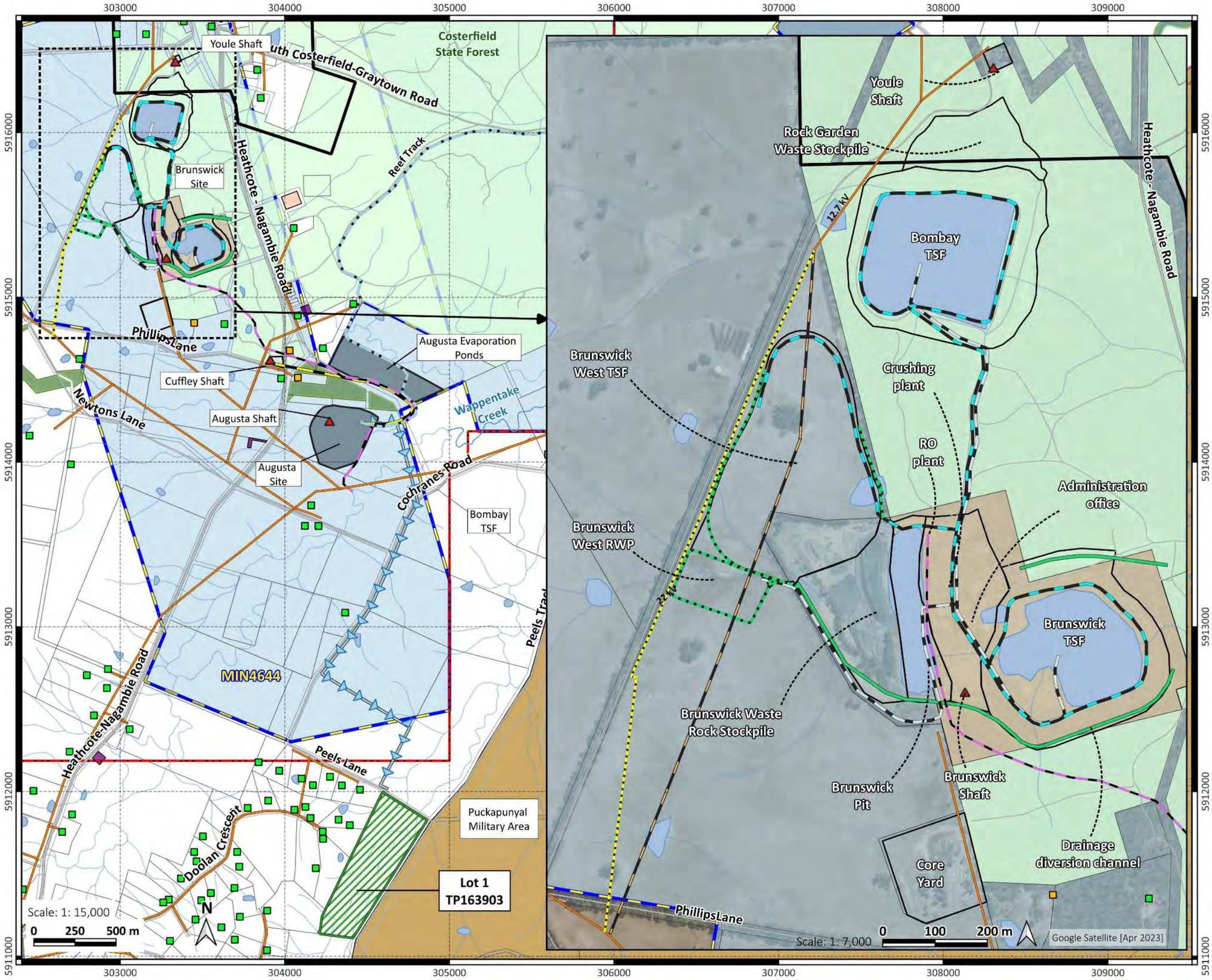
**AE1046.9 Mandalay Resources - Costerfield Operation**
**Figure 2.3. Site layout - Brunswick site**
Created 3/11/2022, revised 21/04/2023
CRS: GDA 20 MGA 55
Scale: 1:22,250 @ A3 (main map)
Page size: A3

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- Process water delivery pipeline
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- Main watercourse
- Watercourse - tributary
- Exploration Licence
- Mining Licence
- Mine site domain (main map)
- Vegetation offset area
- Private land lot boundary
- Water body

**Crown land (main map)**

- Commonwealth Land
- Natural Features Reserve
- State Forest
- Uncategorised Crown Land

Additional data: VIC_TR_ROAD, VIC_MINTEN, VIC_HY_WATERCOURSE, VIC_HY_WATER_AREA_POLYGON, V_PARCEL_MP_POLYGON, VIC_POWER_LINE, PLM25_Vic_Crown_Lands.

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## 2.2 Environmental and social setting

### 2.2.1 Climate

The Costerfield area has a Mediterranean climate with temperatures ranging from -2°C in winter (May to August) to +40°C in summer (November to February). Annual rainfall in the area is approximately 500 mm to 600 mm, with the majority occurring between April and October. The annual pan evaporation is between 1,300 mm and 1,400 mm.

Construction activities are generally restricted to the summer months as high winter rainfall can lead to saturated ground conditions that affect surface activities.

### 2.2.2 Geology

Mineralised veins in the Costerfield district are hosted by Silurian Costerfield siltstone, exposed in the core of the Costerfield Anticline. Historically, Costerfield mineralisation has been mined over a length of approximately 8 km north to south. Auriferous quartz-stibnite veins strike north-northwest and dip steeply to the west or east. They occur as either discrete, near vertical veins or in mineralized zones that range in thickness from a few millimetres up to a maximum of 4 m. Despite their narrow width, the veins tend to be persistent along strike and down dip. Individual ore shoots have been traced over 800 m strike length and have been worked down to 550 m depth.

Lodes typically comprise quartz (laminated to brecciated) and sulphides. The dominant sulphide mineral is stibnite ($Sb_2S_3$). In addition to stibnite, arsenopyrite and pyrite are observed. Gold mineralisation occurs within the stibnite as small grains, less than 20 micron, and is often associated with the presence of arsenopyrite. Stibnite mineralisation is fine-grained and is present as either massive mineralisation or as a matrix support to quartz breccias.

### 2.2.3 Landscape and landuse

The Costerfield Operations are located within a relatively flat, undulating plain, with several shallow waterway cut into it. The vegetation in the area consists of sparse woodland with little understory, typical of Box Ironbark forest in this area.

Land use surrounding the site is mainly small-scale farming, State forest and some low intensity residential properties. Vegetation in the farmed areas comprises mainly grasses used for grazing, with small copses of trees in natural waterholes and along waterways. State forest is located adjacent to the site.

Refer to Figure 2.4 and 2a for planning zones and overlays.

**AE1046.9 Mandalay Resources - Costerfield Operation**
**Figure 2.4. Planning zones**

Created 3/11/2022 and revised 3/04/2023
CRS: GDA 20 MGA 55
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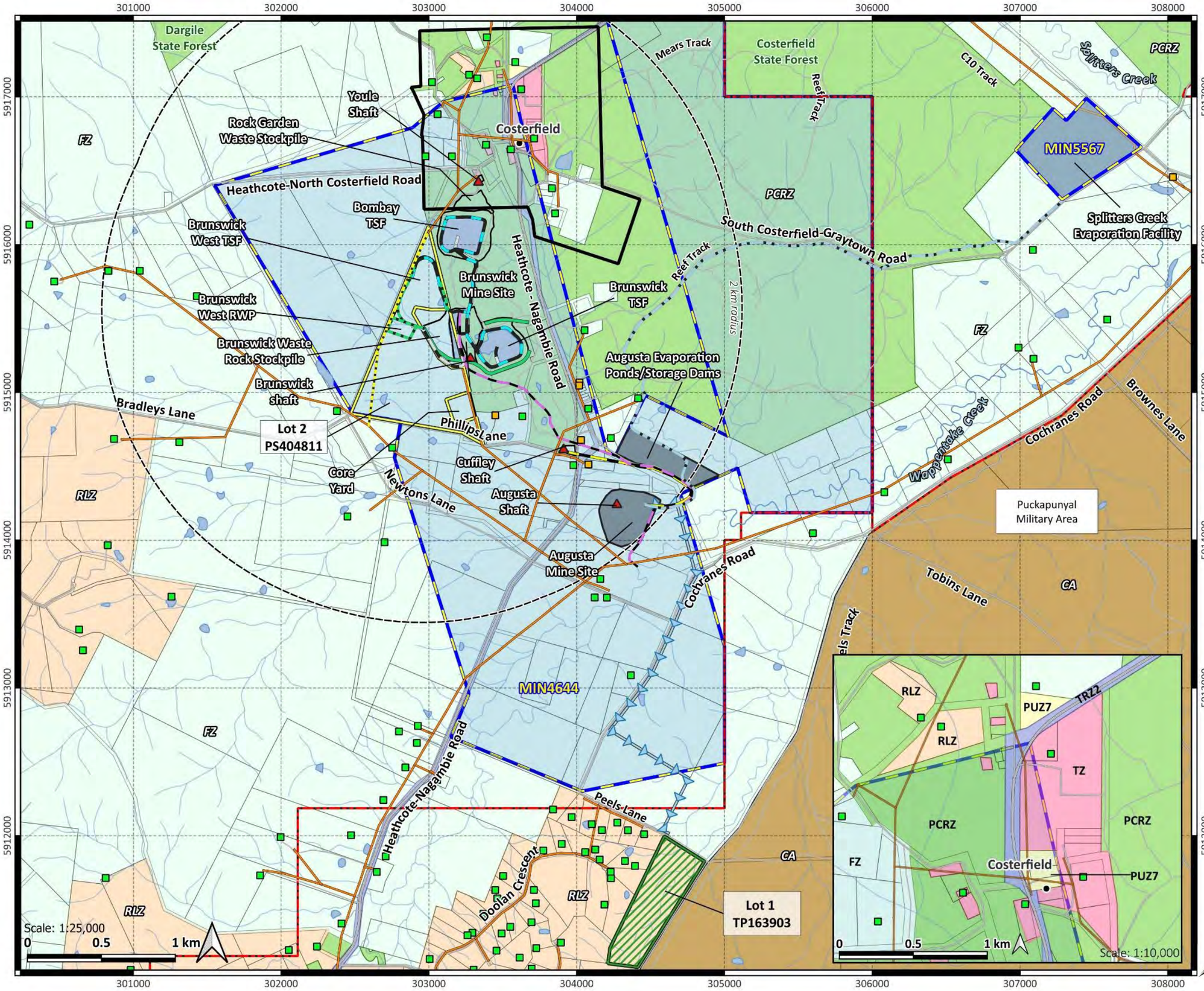
Page size: A3

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- Relocated power transmission line
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- Main watercourse
- Watercourse - tributary
- Exploration Licence
- Mining Licence
- Mine site domain
- Lot 2 PS404811
- Vegetation offset area
- Private land lot boundary
- Costerfield township
- Water body
- Radius circle

**Planning Overlay**

- Commonwealth Land (Planning zone category - CA)

**Planning Zone**

- FZ- Farming zone
- PCRZ - Public Conservation and Resource
- TZ - Township
- RLZ - Rural Living Zone
- TRZ2 - Principal Road Network
- PUZ7 - Public Use Zone - Other Public Use

Additional data: VIC_TR_ROAD, VIC_MINTEN, VIC_HY_WATERCOURSE, VIC_HY_WATER_AREA_POLYGON, V_PARCEL_MP_POLYGON, VIC_TOWNSHIP-POLYGON, VIC_POWER_LINE, PLM25_Vic_Crown_Lands, PLAN_ZONE wms (http://services.land.vic.gov.au/catalogue/publicproxy/guest/dv_geoserver/wms?VERSION=1.1.1

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**AE1046.9 Mandalay Resources - Costerfield Operation**
**Figure 2.4a. Planning overlayss**

Created 3/11/2022 and revised 1/04/2023
CRS: GDA 20 MGA 55
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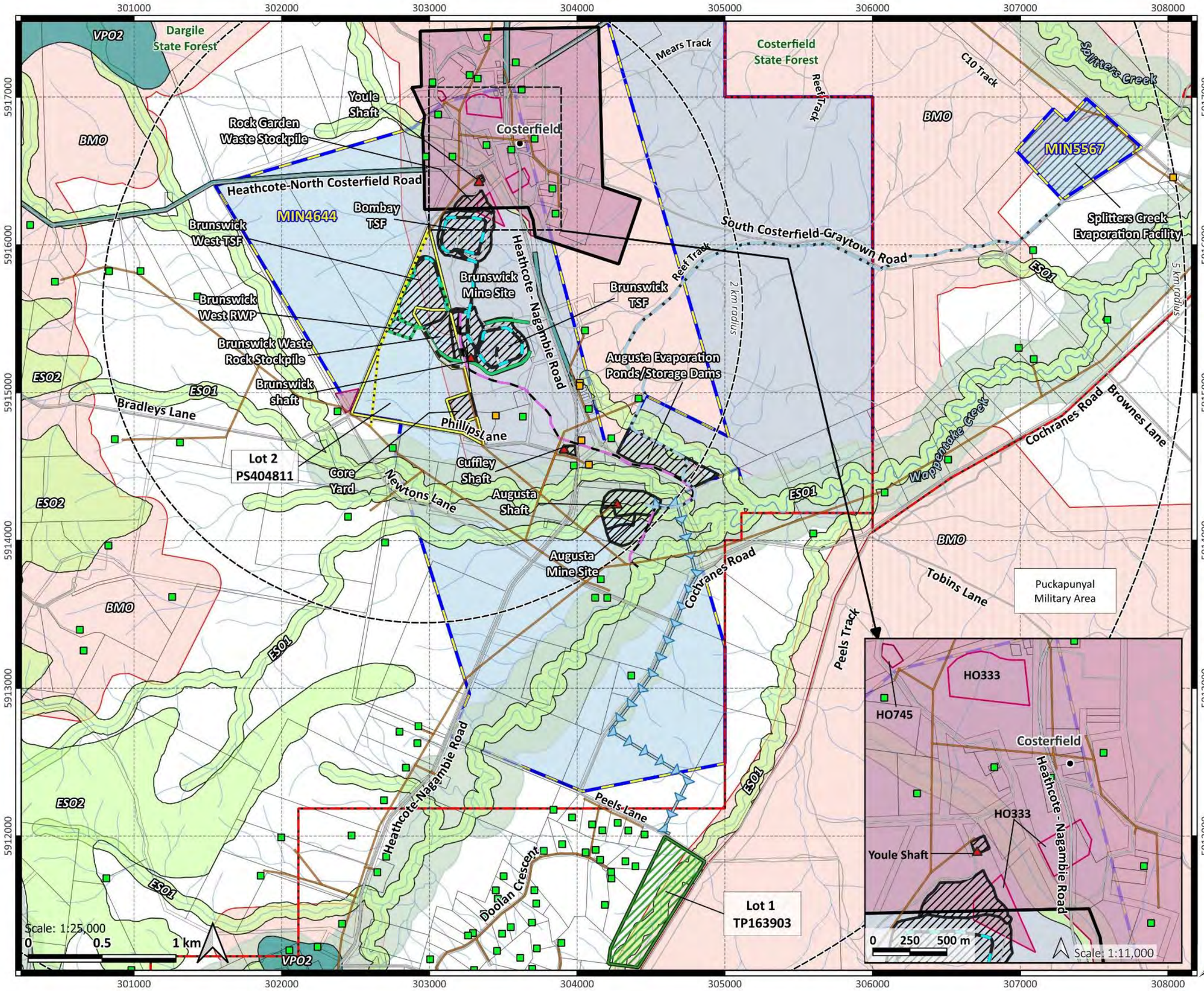


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- Exploration Licence
- Mining Licence
- Mine site domain
- Lot 2 PS404811
- Vegetation offset area
- Private land lot boundary
- Costerfield township
- Water body
- Radius circle

**Planning Overlay**

- Environmental Significance Overlay (ESO) - Schedules 1 and 2
- Heritage Overlay (HO)
- Vegetation Protection Overlay (VPO) - Schedules 2 and 3
- Aboriginal Cultural Heritage Overlay

Additional data: VIC_TR_ROAD, VIC_MINTEN, VIC_HY_WATERCOURSE, VIC_HY_WATER_AREA_POLYGON, V_PARCEL_MP_POLYGON, VIC_TOWNSHIP-POLYGON, VIC_POWER_LINE and VIC_PLAN_OVERLAY

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### 2.2.4 Surface water and groundwater

There are a number of ephemeral creeks in the vicinity of the mining operations, including Wappentake Creek and its tributaries. The surrounding plains are considered to be alluvial, and the lower-lying areas occasionally flood during heavy rainfall events.

The regional groundwater aquifer is confined to semi-confined and consists of Silurian siltstones and mudstones. Groundwater flow within this regional aquifer is through fractures and fissures within the rock. This is overlain by a perched alluvial aquifer comprising recent gravels, sands and silt. The perched alluvial aquifer is connected to the surface water system.

Based on monitoring and hydrogeological modelling, dewatering from the Augusta, Cuffley and Youle underground workings does not affect the alluvial aquifer. There are no beneficial users of groundwater in the area due to the poor quality of the water.

The pre-mining groundwater level at Brunswick shaft is approximately 178 AHD (WSP-Golder 2023). Currently the groundwater level is at approximately 120 m RL below the pit floor and thus 66 metres below its pre-existing level, due to mine associated dewatering activities.

There are no registered users of groundwater within at least 3 km of the Costerfield Mine site. Naturally occurring groundwater in the vicinity of the Costerfield Mine generally contains elevated levels of salt and dissolved metals, with low yield making it unsuitable for most stock and domestic purposes.

### 2.2.5 Flora

Part of the operation is located within the Costerfield State Forest and in a Public Conservation and Resource Zone (PCRZ). The Department of Environment, Land, Water and Planning (DELWP) maps the following Ecological Vegetation Classes (EVCs) as potentially occurring in the vicinity of the Costerfield Operations site: EVC 175 Low Rises Grassy Woodland (conservation status: vulnerable); and EVC 61 Box Ironbark (conservation status: depleted). For EVC evaluation purposes, Costerfield mining operations lies within the Goldfields Bioregion.

A field inspection identified EVC 20 Heathy Dry Forest in areas adjacent to the Brunswick site (Cheers 2016). The Heathy Dry Forest was identified to be a low overstorey, open eucalypt forest which is poor in form to 20 m tall with an open crown cover. The understorey is dominated by a low, sparse to dense layer of ericoid-leaved shrubs including heaths and peas. Graminoids and grasses are frequently present in the ground layer, but do not provide much cover.

MRCO has procured a native vegetation offset site located at Peels Lane, Costerfield, to compensate for the clearing of vegetation for all mining-related activities.

### 2.2.6 Heritage

#### Aboriginal cultural heritage

The Taungurung Clan Aboriginal Corporation is the Registered Aboriginal Party designated as the traditional owners of the land on which mining licence MIN4644 is located (SRK 2017).

Certain areas within MIN4644 and close to current operational areas are designated as Areas of Cultural Heritage Sensitivity. These include:

- Wappentake Creek (a waterway that traverses the southern portion of the eastern half of MIN4644) and 200 m either side of the drainage line.
- Mountain Creek South (a waterway that traverses the southern portion of the eastern half of MIN4644) and 200 m either side of the drainage line.

Mining heritage

The Costerfield Gold and Antimony Mining Precinct consists of three historic heritage sites (Bombay Mine and Cyanide Works, Minerva Mine and Costerfield Main shaft) that are located within MIN4644 to the northwest of the Brunswick TSF. The precinct is considered to be of historical, archaeological and scientific importance to the State of Victoria (HCV 2022).

In addition, the following features of local cultural heritage significance associated with historic mining have been identified within MIN4644 between the Augusta and Brunswick sites:

- South Costerfield Mine Shaft
- Old Alison Mine Shaft
- New Alison Mine Shaft.

The mine operations do not disturb any historic mine workings or other heritage features.

### 2.2.7 Community

Costerfield township is located 120 km north of Melbourne, has a total population of 75, and falls within the City of Greater Bendigo (MRCO 2022).

### 2.2.8 Sensitive receptors

Sensitive receptors are those aspects of the natural or human environment that may be impacted by mining operations. Under the MRSD Act, ERR has a duty when determining the consequence of a risk event to consider the potential impacts to (ERR 2020a):

- *Members of the public:*
  - *Public health, safety, amenity and Aboriginal heritage*
- *Land, property and infrastructure:*
  - *Neighbouring property, land use and nearby infrastructure such as highways, transmission lines, pipelines, schools and hospitals*
- *Environment:*
  - *Air, water, soil, vegetation, and flora and fauna species.*

In 2015, ERR released guidance for a risk based approach to the submission of Work Plans that requires the identification of sensitive receptors and the risk of the project creating a hazard to (or impact on) these receptors.

*MRCO has identified the following sensitive receptors around MIN4464. The sensitive receptors closest to the project sites are listed in*

Table 2-3 and shown in

| Receptor | Facility | Direction from site | Distance |
|---|---|---|---|
| **Heathcote-Graytown National Park** | Brunswick site | North, northeast and northwest | 1.5 -3.0 km |
| **Costerfield State Forest** | Rock Garden, Bombay TSF Brunswick TSF and processing plant | - | Within |
| | Augusta site | North | 500 m |
| **Mountain Creek** | Brunswick site | south | 500 m |
| | Augusta site | West to east | Within |
| **Tin Pot Gully Creek** | Augusta sites | East | 100 m |
| | Augusta evaporation ponds | Northeast | 20 m |
| | Brunswick site | | 300 m |
| **Wappentake Creek** | Augusta site | South | 200 m |
| **Heritage area (HO330)** | Rock Garden/Bombay TSF | | Within |
| **Heritage place (Miner's cottage 326110)** | Rock Garden/Bombay TSF | North | 500 m |
| **Residences** | | | |
| **Three residences** | Augusta evaporation ponds | | 150-300 m |
| **Six residences** | Augusta site | | 250-1000 m |
| **Eleven residences** | Both Augusta and Brunswick | | <2000 m |
| **Six residences** | Youle Ventilation Shaft | | 100 -500 m |
| **Six residences** | Rock Garden/Bombay TSF | | 300-500 m |
| **Four residences** | Brunswick site | | 500-1000 m |
| **Four residences** | Cuffley Ventilation Shaft | | 150-300 m |
| **Infrastructure** | | | |
| **McNichols Lane** | Augusta site | | 100 m |
| | Augusta evaporation ponds | | 20 m |
| **Cochranes Road, Newtons Lane, Peels Lane, Tobins Lane** | Augusta site | | <1000 m |
| **Phillips Lane** | Cuffley Ventilation Shaft | | 20 m |
| **Bradleys Lane** | Youle Ventilation | | 20 m |
| | Brunswick West TSF | | 50 m |
| **Heathcote-Nagambie Road** | Augusta site | | 200 m |
| **Heathcote-Nagambie Road** | Brunswick Plant site | | 200 m |

Figure 2.5.

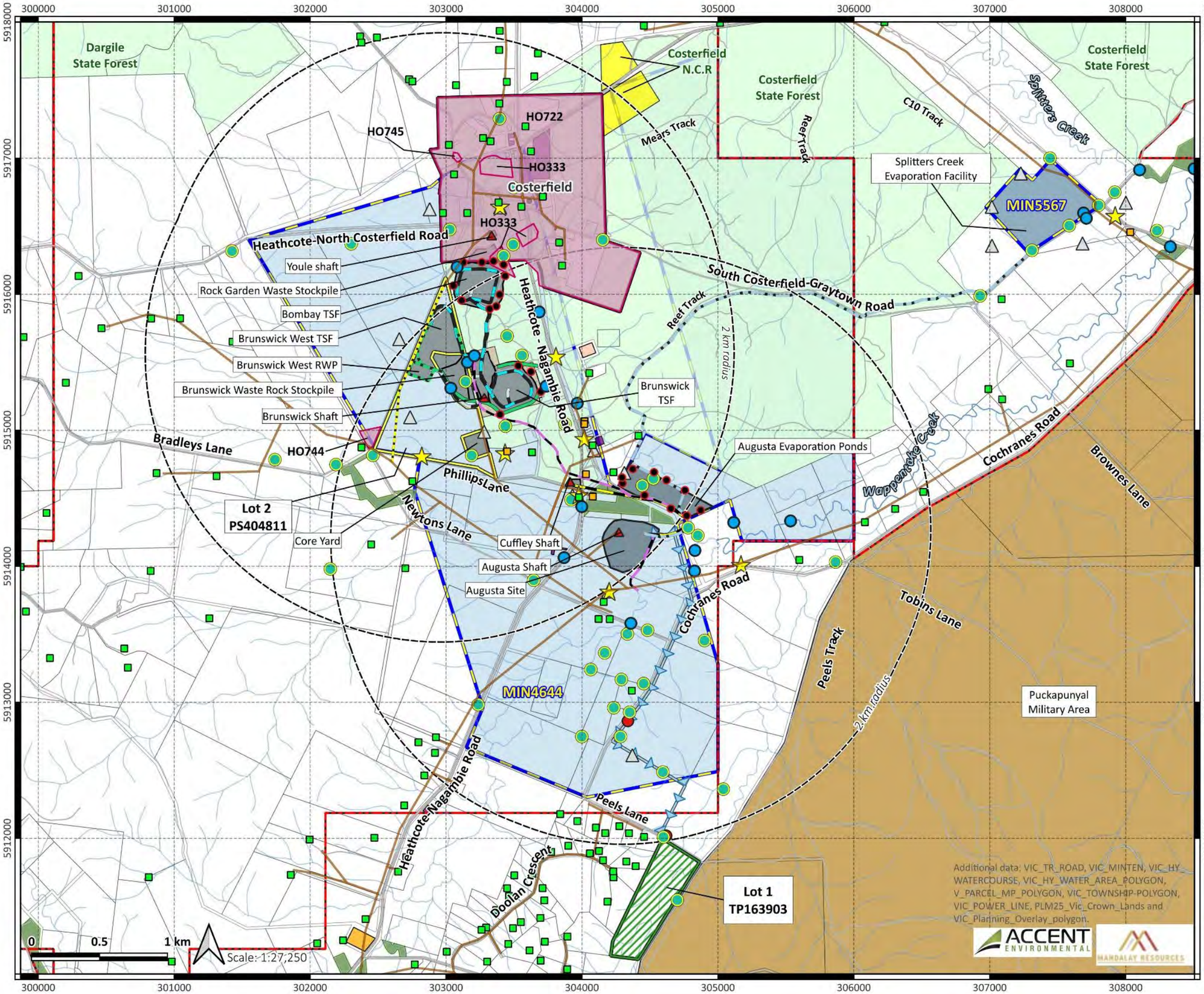
*Table 2-3 Sensitive receptors within 2km of MRCO.*

| Receptor | Facility | Direction from site | Distance |
|---|---|---|---|
| **Heathcote-Graytown National Park** | Brunswick site | North, northeast and northwest | 1.5 -3.0 km |
| **Costerfield State Forest** | Rock Garden, Bombay TSF Brunswick TSF and processing plant | - | Within |
| | Augusta site | North | 500 m |
| **Mountain Creek** | Brunswick site | south | 500 m |
| | Augusta site | West to east | Within |
| **Tin Pot Gully Creek** | Augusta sites | East | 100 m |
| | Augusta evaporation ponds | Northeast | 20 m |
| | Brunswick site | | 300 m |
| **Wappentake Creek** | Augusta site | South | 200 m |
| **Heritage area (HO330)** | Rock Garden/Bombay TSF | | Within |
| **Heritage place (Miner's cottage 326110)** | Rock Garden/Bombay TSF | North | 500 m |
| **Residences** | | | |
| **Three residences** | Augusta evaporation ponds | | 150-300 m |
| **Six residences** | Augusta site | | 250-1000 m |
| **Eleven residences** | Both Augusta and Brunswick | | <2000 m |
| **Six residences** | Youle Ventilation Shaft | | 100 -500 m |
| **Six residences** | Rock Garden/Bombay TSF | | 300-500 m |
| **Four residences** | Brunswick site | | 500-1000 m |
| **Four residences** | Cuffley Ventilation Shaft | | 150-300 m |
| **Infrastructure** | | | |
| **McNichols Lane** | Augusta site | | 100 m |
| | Augusta evaporation ponds | | 20 m |
| **Cochranes Road, Newtons Lane, Peels Lane, Tobins Lane** | Augusta site | | <1000 m |
| **Phillips Lane** | Cuffley Ventilation Shaft | | 20 m |
| **Bradleys Lane** | Youle Ventilation | | 20 m |
| | Brunswick West TSF | | 50 m |

| Receptor | Facility | Direction from site | Distance |
|---|---|---|---|
| **Heathcote-Nagambie Road** | Augusta site | | 200 m |
| **Heathcote-Nagambie Road** | Brunswick Plant site | | 200 m |

ADVERTISED PLAN

**AE1046.9 Mandalay Resources - Costerfield Operation**
**Figure 2.5. Sensitive receptors - Brunswick and Augusta sites**
Created 3/11/2022 and revised 1/04/2023
CRS: GDA 20 MGA 55
Scale: 1:27,250 @ A3
Page size: A3




- Owned by Mandalay Resources
- Sensitive receptor (residence)
- Vent shaft
- Dust monitoring site
- Groundwater monitoring site
- Injection site
- Noise monitoring site
- Seepage detection bore
- Surfacewater monitoring
- Existing clean water diversion drain
- Brunswick West TSF clean water diversion drain
- Injection site
- Splitters Creek pipeline
- RO discharge pipeline
- Rising main pipeline
- Process water return pipeline
- Process water delivery pipeline
- Relocated power transmission line
- Existing power transmission line
- Road
- Main watercourse
- Watercourse - tributary
- Exploration Licence
- Mining Licence
- Mine site domain
- Vegetation offset area
- Private land lot boundary
- Costerfield township
- Water body
- Site radius - 2 km

**Crown Land**
- Commonwealth Land
- Community Use Area
- Earth Resources
- Natural Features Reserve
- Nature Conservation Reserve
- Services and Utilities
- State Forest
- Uncategorised Crown Land
- Other Crown Land

**Planning Overlay**
- Heritage Overlay (HO)

# 3 Rehabilitation obligations and commitments

MRCO has identified the legal and other requirements listed below relevant to the rehabilitation of the Costerfield Operations.

## 3.1 Legislation

The primary legislative instruments that regulates the operation of a mine in Victoria are the *Mineral Resources (Sustainable Development) Act 1990* (MRSD Act) and the Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2019 (MRSD (MI) Regulations). Both the MRSD Act and the Regulations include requirements for a rehabilitation plan.

Section 79 of the MRSD Act sets out what a rehabilitation plan must take into account:

> *A rehabilitation plan must –*
>
> *a) take into account –*
>
> *i) any special characteristics of the land; and*
>
> *ii) the surrounding environment; and*
>
> *iii) the need to stabilise the land; and*
>
> *iv) the desirability or otherwise of returning agricultural land to a state that is as close as is reasonably possible to its state before the mining licence, prospecting licence or extractive industry work authority was granted; and*
>
> *v) any potential long-term degradation of the environment; …*

The Regulations further specify what information must be included in a rehabilitation plan lodged on or after 1 July 2020 at regulation 43(2):

> *a) proposed land uses for the affected land after it has been rehabilitated, that considers community views expressed during consultation; and*
>
> *b) a land form that will be achieved to complete rehabilitation, which must—*
>
> *i) be safe, stable and sustainable; and*
>
> *ii) be capable of supporting the proposed land uses referred to in paragraph (a); and*
>
> *c) objectives that set out distinct rehabilitation domains that collectively amount to the land form described in paragraph (b); and*
>
> *d) criteria for measuring whether the objectives described in paragraph (c) have been met; and*
>
> *e) a description of, and schedule for, rehabilitation milestones; and*
>
> *f) an identification and assessment of relevant risks that the rehabilitated land may pose to the environment, to any member of the public or to land, property or infrastructure in the vicinity of the rehabilitated land, including—*
>
> *i) the type, likelihood and consequence of the risks; and*

*ii) the activities required to manage the risks; and*

*iii) the projected costs to manage the risks; and*

*iv) any other matter that may be relevant to risks arising from the rehabilitated land.*

Relevant risk is defined at regulation 43(5):

*In this regulation—*

*a) "relevant risks" means risks that may require monitoring, maintenance, treatment or other ongoing land management activities after rehabilitation is complete.*

## 3.2 Workplan approvals

The final rehabilitation of the land and infrastructure on site will be in accordance with requirements set out in Work Plans (WPs) and Work Plan Variations (WPVs) that have been approved by ERR.

The following approved WP/WPV submissions contain key rehabilitation information for mining licences MIN4644 and MIN5567 are shown in Table 3-1:

*Table 3-1 List approved WP/WPV submissions containing key rehabilitation information*

| WP/WPV date | Nature of work |
|---|---|
| **MIN4644** | |
| **08/11/2005** | WPV Augusta open cut excavations, decline access for underground mining, associated surface facilities |
| **08/02/2006** | WPV Brunswick upgrade/modification of processing plant, ROM area, pipelines to tailings area and return |
| **25/06/2012** | WPV Augusta Waste Rock Storage Facility |
| **24/09/2013** | WPV Vent Shaft and Associated Infrastructure for the Cuffley Mine |
| **29/01/2014** | WPV Bombay Tailings Storage Facility Embankment Raise |
| **13/02/2014** | WPV Brunswick Tailing Storage Facility Embankment Raise |
| **16/02/2018** | WPV Consolidated Work Plan |
| **21/06/2019** | WPV Vent Shaft and Associated Infrastructure for the Youle Mine |
| **TBC** | WPV Brunswick West Tailing Storage Facility |

The WP/WPVs have been reviewed to determine the rehabilitation concepts that have been approved for the site. The sections below list key commitments that have been made in relation to rehabilitation.

### 3.2.1 Open cut mining of oxide ore from the Augusta deposit (2005)

*Table 3-2 Augusta mine WP/WPV commitments*

| WP/WPV date | Heading | Relevant text |
|---|---|---|
| **08/11/2005** | 6 Rehabilitation Plan<br>6.1 End use of site<br>[page 14] | *The majority of land to be utilised for mining and associated activities will be returned to its current use. The only exception to this rule is the area to be occupied by the works associated with the waterway diversion, to be managed so as to protect the waterway environment rather than being used for agriculture, as is now the case.*<br>*Appendices B and C include detailed descriptions of the rehabilitation works to be completed on the waterways while the rehabilitation works on the other land affected are described below.* |
| | 6 Rehabilitation Plan<br>6.2 Rehabilitation schedule<br>[page 14] | *The scheduling of rehabilitation works depends on both the schedule of completion of works in a particular area and the season.*<br>*Table 6.1 shows the seasons in which rehabilitation works need to be completed in order to minimise adverse impacts of earthworks and provide a high degree of success in revegetation.*<br>[Table 6.1 of Timing of Rehabilitation Works]… |
| | | [Table 6.2 of Schedule of Availability for Rehabilitation]…<br>*At all times the principle of rehabilitating the land at the earliest practical time will be adopted. Examples of the application of this principle are provided by the following:*<br>*Rehabilitation works on the waterway diversion channel will commence immediately following construction.*<br>*The back filling of the pit using barren rock enables rehabilitation of the area occupied by the temporary barren rock storage to rehabilitate at the earliest possible time.*<br>*In addition to the final rehabilitation of disturbed land, structures that will be in place throughout the life of the mine will be treated with temporary rehabilitation works to promote stability and to lessen visual impacts such structures include the acoustic barrier and the wall of the evaporation pond.*<br>*The outside of the acoustic barrier and evaporation pond wall will be covered with topsoil and planted with pasture species.* |
| | 6 Rehabilitation Plan<br>6.3 Rehabilitation techniques<br>[page 16] | *The only area of disturbed land that will be subject to rehabilitation aimed at a return to its existing ecological state is the point where the mine road access crosses McNichols Lane. In this area rehabilitation will consist of the following:*<br>*Testing of the disturbed area for contamination and removal of any contaminated material for disposal in the pit or the underground mine.* |

| WP/WPV date | Heading | Relevant text |
|---|---|---|
| | | *Deep ripping of any compacted areas*<br>*Earthworks will be completed to:*<br>*profile the surface to fit in with that of the surrounding area and provide free draining non eroding surface*<br>*return of original topsoil to the surface*<br>*shallow ripping (approximately 300 mm) on contour*<br>*Direct seeding and planting of seedlings*<br>*Monitoring, as described in the section 7.8* [8.7] *with replanting and control of erosion weeds and vermin as necessary.* |
| | | *The rehabilitation of agricultural land will be completed in consultation with the landowner but in general terms the rehabilitation work will leave the land in a suitable condition for cropping or pasture by:*<br>*Removal of all equipment and infrastructure including structural and building foundations not required by the landowner.*<br>*Profiling to match with the existing topography of adjacent areas and to provide a free draining non eroding surface.*<br>*Return the topsoil originally removed and stored.*<br>*Planting of a crop or pasture species selected by the landowner.* |
| | | *The rehabilitation of the area disturbed by the construction of the waterway diversion will consist of the following:*<br>*Return of topsoil to disturbed area.*<br>*Placement and securing of large logs at various locations along the constructed waterway. These logs which will number 10 to 12, will be partially laid across the low flow channel and extend at least a metre into the side of the channel so they are firmly secured.*<br>*Fencing to prevent access by stock and vermin with fences running along the outside of the small bund walls on either side of the channel.*<br>*In the vicinity of the low flow channel in 6 to 8 metres wide strip, species found in the Creekline Grassy Woodland association with the waterways in the local area will be planted. Plantings will include tree, sedge, rush and grass species.*<br>*In the remainder of disturbed area a crop of rye grass will initially be sown, as this is the fastest way of stabilising the surface of the channel. In subsequent years a variety of native grasses such as wallaby grass, common wheat-grass and weeping grass will be sown and in time will replace the rye grass.* |

| WP/WPV date | Heading | Relevant text |
|---|---|---|
| | | *The rehabilitation of the evaporation pond, the ventilation rises collars, McNichols Lane and the underground mine will be as described in the existing Work Plan.* |
| | 8 Environmental Monitoring Program<br>8.7 Flora and Fauna<br>[Page 50] | *All sites that are subjected to revegetation will be monitored as follows:*<br>*Quarterly site inspections for erosion, weed invasion, vermin and vandalism with results being recorded and remedial action taken as required. The quarterly site inspection regime will continue for a period of 18 months to two years following initial planting.*<br>*18 months to two years after initial planting a survey of vegetation establishment and other relevant aspects will be conducted.*<br>*After the formal survey site inspections will be conducted at six monthly intervals for a two-year period.*<br>*Two years after the formal survey a more thorough survey will be undertaken of both flora and fauna. The results of this survey will be used to determine the need for on-going monitoring.* |
| | Appendix B<br>Waterway Crossing - Description of Works<br>7. Rehabilitation and Revegetation<br>[page 2] | *If, at the cessation of mining, the landowner has no further use for the crossing and wishes it to be removed the following works will be performed.*<br>*All concrete, including the crown units and the slabs will be broken up and removed.*<br>*The land surface will be profiled to match in with the surrounding topography and provide a stable, non-eroding profile.*<br>*The disturbed area will be revegetated with species selection for the area in close proximity to the centre of the waterway being made to duplicate the areas immediately upstream and downstream of the crossing. The remaining disturbed area will be revegetated with species selected by the landowner.* |

### 3.2.2 Upgrading and operation of the Brunswick treatment (2006)

*Table 3-3 Brunswick plant WP/WPV commitments*

| WP/WPV date | Heading | Relevant text |
|---|---|---|
| **8/2/2006** | 5 Rehabilitation Plan<br>5.1 End use of site<br>[page 22] | *The proposed end use of the site is as part of the surrounding forest. The aims of rehabilitation of the site are therefore to provide a stable landform suitable for use for passive recreation with vegetation of a form and a standard that adds to the ecological value of the surrounding forest.* |

| WP/WPV date | Heading | Relevant text |
|---|---|---|
| | 5 Rehabilitation Plan<br>5.2 Rehabilitation schedule<br>[page 22] | *The nature of the work in the plant area is such that there is limited opportunity for progressive rehabilitation so rehabilitation works will commence after plant operations have been discontinued.*<br>*When this occurs the precise scheduling of rehabilitation works depends on the climatic conditions.*<br>*Table 5.1 shows the seasons in which rehabilitation works need to be completed in order to minimise adverse impacts of earthworks and provide a high degree of success in rehabilitation.*<br>[Table 5.1 timing of rehabilitation works] … |
| | 5 Rehabilitation Plan<br>5.3 Rehabilitation techniques<br>[page 22] | *Rehabilitation of the site will involve the following:*<br>*Removal of all plant, equipment and buildings from the site.*<br>*Testing of the disturbed area for contamination and removal of any contaminated material for disposal in the pit or the underground mine*<br>*Earthworks will be completed to:*<br>*deep rip all compacted areas*<br>*profile the surface to fit in with that of the surrounding area and provide free draining non eroding surface*<br>*place topsoil*<br>*shallow ripping (approximately 300 mm) on contour*<br>*Direct seeding and planting of seedlings*<br>*Monitoring, as described in the section 7.8 of the currently approved work plan for MIN4644, with replanting and control of erosion weeds and vermin as necessary.* |

### 3.2.3 Augusta Waste rock storage facility (2012)

*Table 3-4 Waste rock storage facility (Augusta) WP/WPV commitments*

| WP/WPV date | Heading | Relevant text |
|---|---|---|
| **25/6/2012** | 4 Impacts and Mitigation<br>Rehabilitation<br>[page 4] | *The stockpile is a temporary structure which shall be removed and returned to pasture on closure of the mine in accordance with the approved Work Plan.*<br>*Waste rock from the stockpile shall be used to rehabilitate various areas around the site on closure including the mine boxcut, Brunswick pit and Tailing Storage Facilities. Excess material may be considered for off-site beneficial reuse pending relevant approvals.* |

### 3.2.4 Ventilation Shaft and associated infrastructure for Cuffley the Mine (2013)

*Table 3-5 Ventilation Shaft (Cuffley) WP/WPV commitments*

| WP/WPV date | Heading | Relevant text |
|---|---|---|
| **24/9/2013** | 3.6 Security and Rehabilitation<br>[page 15] | *On the completion of mining operations, company owned infrastructure will be removed and an engineered concrete cap will be installed over the shaft, similar to the design shown in Figure 14. The access to be utilised will be the pre-existing track. This track will be improved to an acceptable standard; therefore no future rehabilitation requirement is foreseeable.*<br>[Figure 14…] |

### 3.2.5 Bombay TSF Embankment Raise (2014)

*Table 3-6 Bombay TSF WP/WPV commitments*

| WP/WPV date | Heading | Relevant text |
|---|---|---|
| **29/1/2014** | 11.0 Rehabilitation and Closure<br>[page 23] | *The primary closure objective for the Bombay TSF is to design and construct an engineered cover system utilising available on-site materials to ensure long-term tailings containment. Once constructed, the covered tailings impoundment should require minimal and ideally no ongoing supervision.*<br>*The TSF Closure Plan will ultimately be developed prior to closure of mining operations in consultation with state regulators. The TSF Closure Plan will address key post-closure issues such as embankment stability, surface water erosion, flora and fauna impacts, dust, seepage and visual amenity.*<br>*The proposed cover design is envisaged to be graded at 1% from the centre point of the TSF and rehabilitated to Box Ironbark forest. Rehabilitation of the site shall include the following measures:*<br>*All infrastructure, equipment, structures and pipelines are to be removed;*<br>*the existing embankment slopes will be flattened to 3H:1V forming the footprint as shown on the drawings, refer to Appendix A;*<br>*A suitably qualified Engineer shall develop a detailed design for encapsulation of the tailings and rehabilitation of the external embankment on closure. It is anticipated that a layer of inert material and topsoil will cap the tailings;*<br>*The inert material will likely be excavated waste rock from the Augusta Mine and will undergo geochemical characterization to confirm its suitability for use in the final rehabilitation;*<br>*Topsoil, stripped and stockpiled during the various construction stages shall be spread across the site; and* |

| | | |
|---|---|---|
| | | *The site shall be revegetated as Box Ironbark forest.* |
| | | *The closure design proposed for the effective management of the key post closure risks will aim to:*<br>*Maintain the stability and integrity of the embankments, crests and surfaces into perpetuity.*<br>*Provide erosion protection for any intermediate cover layer materials and the underlying tailings.*<br>*Provide sufficient thickness of rock cover so that burrowing animals cannot access the tailings.*<br>*Minimise dust by preventing uncontrolled erosion and release of the fine tailings material.*<br>*Minimise seepage.* |

### 3.2.6 Brunswick TSF Embankment Raise (2014)

*Table 3-7 Brunswick TSF WP/WPV commitments*

| WP/WPV date | Heading | Relevant text |
|---|---|---|
| **13/2/2014** | 11.0 Rehabilitation and Closure<br>[Page 22]<br>Brunswick TSF 2014 | *The primary closure objective for the Brunswick TSF is to design and construct an engineered cover system utilising available on-site materials to ensure long-term tailings containment. Once constructed, the covered tailings impoundment should require minimal and ideally no ongoing supervision.*<br>*The TSF Closure Plan will ultimately be developed prior to closure of mining operations in consultation with state regulators. The TSF Closure Plan will address key post-closure issues such as embankment stability, surface water erosion, flora and fauna impacts, dust, seepage and visual amenity.*<br>*The proposed cover design is envisaged to be graded at 1% from the centre point of the TSF and rehabilitated to Box Ironbark forest. Rehabilitation of the site shall include the following measures:*<br>*All infrastructure, equipment, structures and pipelines are to be removed;*<br>*the existing embankment slopes will be flattened to 3H:1V forming the footprint as shown on the drawings, refer to Appendix A;*<br>*A suitably qualified Engineer shall develop a detailed design for encapsulation of the tailings and rehabilitation of the external embankment on closure. It is anticipated that a layer of inert material and topsoil will cap the tailings;*<br>*The inert material will likely be excavated waste rock from the Augusta Mine and will undergo geochemical characterization to confirm its suitability for use in the final rehabilitation;* |

| | | |
|---|---|---|
| | | *Topsoil, stripped and stockpiled during the various construction stages shall be spread across the site; and*<br>*The site shall be revegetated as Box Ironbark forest.* |
| | | *The closure design proposed for the effective management of the key post closure risks will aim to:*<br>*Maintain the stability and integrity of the embankments, crests and surfaces into perpetuity.*<br>*Provide erosion protection for any intermediate cover layer materials and the underlying tailings.*<br>*Provide sufficient thickness of rock cover so that burrowing animals cannot access the tailings.*<br>*Minimise dust by preventing uncontrolled erosion and release of the fine tailings material.*<br>*Minimise seepage.* |

### 3.2.7 WPV for the Youle ventilation shaft and Rising Main (2019)

*Table 3-8 Youle shaft WP/WPV commitments*

| WP/WPV date | Heading | Relevant text |
|---|---|---|
| **21/6/2019** | RRAM: WPV for the Youle ventilation shaft: Construction and Operation | *The Rehabilitation Plan will include the shaft/rising main site as an additional site to be rehabilitated using existing shaft rehabilitation procedures.* |

### 3.2.8 WPV for Brunswick West Tailings Storage Facility (2022)

*Table 3-9 Brunswick West TSF WP/WPV commitments*

| WP/WPV date | Heading | Relevant text |
|---|---|---|
| **TBC** | WPV for the Brunswick West TSF<br>4.1.9 Conceptual Closure | *A Conceptual Closure concept for the TSF has been developed as follows:*<br>*A domed (convex), self-shedding cover with a nominal 5% grade.*<br>*The cover layers will comprise a low permeability earthfill material, overlain by inert (i.e., non-acid generating) earthfill and weathered rockfill, and a final layer of topsoil to support revegetation.*<br>*The low permeability earthfill material will be placed directly over the tailings surface and will be:*<br>- *a minimum thickness of 0.5m at the perimeter embankment, and increase in thickness over the tailing surface to the centre of the TSF to form a minimum 5% grade from the centre of the TSF towards the perimeter embankment.*<br>- *be connected to the BGM clayey subgrade and BGM liner around the entire perimeter of the TSF to fully encapsulate the tailings.*<br>- *designed to a thickness to support a revegetated surface without plant roots intercepting the tailings below.*<br>*The earthfill and weathered rockfill will be placed over the earthfill material to a minimum thickness of 0.5 m, matching the minimum underlying 5% grade of the landform.*<br>*The topsoil material will be placed over the weathered rockfill to a nominal thickness of 300 mm.*<br>*If early closure of the facility is expected, the final TSF landform can be achieved by partial deconstruction of the embankment to the tailings level, and reclamation of embankment materials for impoundment backfilling/cover construction.* |
| | 8 Rehabilitation<br>8.1.1 Post-mining land uses | *The Costerfield Operations operate under agreements with the state and landowners that commit MRCO to return the disturbed land to the pre-mining land uses, where practical.*<br>*Brunswick*<br>*The planned final land use for the Brunswick West TSF site is grazing.*<br>*Alternative land uses*<br>*The current planned final land use represents the base-case and will be subject to review and stakeholder consultation as part of the closure planning process.* |

| WP/WPV date | Heading | Relevant text |
|---|---|---|
| | 8.1.2 Post-mining landforms | *The rehabilitated site of the Brunswick West TSF will be returned in the form of pastoral grassland. Rehabilitation of areas disturbed by Brunswick West TSF shall be implemented to achieve the following outcomes:*<br>• *long-term stable landform compatible with the surrounding landscape;*<br>• *turkey nest style TSF to become water shedding hill with non-eroding slopes; and*<br>• *suitable for grazing land use.* |
| | 8.1.3 Closure concept | *The proposed TSF has been the subject of detailed design and assessment by consulting engineers, ATC Williams and their report "Brunswick West Tailings Storage Facility Investigation and Design - Detailed Design Report 109014.15 R04 (Rev 1)" includes details of the Conceptual Closure Plan in accordance with ANCOLD (2019). An outline of this concept is presented in Section 4.1.9.*<br>*A detailed closure design and plan will be prepared for the decommissioning and closure of the facility in accordance with the ANCOLD Guidelines on Tailings Dams (2019).* |

## 3.3 Planning

The Costerfield Mine operates under planning consent in the form of various planning permits issued by the City of Greater Bendigo. Text from the planning permits relevant to rehabilitation is provided below.

### 3.3.1 Permit No. 1834 - Mining (8 May 1996)

*THE PERMIT ALLOWS: Mining*

*Condition 16. On the completion of mining, the tailings dam, pit surrounds the waste rock emplacement site, the open pits and the site generally shall be rehabilitated generally in accordance with the requirements of the work plan, and to the satisfaction of the Department of Conservation and Natural Resources and the Department of Agriculture, Energy and Minerals in consultation with the responsible authority.*

### 3.3.2 Permit No. AM/2248/1997/C – Brunswick open cut (Amended 12 November 2014)

*THE PERMIT ALLOWS: Open cut mining and gold antimony recovery and existing treatment plant (located at the Brunswick mine site) and works allowed by the Victorian Civil and Administrative Tribunal in its determination of permit amendment proceedings P842/2014 and P846/2014 authorising the raising of the dam walls of the Bombay tailings dam and the Brunswick tailings dam*

*Condition 1.3. In relation to the raising of the height of the Bombay tailings dam and the Brunswick tailings dam authorised by the amendments to this permit granted by the Victorian Civil and Administrative Tribunal in its determination of proceedings P842/2014, and P846/2014*

*such works are not to commence until plans thereof have been submitted to and approved by the responsible authority. Such plans are to be drawn to scale with dimensions and three copies are to be submitted. When approved, such plans will be endorsed as evidence of their approval and will thereby become the part of the endorsed plans under this permit relating to the elevation of the heights of the dam walls of the Bombay tailings dam and the Brunswick tailings dam such plans are to depict or specify:*

*…*

*(h) plans for the ultimate closure of the said tailing dams with specifications including capping and rehabilitation but on the basis that the provision of such closure and rehabilitation plans may be deferred with the consent of the responsible authority pending the report of the independent reviewer required by condition 1.4 in so far as it relates to such capping and rehabilitation.*

*Note that: In determining what it will approve in relation to such plans the responsible authority will take into consideration reports and recommendations submitted to it in accordance with condition 1.4 below.*

*Condition 1.4. A report or reports from a suitably qualified independent reviewer whose qualifications are to the satisfaction of the responsible authority is to be submitted to the responsible authority prior to its approval of the plans required by condition 1.3 above.*

*Such a report and recommendations are to review the stages of design construction and operation of the tailings dams as extended and their capping and rehabilitation including whether a closing cap with a gradient of 1:100 is appropriate and if not what gradient should be required save that insofar as plans, report and recommendations might relate to final capping and rehabilitation, their submission can be delayed with the consent of the responsible authority granted in writing which consent can be granted from time to time.*

*The report or reports are to confirm that the tailings dams raisings have been designed, constructed, operated, closed and rehabilitated in accordance with ANCOLD Guidelines on Tailings Dams – Planning, Design, Constructions, Operation and Closure (ANCOLD 2012) and that the dams have been designed as High C consequence category dams.*

*Condition 1.5. All works and rehabilitation works allowed or required by amendments to this permit granted by the Victorian Civil and Administrative Tribunal in its determination of proceedings P842/2014 and P846/2014 are to be carried out in accordance with the plans approved under 1.3 above and such plans, after approval, are not to be altered or varied except with the written consent of the responsible authority.*

*Condition 11.4. Following completion of mining approved by this permit, all roads that have been temporarily closed must be reopened on the original alignments by construction to at least a comparable standard as existing prior to operations, to the satisfaction of the Responsible Authority.*

*Condition 11.5. Any and all buildings and works, including waste dumps, erected or constructed within 20 metres of the Heathcote-Nagambie Road reserve shall be removed and the site restored to the satisfaction of and at no cost to the Responsible Authority within three months of the termination of the use hereby permitted.*

*Condition 11.6 Any vegetation or other planting within the Heathcote-Nagambie Road reserve shall be in accordance with the requirements of VicRoads.*

*Condition 11.8. If required, the permit holder shall enter into a Section 173 Agreement under the Planning and Environment Act 1987 with the Responsible Authority and the Department of Natural Resources and Environment to ensure that buildings, works and waste dumps are removed and the site restored.*

*Condition 14. Rehabilitation*

*The approved pit must be progressively backfilled and rehabilitated generally in accordance with the endorsed plans, except that the drainage area shown in Figure 19D may be restored as a water feature in accordance with detailed landscape plans developed in consultation with the Responsible Authority, Department of Natural Resources and Environment and the local community.*

### 3.3.3 Permit No. DM/753/03 - UG mine (14 January 2004)

*THE PERMIT ALLOWS: Underground mining*

*Condition 11. Upon completion of mining operations further rehabilitation efforts in the form of native vegetation plantings should be considered where practicable to the satisfaction of the responsible authority.*

### 3.3.4 Permit No. DM/253/2005 - Boxcut (11 August 2005)

*THE PERMIT ALLOWS: Establishment & operation of open pit Gold/Antimony mine*

*Condition 8. Upon completion of mining operations, further rehabilitation efforts in the form of native vegetation plantings, should be considered where practicable, to the satisfaction of the responsible authority.*

### 3.3.5 Planning Permit No. DM/576/2013 - Cuffley Vent Shaft (20 September 2013)

*THE PERMIT ALLOWS: use an developed earth resources industry (ventilation shaft and associated infrastructure for existing underground mining operation)*

### 3.3.6 Planning Permit No. DM/621/2018 – Vent Shaft (7 June 2019)

*THE PERMIT ALLOWS: Construct an exhaust mine ventilation shaft*

*Condition 7. Rehabilitation of the vent shaft*

*Prior to use of the vent shaft commencing a copy of the rehabilitation plan which forms part of the Work Plan must be submitted to the responsible authority. If the use of the vent shaft ceases, rehabilitation of the site must be undertaken in accordance with the rehabilitation plan.*

## 3.4 Other licences, permits and agreements

Other licences permits and agreements held by MRCO are shown in Table 3-10.

*Table 3-10 Table Other licences permits and agreements*

| I.D. | Entity | Description |
|---|---|---|
| **#HAR001** | Harris | Landholders agreements 12/03/1988<br>Details for retention of features and land end use |
| **#TOB001** | Tobin | Landholders agreements 12/03/1988<br>Agreements for retention of features and land end use |
| **109992** | EPA | EPA Works Approval and EPA Discharge Licence (updated: 05/07/2018)<br><br>The licence holder operates a gold and antinomy underground mining operation.<br>This licence allows the discharge of 2ML/day of reverse osmosis treated groundwater into mountain Creek South diversion channel. |
| **210974** | EPA | EPA Research, Development And Demonstration Approval (Issued: 31/10/2019)<br>This approval allows construction and operation of works to dispose of 730ML of mine wastewater via injection to groundwater in Margaret's Aquifer on a trial basis over an operation period of 24 months in accordance with the conditions of this approval. |
| **BEE006479** | Goulburn-Murray Water | Licence to Take and Use<br>Permits extraction of up to 700 ML of groundwater per annum |

## 3.5 Guidelines

### 3.5.1 ERR guidelines

Approval processes under the MRSD Act are administered by ERR within the Department of Jobs, Precincts and Regions (DJPR).

This Rehabilitation Plan for the MRCO has been prepared with consideration of the following ERR guidance documents:

- *Preparation of Rehabilitation Plans Guideline for Mining & Prospecting Projects* (ERR 2020a) (the Guidelines)
- *Preparation of Work Plans and Work Plan Variations. Guideline for Mining Projects* (ERR 2020b)
- *Establishment and Management of Rehabilitation Bonds for the Mining and Extractive Industries* (ERR 2022)
- *Geotechnical Guideline for terminal and rehabilitated sloped* (ERR 2020)
- *Technical Guideline Design and Management of Tailings Storage Facilities* (ERR 2017).

The primary guidance document is the Guidelines (ERR 2020a), which sets out the regulatory requirements for rehabilitation under the MRSD Act and the MRSD (MI) Regulations.

The Guidelines outline the process for developing a rehabilitation plan as follows:

- Develop a knowledge base.

- Compare current plan against new requirements.
- Propose post-mining land uses.
- Identify post-mining landforms.
- Identify domains.
- Develop rehabilitation objectives.
- Develop rehabilitation criteria.
- Identify rehabilitation milestones.
- Assess residual risks from rehabilitated land.



### 3.5.2 Industry leading practice

Industry leading practice has also been considered in the development of this Rehabilitation Plan, as outlined below.

Leading Practice Sustainable Development Program

The mining industry has been working with Australian governments through the Leading Practice Sustainable Development Program to improve the mutual understanding of how rehabilitation can minimise the future impacts of mining activities. The Commonwealth Government has supported the development of a series of leading practice handbooks on Best Practice Environmental Management in Mining. These handbooks are relevant to all stages of a mine's life (exploration, feasibility, design, construction, operation, rehabilitation and closure) and to all facets of its operation.

*Mine rehabilitation handbook*

The mine rehabilitation handbook (DIIS 2016a) outlines the key principles and procedures recognised as leading practice for planning, implementing and monitoring rehabilitation, comprising:

- understanding the importance of rehabilitation and its business case for the mining sector
- establishing rehabilitation objectives, targets and success criteria
- planning to rehabilitate through engaging with stakeholders, setting objectives and completion criteria, and establishing rehabilitation baselines
- integrating and implementing rehabilitation plans during the life of the operation
- monitoring and reporting mine-site rehabilitation performance.

The following definition of rehabilitation is adopted in the handbook:

> *Rehabilitation comprises the design and construction of landforms as well as the establishment of sustainable ecosystems or alternative vegetation, depending upon desired post-operational land use*.

*Mine closure handbook*

The mine closure handbook (DIIS 2016b) is primarily intended for use as a management tool to improve closure planning and execution on mine sites. The handbook considers mine closure through the lens of sustainable development and considers all life-of-mine phases; exploration; feasibility; planning and design; construction and commissioning; operations; decommissioning and closure; and post-closure management and monitoring.

The handbook incorporates a new phase in life-of-mine management which it terms 'post-closure management'. This phase has been added to the handbook to "*accommodate longer term considerations for companies to manage post-decommissioning conditions en route to relinquishment*".

Strategic Framework for Mine Closure

The Australian and New Zealand Minerals and Energy Council (ANZMEC) and the Minerals Council of Australia jointly published the Strategic Framework for Mine Closure (ANZMEC 2000). The overall objective of the framework is "*to encourage the development of comprehensive closure plans that return all mine sites to viable, and wherever practicable, self-sustaining ecosystems, and that these plans are adequately financed, implemented and monitored within all jurisdictions*".

The Strategic Framework for Mine Closure is structured around a set of objectives and principles grouped under six key areas:

- Stakeholder involvement: objective is to enable all stakeholders to have their interests considered during the mine closure process.
- Planning: objective is to ensure the process of closure occurs in an orderly, cost-effective and timely manner.
- Financial provision: objective is to ensure the cost of closure is adequately represented in company accounts and that the community is not left with a liability.
- Implementation: objective is to ensure there is clear accountability, and adequate resources, for the implementation of the closure plan.
- Standards: objective is to establish a set of indicators which will demonstrate the successful completion of the closure process.
- Relinquishment: objective is to reach a point where the company has met agreed completion criteria to the satisfaction of the Responsible Authority.

ANCOLD

The following is a list of current ANCOLD engineering best practice documentation upon which TSF design had been based:

- Australian National Committee on Large Dams (ANCOLD 2012) – Guidelines on the Consequence Categories for Dams
- Australian National Committee on Large Dams (ANCOLD 2019) – Guidelines on Tailings Dams
- Australian National Committee on Large Dams (ANCOLD 2019) – Guidelines for Design of Dams and Appurtenant Structures for Earthquake
- Australian National Committee on Large Dams (ANCOLD 2003) – Guidelines on Risk Assessment.

## 3.6 Policy

MRCO's environmental policy is provided in Appendix A.

# 4 Stakeholder identification and community engagement

## 4.1 Community Engagement Plan

MRCO's 2021 Community Engagement Plan (CEP) sets the framework for engaging with the mine's stakeholders and provides tools for employees to utilise when making operational decisions. In doing so, the Plan ensures that any adverse impacts of the mining operation on stakeholders are minimised and well managed, and that transparent and ongoing consultative relationships are developed and maintained.

The CEP is relevant to all operational phases of mining and exploration at Costerfield including pre-planning, exploration, project approval, project development, operation and mine closure. The principles and methodologies identified relate to changes in operational circumstance, both planned and unplanned. The CEP provides strategic direction for both pro-active consultation with stakeholders, prior to a change or event, and re-active consultation as it may relate to an incident or complaint. It also addresses the Company and the mine's material risks and provides a preventative approach to managing and mitigating such risks.

In relation to mine rehabilitation, the CEP describes aims and strategies of MRCO in relation to consultation associated with rehabilitation and closure. Various forms of stakeholder engagement and information sharing are prescribed in the CEP, which will be utilised through various stages of mine operation and closure.

Rehabilitation and closure consultation will be consistent with the requirements of the CEP, and will include:

- identifying stakeholder attitudes and expectations
- providing information to stakeholders
- receiving feedback from stakeholders
- analysing stakeholder feedback and considering community concerns or expectations.

Refer to the CEP for further details.

## 4.2 Stakeholder identification

The following stakeholders (in no particular order) have been identified as being impacted by or interested in the Costerfield Operations. These stakeholders have been identified over the course of the operation's life and the list continues to be amended based on operational or stakeholder changes:

- neighbours <500 m
- Costerfield community <5 km
- Costerfield & Heathcote surrounding community <20 km
- Environment Review Committee (ERC)
- ERC Community Reference Subcommittee (CRS)
- employees
- business partners

- regulators
- local government
- public service
- state and national government
- political parties and their representatives
- indigenous communities (Taungurung People)
- media
- unions (Australian Workers Union (AWU))
- education facilities
- special reference groups
- emergency services (Country Fire Authority (CFA), State Emergency Service (SES), police, ambulance).



### 4.2.1 Stakeholder concerns

In 2016, a stakeholder survey was commissioned by Mandalay Resources Corporation and undertaken in each of the company's operating locations. At Costerfield, the survey was undertaken by company personnel and a total of 32 community members were surveyed.

The Costerfield Community Survey revealed that MRCO is held in good regard by the majority of respondents. More than 70% of respondents believe the community would be worse off without the mine.

Although landholders close to the mine were the most likely to feel negative about issues such as traffic, water quality and noise, none of these respondents complained about the way Mandalay staff communicated with them or dealt with their concerns. When asked about Mandalay's response to community issues, 84% of all respondents said it had been either 'about right' or 'better than expected'. Most respondents were able to identify particular concerns that Mandalay had responded to as well as the outcomes in each case.

The following potential, project-related impacts have either been identified by community members through the 2016 community survey or in discussions with MRCO personnel:

- increased traffic
- ground vibration
- noise
- ground water changes, level or quality
- surface water changes, redirection of flow or quality
- dust
- air quality
- visual amenity
- loss of property value
- soil erosion
- loss of natural environment
- safety

- failure to consult with parties.

The potential impacts identified in the 2016 community survey have been addressed in a Community Risk Action Plan (refer to the CEP) to determine what actions are required both internally within MRCO and externally with stakeholders to minimise the risk of impacts. The action plan considers operational activities that have the potential to cause impacts and assigns mitigating actions to MRCO personnel or departments to achieve the desired risk reduction. These actions are used to plan and schedule activities or communications throughout the year.

The potential impacts identified are all relevant to the process of rehabilitation and closure. Some impacts, such as increased traffic and noise, are relevant to the activities undertaken during the process of rehabilitation. Other impacts, such as soil erosion and the loss of natural environment, are also relevant to the achievement of acceptable and stable post-closure landforms and landuses. The potential impacts identified above and their associated risk factors will be a key focus of rehabilitation consultation and planning.

## 4.3 Environmental Review Committee

The role of the ERC is to achieve review of environmental and social monitoring and compliance data and review annual reports, audit reports and outcomes in line with the licence conditions and the MRSD Act.

Information presented to and discussed by the ERC includes:

- corporate quarterly reports
- environmental monitoring data gathered during the reporting period
- WPV proposals and updates
- complaints
- incidents
- reports from the CRS
- other relevant environmental or social issues raised by members of the committee or the company.

The ERC membership includes relevant regulatory authorities, community members (who are all CRS members) and relevant mine personnel.

A report to the ERC membership is circulated quarterly. Members are encouraged to contact the mine to discuss any content that may be relevant to their business/interest or to discuss any areas of concern as soon as possible after the minutes are circulated. Where appropriate, MRCO may address any concerns, issues or queries via email to the ERC membership to ensure all members are equally and fairly provided with the same information.

The ERC meets every three months to discuss data presented during the previous quarter.

The ERC provides a key forum for informing stakeholders in relation to rehabilitation and closure planning and identifying and discussing any issues of concern.

### 4.3.1 Community Reference Subcommittee

The aim of the CRS is to resolve issues or concerns before complaints are generated and to assist MRCO in their planning and decision making. The role of the CRS is to promote a good working relationship between the mine and the community by providing a platform for information sharing, collaborative discussion, constructive input and meaningful feedback on project proposals and future mine operations. The CRS works under the auspices of the ERC but affords more time to relevant discussion regarding community affairs. The group may also provide feedback on planning or execution of consultation initiatives with the broader Community and guidance around philanthropic contributions made to the Community.

The scope of discussion at the CRS meetings may include:

- new project proposals and draft approvals (i.e. WPVs)
- feasibility studies
- rehabilitation and mine closure
- philanthropic contributions
- complaints and current issues
- recent changes to the mine plan
- communication methods.

The CRS therefore provides an important mechanism for the detailed discussion and resolution of any community concerns regarding rehabilitation and closure. Such concerns could relate to proposed final land uses, potential community impacts, or the potential retention of on-site infrastructure for post-closure use by landholders or the broader community.

## 4.4 Crown land manager consultation

MRCO has regularly undertaken consultation with the Crown Land Manager (DEECA) for Bombay TSF, Brunswick TSF and Brunswick Pit. Most recent discussion was in 2022 for landowner consent for the construction of a core shed on Crown Land, and in 2021 for the construction of an embankment raise on the Bombay TSF.

# 5 Proposed post-mining land uses and post-mining landform

The general rehabilitation concepts described in the WP/WPVs (see Section 3.2) involve:

- decommissioning and removal of the mine facilities
- securing portals
- covering and stabilising TSFs
- reshaping disturbed areas including the Brunswick Pit
- revegetating disturbed areas.

## 5.1 Post-mining land uses

The Costerfield Operations operate under agreements with the state and landowners that commit MRCO to return the disturbed land to the pre-mining land uses, where practical. Currently, the anticipated final land use is to return disturbed land to productive grazing land and areas of rehabilitated native vegetation.

**Augusta site**

The Augusta site is to be rehabilitated where practical to the land use that existed prior to mining, which was pastoral land. With the exception of the water dams (the local landholder has an option to retain these), the site will therefore be levelled to the original surface and seeded with grasses suitable for grazing sheep.

**Brunswick site**

The areas of the Brunswick site located on Crown Land are to be rehabilitated to re-instate Box Ironbark Woodland and grasslands, consistent with the surrounding Crown Land.

The Brunswick Pit surrounds, core yard and Brunswick West TSF are to be rehabilitated where practical to the land use that existed prior to mining, which was pastoral land, predominantly seeded with grasses suitable for grazing sheep.

**Alternative land uses**

The currently proposed end land uses represent the base-case and will be subject to review and stakeholder consultation as part of the closure planning process. It may be that alternative land uses are also incorporated into the post-closure landscape depending upon their technical and economic feasibility, and the requirements and expectations of regulators, council, local landholders and the broader community. Such alternative land uses could include:

- renewable energy (solar farm, pumped hydropower, wind power generation etc.)
- horticulture or other forms of intensive agriculture
- aquaculture
- recreational use.

In addition, facilities such as water storage dams, roads and other infrastructure may be retained if safe, structurally sound and of benefit to the local council, landholders or other parties.

## 5.2 Post-mining landforms

As outlined above, the rehabilitated sites of the operation will be returned in the form of native vegetation for areas of Crown Land and pastoral grassland for private land.

The currently proposed post mining landforms are:

- The Augusta Mine Dam will be retained as a water dam for post mining agricultural use.
- The Augusta boxcut will be backfilled to natural surface level, with material from the Augusta waste rock storage stockpile, to form a flat-lying landform consistent with the surrounding topography.
- The Brunswick, Bombay and Brunswick West turkey nest style TSFs will become water shedding hills with non-eroding slopes.
- The Augusta, Bombay and Brunswick waste rock stockpiles will be returned to natural surface levels, with a flat-lying landform consistent with the surrounding topography.
- The Brunswick Pit void will remain, with pit faces above 175m AHD be battered at 3H:1V to ensure long term stability..
- All infrastructure areas will be returned to natural surface level and pre-existing drainage.

### 5.2.1 Modified landforms

The closure landforms to be retained are the Brunswick, Brunswick West and Bombay TSFs and the Brunswick Pit. Plans and section details of these features can be found in Appendix B.

## 5.3 Outcomes of past rehabilitation

The area was first developed for mining in the 1860's. Since then, there has been natural revegetation of areas of disturbed land. The results of this natural revegetation can help define future revegetation methods and inform the concepts for end land uses and landforms. The seeding and planting of Box Ironbark Woodland on Crown Land will mimic the natural revegetation using species as detailed in Section 9.2.12.

Progressive rehabilitation provides valuable information to enable refinement of the rehabilitation design and methods. The closure and rehabilitation of the Brunswick TSF and waste rock stockpile areas will potentially provide years of monitoring before it is envisaged that the Bombay TSF and Rock Garden and Augusta waste rock stockpiles will be prepared for rehabilitation. The lessoned learned from these two campaigns will influence the final closure and rehabilitation of the site.

# 6 Rehabilitation domains

Specific rehabilitation domains can be identified for mining projects by dividing operational sites into areas requiring similar closure processes and outcomes. This approach allows each domain to be treated as a separate detailed entity within an overall plan that deals with common issues and has similar risks like drainage and site monitoring (ICMM 2008).

The rehabilitation domains developed for the Costerfield Operations are listed in Table 6.1 and shown on Figure 6.1 and

Figure 6.2.

*Table 6-1 Rehabilitation domains*

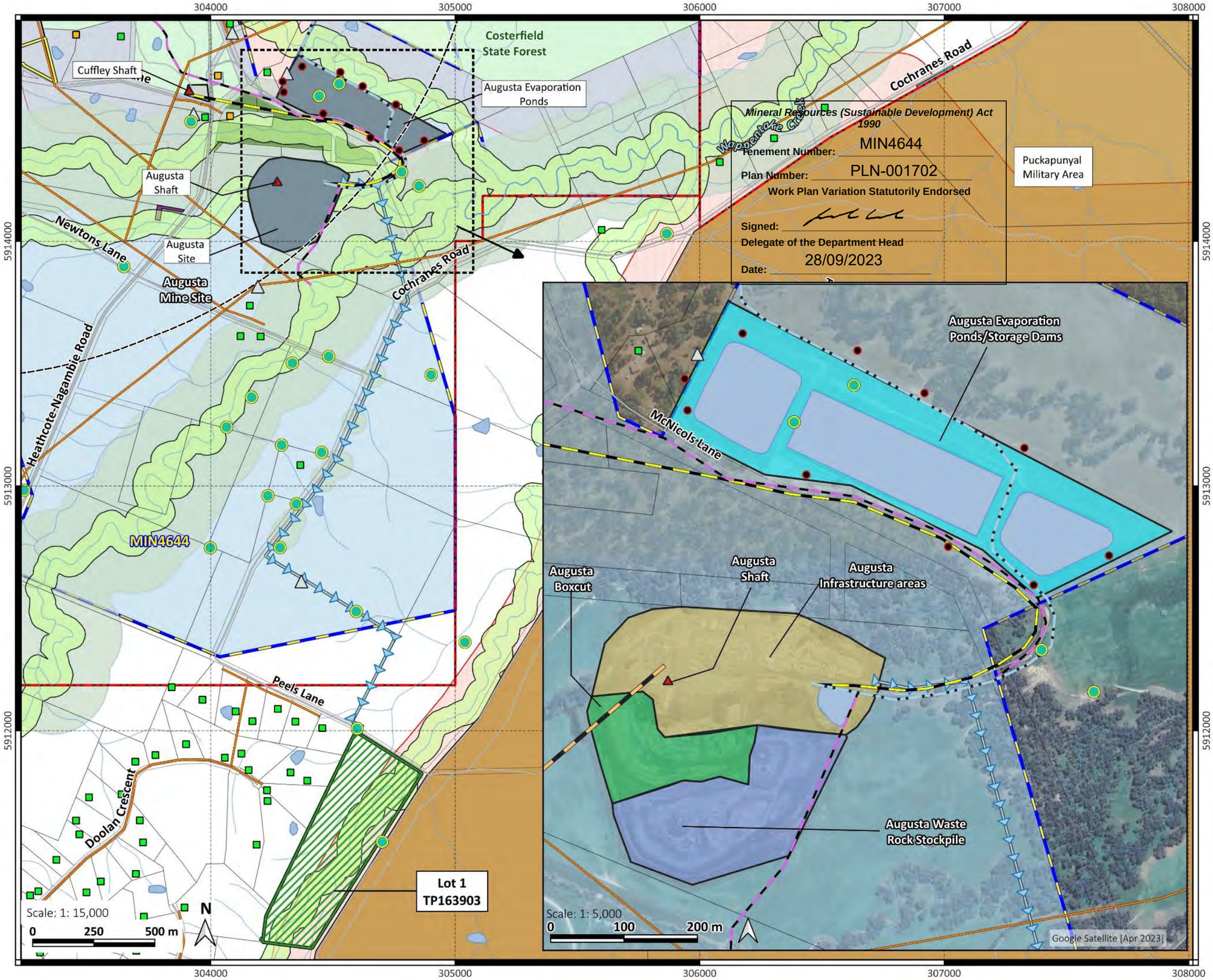
| Location | Domain | Area |
|---|---|---|
| **Augusta** | Augusta Infrastructure Areas | 5.4 ha |
| | Augusta Evaporation Ponds/Storage Dams | 10.0 ha |
| | Augusta Shafts | <0.1 ha |
| | Cuffley Shaft | 0.5 ha |
| | Augusta Waste Rock Stockpile | 3.8 ha |
| | Augusta Boxcut | 2.0 ha |
| **Brunswick** | Brunswick Infrastructure Areas | 3.3 ha |
| | Brunswick Core Yard | 2.75 ha |
| | Brunswick Shaft | <0.1 ha |
| | Youle Shaft | <0.1 ha |
| | Brunswick Tailings Storage Facility | 10.5 ha |
| | Bombay Tailings Storage Facility | 11.8 ha |
| | Brunswick West Tailings Storage Facility | 11.8 ha |
| | Brunswick Waste Rock Stockpile | 5.0 ha |
| | Rock Garden Waste Stockpile | 2.4 ha |
| | Brunswick Pit | 1.6 ha |

ADVERTISED PLAN

**AE1046.9 Mandalay Resources - Costerfield Operation**

**Figure 6.1. Rehabilitation domains - Augusta site**

Created 3/11/2022, revised 21/04/2023
CRS: GDA 20 MGA 55
Scale: 1:15,000 @ A3 (main map)
Page size: A3




Owned by Mandalay Resources
Sensitive receptor (residence)
Dust monitoring site
Groundwater monitoring site
Seepage detection bores
Injection site
Splitters Creek pipeline
RO discharge pipeline
Rising main pipeline
Existing power transmission line
Power transmission line to be disconnected (inset map)
Road
Main watercourse
Watercourse - tributary
Exploration Licence
Mining Licence
Mine site domain (main map)
Vegetation offset area
Private land lot boundary
Water body

**Agusta domains (inset map)**

Boxcut area
Infrastructure area
Overburden and waste dump area
Evaporation Pond area

**Planning overlay (main map)**

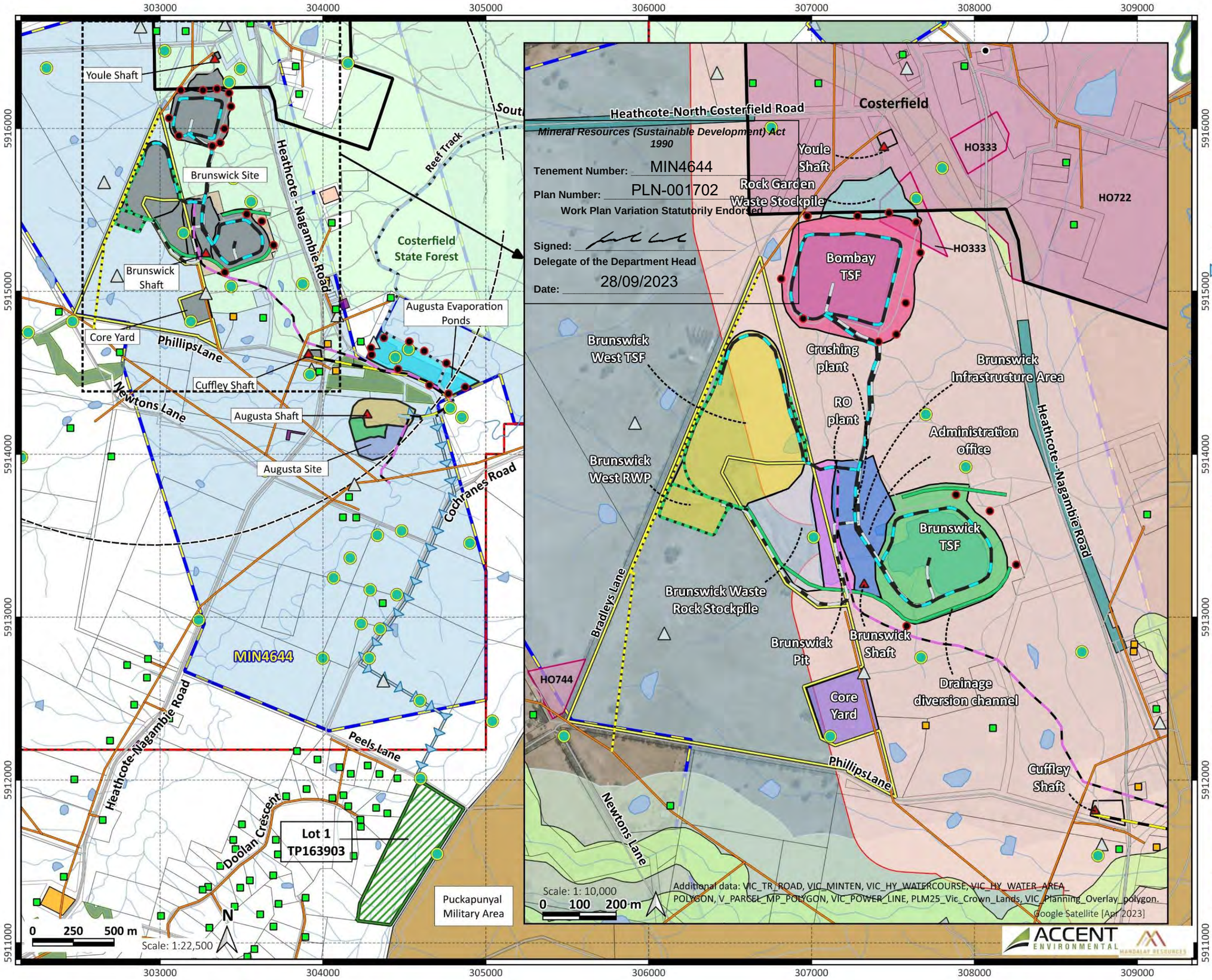
Bushfire Management Overlay
Environmental Significance Overlay
Aboriginal Cultural Overlay

**Crown land (main map)**

Commonwealth Land
Natural Features Reserve
State Forest
Uncategorised Crown Land

Additional data: VIC_TR_ROAD, VIC_MINTEN, VIC_HY_WATERCOURSE, VIC_HY_WATER_AREA_POLYGON, V_PARCEL_MP_POLYGON, VIC_POWER_LINE, PLM25_Vic_Crown_Lands.

ACCENT ENVIRONMENTAL
MANDALAY RESOURCES




**AE1046.9 Mandalay Resources - Costerfield Operation**

**Figure 6.2. Rehabilitation domains - Brunswick site**

Created 3/11/2022, revised 3/04/2023
CRS: GDA 20 MGA 55
Scale: 1:22,500 @ A3 (main map)
Page size: A3

- Owned by Mandalay Resources
- Sensitive receptor (residence)
- Dust monitoring site
- Groundwater monitoring site
- Seepage detection bores
- Existing clean water diversion drain
- Brunswick West TSF clean water diversion drain
- Injection site
- Splitters Creek pipeline
- RO discharge pipeline
- Rising main pipeline
- Process water return pipeline
- Process water delivery pipeline
- Existing power transmission line
- Power transmission line to be relocated
- Relocated power transmission line
- Road
- Main watercourse
- Watercourse - tributary
- Exploration Licence
- Mining Licence
- Mine site domain (main map)
- Vegetation offset area
- Vegetation screen
- Private land lot boundary
- Water body

**Planning overlay**

- Bushfire Management Overlay
- Environmental Significance Overlay
- Heritage Overlay
- Vegetation Protection Overlay
- Aboriginal Cultural Overlay

**Crown land**

- Commonwealth Land
- Natural Features Reserve
- State Forest
- Uncategorised Crown Land

**Brunswick domains**

- Brunswick West RWP
- Brunswick infrastructure area
- Bombay TSF
- Brunswick TSF
- Brunswick West TSF
- Core storage area
- Bombay overburden and waste dump
- Brunswick overburden and waste dump
- Brunswick Pit

**ADVERTISED PLAN**

## 6.1 Domain rehabilitation concepts

The proposed rehabilitation concepts for each domain are outlined below, based on the rehabilitation obligations and commitments outlined in Section 3 and the land uses, landforms and outcomes of past rehabilitation outlined in Section 5. The rehabilitation concepts are also being developed and refined in discussion with the community and regulatory stakeholders, as outlined in Section 4.

The modified landforms to be retained are the Brunswick, Brunswick West and Bombay TSFs and the Brunswick Pit. Plans and section details of these features can be found in Appendix B. The rehabilitation work activities for each domain, including areas and quantities, are set out in Appendix C. Appendix D provides details on the capping of shafts. The materials mass balance is shown in Section 9.2.10.

### 6.1.1 Augusta Infrastructure Areas

It is envisaged this site will be decommissioned at the cessation of mining activities and be available for rehabilitation at closure.

All services (including main power supply connection) will be disconnected and removed.

All plant will be demolished and or removed from site. Buildings will be removed. If the landowner has no further use for the crossing it will be broken up and removed.

Any contaminated material will be excavated and sent to an appropriate waste disposal facility.

The area will be contoured to match existing surface topography and final surface preparation will include contour ripping, topsoiling and seeding. Augusta site to be returned to agricultural pasture.

All pipelines (including Splitters Creek and Peels Lane) will be removed and re-used/ recycled/ disposed of.

All groundwater bores will be decommissioned and grouted by a licenced contractor (including Peels Lane injection bores).

All dust gauges will be removed at the end of the closure monitoring period.

### 6.1.2 Augusta Evaporation Ponds/Storage Dams

It is envisaged this site will be decommissioned at the cessation of mining activities and be available for rehabilitation at closure.

Once the water is fully evaporated, the sediments will be contained within in the HDPE liner in the central dam and encapsulated on site.

The eastern and western dam HDPE liners will be removed and taken to a licenced landfill.

The material in the embankments will be pushed back into the excavation and compacted.

All pipelines will be removed and re-used/recycled/disposed of.

Augusta site to be returned to agricultural pasture with exception of water dams which landowner has option to retain.

The areas to return to agriculture will be contoured to match pre-mining surface topography and final surface preparation will include contour ripping, topsoiling and seeding.

### 6.1.3 Augusta and Cuffley Shafts

It is envisaged this site will be decommissioned at the cessation of mining activities and be available for rehabilitation at closure.

All services will be disconnected and removed.

All plant will be demolished and or removed from site. Buildings will be removed.

A concrete plug will be installed over each shaft.

### 6.1.4 Augusta Waste Rock Stockpile

It is envisaged this site will be decommissioned at the cessation of rehabilitation activities and be available for rehabilitation at closure.

Material from the waste rock stockpile will be used for the cover of the TSFs and to backfill the boxcut. Depending upon the volumes of material used for progressive rehabilitation this domain may also be partially rehabilitated prior to site closure.

The area will be contoured to match pre-mining surface topography and final surface preparation will include contour ripping, topsoiling and seeding. Augusta site to be returned to agricultural pasture.

### 6.1.5 Augusta Boxcut

It is envisaged this site will be decommissioned at the cessation of mining activities and be available for rehabilitation at closure.

All services will be disconnected and removed.

All plant will be demolished and/or removed from site.

The boxcut will be backfilled from the Augusta waste rock stockpile and noise bunds.

The area will be contoured to match pre-mining surface topography and final surface preparation will include contour ripping, topsoiling and seeding. Augusta site to be returned to agricultural pasture.

### 6.1.6 Brunswick Infrastructure Areas and Core Yard

It is envisaged this site will be decommissioned at the cessation of processing activities and be available for rehabilitation at closure.

All services will be disconnected and removed.

All plant will be demolished and or removed from site. Buildings will be removed. Core material will be used as fill.

Any contaminated material will be excavated and sent to an appropriate waste disposal facility.

The area will be contoured to match existing surface topography and final surface preparation will include contour ripping, topsoiling and seeding.

Brunswick site (private land) to be returned pastoral land suitable for sheep grazing, Crown land returned to pre-existing Box-Ironbark woodland

### 6.1.7 Brunswick and Youle Shafts

It is envisaged this site will be decommissioned at the cessation of mining activities and be available for rehabilitation at closure.

All services will be disconnected and removed.

All plant will be demolished and/or removed from site. Buildings will be removed.

A concrete plug will be installed over each shaft.

### 6.1.8 Brunswick Tailings Storage Facility

It is envisaged this site will be decommissioned in 2024 and be available for progressive rehabilitation.

All plant and equipment will be demolished and or removed from site.

All pipelines will be removed and re-used/recycled/disposed of.

Embankments batters currently 1:2.5 (V:H) slope will be reduced to 1:3 (V:H) slope by buttressing with waste rock from site (Refer to Appendix B).

Tailings will be contained by a waste rock cover as a domed mound.

The area will be contoured to shed water from the landform and final surface preparation will include contour ripping, topsoiling and seeding. Brunswick TSF and surrounds on crown land to be returned to pre-existing Box-Ironbark woodland.

### 6.1.9 Bombay Tailings Storage Facility

It is envisaged this site will be decommissioned in 2025 and be available for progressive rehabilitation.

All plant and equipment will be demolished and or removed from site.

All pipelines will be removed and re-used/recycled/disposed of.

Embankments batters currently 1:2.5 (V:H) slope will be reduced to 1:3 (V:H) slope by buttressing with waste rock from site (Refer to Appendix B).Tailings will be contained by a waste rock cover as a domed mound.

The area will be contoured to shed water from the landform and final surface preparation will include contour ripping, topsoiling and seeding. Bombay TSF and surrounds on crown land to be returned to pre-existing Box-Ironbark woodland.

### 6.1.10 Brunswick West Tailings Storage Facility

It is envisaged this site will be decommissioned at the cessation of processing activities and be available for rehabilitation at closure.

All pipelines will be removed and re-used/recycled/disposed of.

All plant and equipment will be demolished and or removed from site.

The embankments batters have been built as final slopes and rehabilitated as part of the TSF construction (Refer to Appendix B).

Tailings will be contained by a waste rock cover as a domed mound with 5% grade.

The area will be contoured to shed water from the landform and final surface preparation will include contour ripping, topsoiling and seeding. Brunswick West TSF and surrounds on private land to be returned pastoral land suitable for sheep grazing.

**Return Water Pond**

Removal of the HDPE liner, pipelines and pumps.

Demolishing the return water pond (RWP) embankments.

Re-filling excavation within RWP and surrounding RWP toe drains to 0.5m below previous natural surface level.

Replacement of 0.5m of topsoil over the previous RWP and toe drains area to match the previous topography of the area.

The area will be contoured to shed water from the landform and final surface preparation will include contour ripping, topsoiling and seeding. Brunswick West TSF surrounds on private land to be returned pastoral land suitable for sheep grazing.

### 6.1.11 Brunswick Waste Rock Stockpile

It is envisaged this site will be decommissioned in 2025 and be available for progressive rehabilitation.

Material from the waste rock stockpile will be used for the cover of the TSFs. The volumes of material utilised during progressive rehabilitation will likely allow this domain to be rehabilitated prior to site closure.

The area will be contoured to match pre-mining surface topography and final surface preparation will include contour ripping, topsoiling and seeding. Brunswick site surrounds on private land to be returned pastoral land suitable for sheep grazing.

### 6.1.12 Rock Garden Waste Stockpile

It is envisaged this site will be decommissioned in 2027 and be available for progressive rehabilitation.

Material from the waste rock stockpile will be used for the cover of the TSFs. The volumes of material utilised during progressive rehabilitation will likely allow this domain to be rehabilitated prior to site closure. The area will be contoured to match pre-mining surface topography and final surface preparation will include contour ripping, topsoiling and seeding. Rock Garden site and surrounds on crown land to be returned to pre-existing Box-Ironbark woodland.

### 6.1.13 Brunswick Pit

It is envisaged this site will be decommissioned at the cessation of mining activities and be available for rehabilitation at closure.

The Brunswick Pit runs roughly north-south and is approximately 80 m wide by 300 m long with a maximum depth of 25 m. The existing floor/ramp has a gradient of approximately 1:12, sloping from the existing surface at the north to a depth of 25 m at the southern end. The pit faces to the east, west and south are at approximately 1:1 V:H grades (refer Appendix B).

The portal will be backfilled or plugged.

The Brunswick Pit faces above 175m AHD will be battered at 3H:1V to ensure long term stability and the floor will be graded to provide a uniform slope up to ground level at the northern end of the pit.

Allow groundwater to recover to 178.0 AHD, forming a pit lake with a maximum height of approximately 14 m below the pit crest at the southern end.

The final surface preparation will include contour ripping, topsoiling and seeding for any areas above the pit lake. Brunswick pit surrounds on private land to be returned pastoral land suitable for sheep grazing.

Safety bunding and fencing will be maintained.

## 6.2 Key uncertainties and risks

### 6.2.1 Uncertainties

Key uncertainties in relation to the proposed rehabilitation of the domains are listed below.

TSFs:

The current closure design for the TSFs, such as that outlined by ATC Williams Detailed Design Report (2023) for the Brunswick West TSF, is currently conceptual and conservative (see further discussion in Section 6.3, below). Uncertainties include:

- the optimal final gradients of the TSF embankments
- cover design and thickness
- final land use for TSF
- the sourcing of sufficient and suitable rehabilitation materials.

Brunswick Pit:

- stability of pit faces and requirement (if any) for further setbacks than currently proposed 3H:1V slope.

### 6.2.2 Rehabilitation risks

Risks arising during the operational and rehabilitation phases of the mine are covered in MRCO's risk management plan for the Costerfield Operations. The plan includes identification of the hazards, receptors and potential consequences associated with project activities, and the associated risks, taking standard controls and risk treatment into account.

The risk management plan includes risks of relevance to rehabilitation (and requirements for risk mitigation), including the following:

- Public safety – the need for decommissioning and final rehabilitation to achieve landforms that do not pose a risk to public safety.
- Landform stability – the need for final landforms to be stable, in particular, land located in the vicinity of voids, and TSF embankments.
- Erosion – the need for post-closure landforms to be stable with respect to erosion and to avoid posing a downstream water quality or sedimentation risk.
- Water management – the need for post-closure landforms to retain or shed stormwater in a manner that does not present an erosion, sedimentation or flood risk.
- Pollution – the need for post-closure drainage from disturbed areas to be of sufficient quality that it does not pollute surface waters or groundwaters and result in impacts on beneficial uses or environmental values.
- Revegetation – the need for rehabilitation to result in vegetation that is self-sustaining and supports end land use.

### 6.2.3 Risk and management of premature closure

Premature or unplanned closure is a rehabilitation risk at all mining operations. Unplanned, interim or unexpected closure scenarios can occur including operations being placed under care and maintenance while waiting for market conditions to improve or for the operation to be purchased by another company. MRCO will mitigate the rehabilitation risks associated with premature closure, or care and maintenance, by:

- Keeping the rehabilitation liability estimate for the site up to date. The estimate is based on the rehabilitation liability at the time of estimation and therefore provides sufficient funds for rehabilitation in the event of premature closure.
- Keeping this Rehabilitation Plan up to date, so that rehabilitation concepts and activities align with current site configuration and risks and therefore cover the rehabilitation activities required in the event of premature closure.
- Maintaining a mass balance of required and available rehabilitation resources (see Section 9.2.10), so that at any one time, the source of materials is known (along with the associated costs of transportation and use).

Whether the site proceeded directly to premature closure or was placed under care and maintenance, a key issue would be to ensure that landforms are geotechnically, erosionally and geochemically stable during the period before closure commences or operations resume, which could be several years depending on circumstances.

Constructed facilities such as waste stockpiles or low-grade ore stockpiles are only likely to be geotechnically unstable if they are awaiting re-use (e.g. as underground fill or processing) when operations cease or have active faces. Any geotechnically unstable faces would be either dozed down to a stable angle, or buttressed.

Erosional stability would be achieved by sowing groundcover species on any exposed areas, such as newly constructed slopes.

The first step in rehabilitating the operational TSFs will be to leave the tailings material to dry after cessation of deposition. There would therefore be no immediate need to cap the TSFs in the event of care and maintenance and, based on site water quality monitoring data, the geochemical risk posed by the TSFs to downgradient surface water and groundwater quality would be low.

The Brunswick Processing Plant and other site equipment would be placed under a standard program of care and maintenance prior to either closure commencing or operations resuming. The program would maintain the equipment in serviceable order, and also include routine inspection for contaminant spills or leaks (and clean-up/remediation where required).

General land management would be maintained at the site, including erosion control and weed and pest control. Environmental monitoring would also be continued and site security maintained.

Final rehabilitation, decommissioning and closure would be undertaken as soon as a decision was made to prematurely close the site.

## 6.3 Further investigation

Additional investigation is required to further understand rehabilitation issues and risks and to further refine rehabilitation concepts and activities over the remaining project life. The key areas of additional investigation are outlined below.

1. If the requirement for successful closure of the existing Bombay and Brunswick TSF is to provide for a 5% capping gradient cover then the earthfill/rockfill material shortfall will be 167,000 m³.

| | Bombay TSF | Brunswick TSF |
|---|---|---|
| **Bulk earthfill over tailings** | 69,000 m³ | 60,000 m³ |
| **Rockfill/earthfill over earthfill (0.5m thick)** | 39,200 m³ | 25,000 m³ |
| **Topsoil cover (100mm thick)** | 10,800 m³ | 10,000 m³ |
| **Rockfill Buttressing (3:1 batter slopes)** | 118,200 m³ | 105,000 m³ |
| **Additional material to crown to 5%** | **89,500 m³** | **77,500 m³** |

2. Additional investigations and design work to reduce the closure material shortfall of the Brunswick West TSF will be conducted by Mandalay as the existing Bombay and Brunswick facilities move into a nonoperational stage of their life. These investigations will include:
   - reshaping of the tailings in the facility
   - reprocessing of the tailings and disposal in the Brunswick West TSF
   - decontamination and reuse of the tailings for building products or soil
   - increasing production of rockfill materials from the underground mine.

### 6.3.1 Final void design

At closure, the concept design is for the groundwater to recover to 178.0 AHD to form a pit lake and for the pit faces above 175m AHD to be battered to 3H:1V to ensure long term stability. A zone of rock armouring is to be installed at the pit lake water level to ensure slope stability is maintained during reductions in water level as well as address the risk of wave action.

Around the perimeter of the pit, a safety bund 2.0 metres in height will be constructed 5 metres from the pit crest. A security fence 1.8 metres in height will be installed outside the safety bund and maintained. The floor of the pit will be graded at the northern end, to provide a beach zone to aid egress in the event the pit is accessed by public, livestock or native animals. Battering the slopes to 3H:1V will further allow egress from the pit lake, in the event the constructed beached zone is not accessible.

### 6.3.2 TSF detailed design

The current closure design for the TSFs, such as that outlined by the ATC Williams Detailed Design Report (2023) for the Brunswick West TSF, is currently conceptual. In the absence of more detailed investigation and modelling, the design is conservative, particularly in terms of cover design (e.g. cover thickness, slope angle and material volumes).

The final TSF closure design will need to demonstrate compliance with ANCOLD (2019) and other relevant guidance. The capping/covering of the surface of the tailings and external slope design will be based on erosion/geomorphic studies supported by evidence to show that the design will prevent escape of tailings. The design will acceptably minimise the risk of surface runoff coming into contact with the tailings and generating problematic tailings seepage.

The detailed closure design will demonstrate that capping/covering of the tailings has been designed using sound science and engineering approaches and meets multiple objectives for geotechnical and geochemical stability. The design will account for site-specific conditions and be able to achieve a landform that is permanently safe, stable and non-polluting.

The detailed closure design needs to demonstrate that the TSFs require no long-term care and maintenance or, if they do, arrangements are made to do so with appropriate institutional controls (e.g. legal, land use zoning, post-rehabilitation risk funding and responsible party identified and agreed) (ERR 2019).

### 6.3.3 TSF embankment stability

Ongoing monitoring and review of the geotechnical stability of the TSF embankments will confirm the suitability of the structures and provided recommendations for the final rehabilitation and closure.

### 6.3.4 TSF cover systems and revegetation

The land uses approved for the TSFs need to be compatible with design and rehabilitation standards. The nature reserves proposed for the Brunswick and Bombay TSFs are potentially inconsistent with leading practice, as the presence of trees (either planted or self-sown) may adversely affect the integrity of the TSF covers.

The conceptual closure concept for the Brunswick West TSF, described in the ATC Williams Detailed Design Report (2023), specified that the cover is designed to support a revegetated surface without vegetation intercepting the tailings below. However, as the proposed final land use is pasture, the risk of tree growth is reduced and a thinner cover may be justified (with provision for post-closure maintenance to remove any self-sown tree saplings), subject to the successful attainment of other performance criteria.

The geotechnical stability of the TSF and its geochemical performance with respect to different cover designs and options for final vegetation will require further assessment to identify an optimal design.

### 6.3.5 Geochemical assessment

Geochemical risks associated with tailings, materials used to construct final landforms (including TSF covers), pit walls and underground workings (particularly where above predicted final level of groundwater rebound) will require further assessment as part of final rehabilitation planning to confirm the findings of earlier testwork (that the risk of acid and metalliferous drainage (AMD) is low).

Such investigations will include additional static and kinetic testwork under the supervision of a suitably experienced geochemist to enable the long-term, post-closure quality of site drainage waters to be predicted in relation to pH, metals and salinity.

### 6.3.6 Mass balance

Requirements for rehabilitation materials could also change as a result of updated rehabilitation design (such as changes to TSF cover design and thickness).

Accordingly, MRCO will maintain and routinely update a mass balance of required and available rehabilitation materials to ensure that adequate materials are available for rehabilitation across the life of the project. The mass balance will include locations and volumes of:

- topsoil
- rock/earthfill
- capping materials/clay.

The current mass balance is included in Section 9.2.10.

MRCO will assess options for optimising the mass balance across the life of the project to maintain. The primary use of materials is for the rehabilitation of the TSFs. Sufficient material exists in existing waste rock/overburden stockpiles to complete rehabilitation for both the Bombay and Brunswick TSFs at current approved design concept of 1% gradient.

Prior to commencing any rehabilitation or construction campaign analysis of materials balance and options for resolving a site wide materials shortfall should be undertaken.

A materials contingency options analysis was undertaken during the design of the Brunswick West TSF using a 1% cover slope gradient on all TSFs and a 5% cover slope gradient on all TSFs, as has been designed for Brunswick West TSF, to compare the volumes available and potential cover material requirements.

A 1% cover slope gradient on all three TSF would provide a surplus of approximately 160,000 $m^3$ volume of cover material. This is within the current volumes of materials onsite. A 5% cover slope gradient on all three TSF would require in the order of an additional 167,000 $m^3$ volume of cover material. This is in excess of the current volumes of materials onsite and would potentially require the importation of materials. Any importation of material will require an imported materials management plan.

Where possible, MRCO intend to achieve a positive materials balance while minimising (or avoiding) the need to import materials from off site. Such options may include:

- reducing the design thickness and gradient of TSF covers if shown to be achievable without compromising performance criteria
- final shaping of tailings to provide a domed beach that mimics cover gradients and minimises the volume of material required for infilling prior to TSF cover construction
- the use of materials from the Brunswick pit walls for rehabilitation if further setback than the current 3H:1V slope is required to achieve geotechnical stability
- the use of TSF embankment materials above the final tailings level as a source of TSF cover materials
- managing the mine schedule in a way that reduces underground fill requirements and frees up waste rock for use in rehabilitation.

### 6.3.7 Rehabilitation trials and investigations

Rehabilitation trials and investigations will be undertaken as areas of the site become available for decommissioning to:

- confirm and/or refine rehabilitation assumptions
- provide the site-specific information required to plan and design for final rehabilitation and closure
- help develop appropriate closure criteria
- enable more accurate costing of, and provisioning for, rehabilitation and closure.

Trials and investigations are anticipated to include:

- confirmation of soil and waste material categories and volumes for use in rehabilitation (backfilling, cover construction, topsoiling etc.)
- assessment of long-term geochemical stability of waste materials and tailings
- cover design for TSFs
- procedures for revegetation, habitat establishment and related weed management.

Other investigations, such as geotechnical assessments and the identification of any soil contamination, will be outlined in the Detailed Decommissioning and Closure Plan to be prepared towards the end of life of each TSF and the operations.

### 6.3.8 Revegetation trials

Revegetation trials conducted during the remaining mine life will be an important input into rehabilitation planning. The aim of undertaking trials is to determine the optimum means of revegetation ahead of the need to undertake it on a broad scale.

Trials will be established as disturbed areas become available for rehabilitation to help inform future revegetation, particularly if the outcome of an earlier TSF cover design is unsuitable for vegetation and there is a need to change the cover design to enable the successful revegetation of further TSFs.

The efficient use of topsoil material and vegetation outcomes are to be explored. Pasture areas may benefit from topsoil depth while tree seeding is often most successful in areas with no topsoil – as there is no competition with grass species and should only be undertaken on flatter areas with lower erosion potential. The depth of topsoil required for successful revegetation can be tested through a series of trials.

### 6.3.9 Alternative revegetation methods

MRCO may wish to adopt alternative revegetation methods successfully used elsewhere to achieve standards at least equal to those that would be expected using conventional methods.

Where alternative methods other than those described above are proposed, a program to investigate and trial the methods will be developed.

# 7 Objectives

Closure planning is a process that extends over the life-of-mine with the objective of achieving lease relinquishment. Relinquishment is the formal approval by the regulator indicating that the completion criteria for the mine have been met to the satisfaction of the regulatory authority (ICMM 2008). Following relinquishment, ongoing responsibility for the lease area can be legally transferred to government or private entities (such as the land holders).

To achieve relinquishment, the site should not endanger public health and safety, should alleviate or eliminate environmental damage, and allow a productive use of the land similar to its original use or an acceptable alternative (ANZMEC 2000).

Whole-of-site and domain-specific rehabilitation objectives have been developed and are outlined below in Sections 7.1 and 7.2. The rehabilitation objectives will be further refined, where appropriate, over the remaining mine life in consultation with landowners and other key stakeholders (see Section 4).

## 7.1 Whole-of-site objectives

MRCO's aim is to decommission and rehabilitate the Costerfield Operations in a manner that leaves the site safe, stable and non-polluting; consistent with agreed post mining outcomes and land uses and the MRSD Act.

The whole-of-site rehabilitation objectives for the closure of the MRCO are to:

- protect the environment and public health and safety by using safe and responsible closure practices
- to progressively stabilise, rehabilitate and revegetate land affected by mining activities
- to undertake landscaping to minimise the visual impact of the mine site
- reduce or eliminate adverse environmental effects once the operations cease
- establish conditions which are consistent with the pre-determined, sustainable, end land-use objectives
- reduce the need for long-term monitoring and maintenance by establishing effective physical and chemical stability of disturbed areas
- enable relinquishment to be achieved in an efficient and timely manner.

In support of the above objectives, MRCO will seek to achieve the following rehabilitation outcomes:

- constructed landforms that are safe, represent minimal risk to the public, native fauna or livestock, and have rates of erosion comparable to surrounding lands
- re-established landforms that, where possible, blend in with surrounding natural landforms
- land returned to a condition that has minimal off-site impacts by ensuring the rehabilitated site is free draining and non-polluting (e.g. by controlling infiltration, erosion, sedimentation, and degradation of drainage and groundwater resources)

- land that has been rehabilitated using technically effective and cost-efficient methods and proven engineering practices to ensure that no or minimal ongoing maintenance is required beyond closure
- re-established self-sustaining vegetation communities consistent with the final land use (with protective cover and species distribution broadly comparable to surrounding sites).

## 7.2 Domain-specific objectives

*Domain-specific rehabilitation objectives are set out in Table 7.1. The final rehabilitated landforms and land uses once rehabilitation has been completed and the rehabilitation objectives have been achieved are shown on*

*Figure 7.1 Final landuse*



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*Table 7.1 Domain-specific rehabilitation objectives*

| Location | Domain | Rehabilitation objectives |
|---|---|---|
| **Augusta** | Infrastructure | • No infrastructure remains onsite<br>• No contaminated soils or substrates remain on site<br>• Area contoured to match existing surface topography<br>• Revegetation of disturbed lands does not introduce noxious weeds, new weed species or increase local weed densities<br>• Disturbed lands are restored suitable for grazing land use as agreed with landowner |
| | Augusta and Cuffley Shafts | • Prevent access to safeguard public safety<br>• Disturbed lands are restored to pre-existing land use as agreed with landowner |
| | Waste Rock Stockpile | • Re-use material for rehabilitation<br>• Area contoured to match existing surface topography<br>• Revegetation of disturbed lands does not introduce noxious weeds, new weed species or increase local weed densities<br>• Disturbed lands are restored suitable for grazing land use as agreed with landowner |
| | Boxcut | • Prevent access to safeguard public safety<br>• Backfill boxcut<br>• Area contoured to match existing surface topography<br>• Revegetation of disturbed lands does not introduce noxious weeds, new weed species or increase local weed densities<br>• Disturbed lands are restored suitable for grazing land use as agreed with landowner |

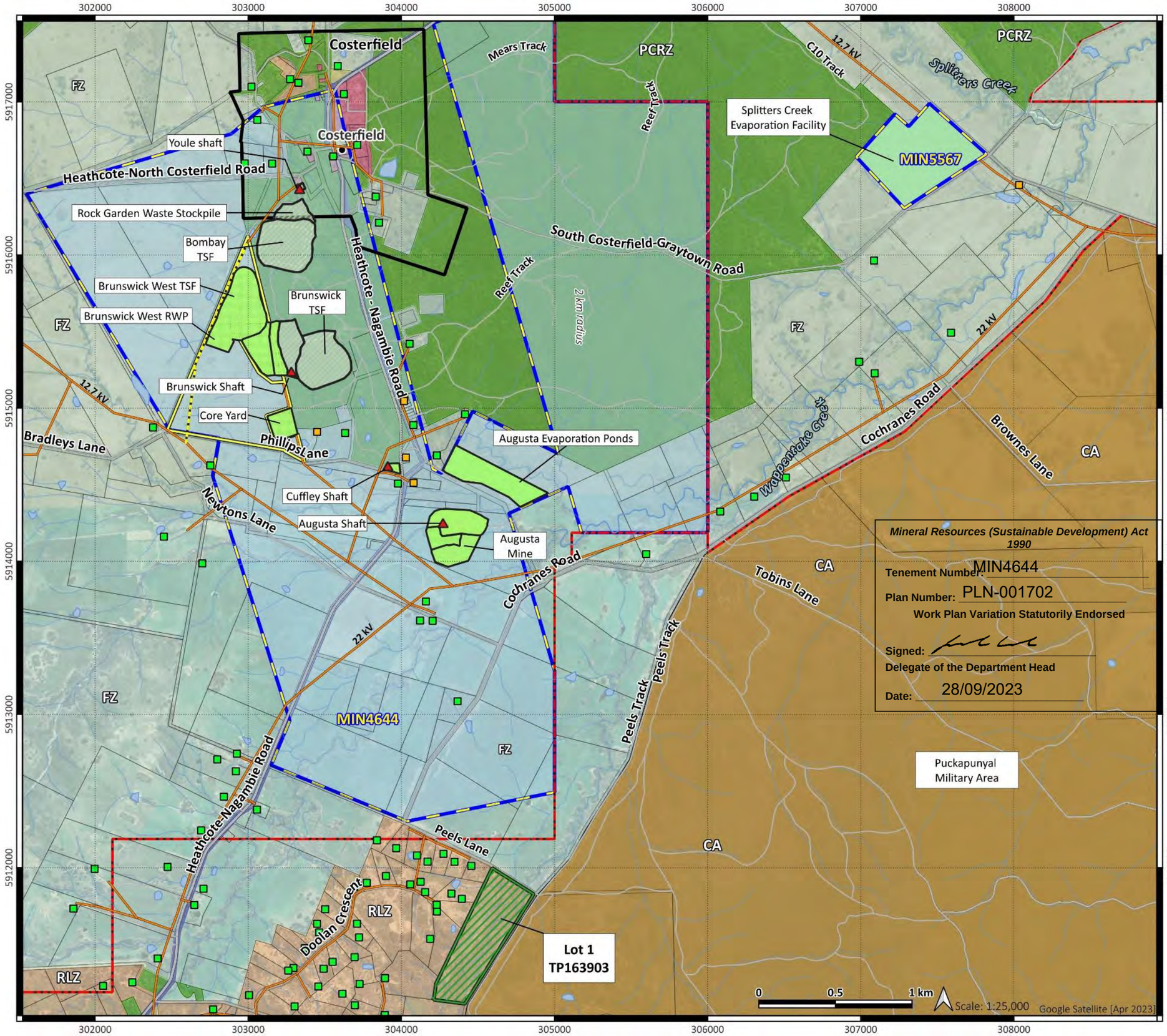
| Location | Domain | Rehabilitation objectives |
|---|---|---|
| | Evaporation Ponds/Storage Dams | • Push down embankments with area contoured to match existing surface topography<br>• Revegetation of disturbed lands does not introduce noxious weeds, new weed species or increase local weed densities<br>• Disturbed lands are restored suitable for grazing land use as agreed with landowner |
| **Brunswick** | Infrastructure | • No infrastructure remains onsite<br>• No contaminated soils or substrates remain on site<br>• Area contoured to match existing surface topography<br>• Revegetation of disturbed lands does not introduce noxious weeds, new weed species or increase local weed densities<br>• Disturbed private lands are restored suitable for grazing land use as agreed with landowner<br>• Disturbed Crown Lands are restored to a landscape suitable for recreation/conservation land use (Box-Ironbark forest) as agreed by Parks Victoria or a satisfactorily agreed landform |
| | Brunswick and Youle Shafts | • Prevent access to safeguard public safety<br>• Disturbed lands are restored to pre-existing land use as agreed with landowner |
| | Brunswick and Bombay TSFs | • Disturbed Crown Lands are restored to a landscape suitable for recreation/conservation land use (Box-Ironbark forest) as agreed by Parks Victoria or a satisfactorily agreed landform<br>• Revegetation of disturbed lands does not introduce noxious weeds, new weed species or increase local weed densities<br>• Final TSF landforms are geotechnically and erosionally stable<br>• Geochemistry of tailings is understood and TSF covers acceptably reduce the risk of impacts on surface water and groundwater quality<br>• Monitoring program records long term trends that demonstrate water quality does not exceed agreed criteria |
| | Brunswick West TSF | • Disturbed pasture lands are restored to a landscape suitable for grazing land use as agreed with landowner<br>• Revegetation of disturbed lands does not introduce noxious weeds, new weed species or increase local weed densities<br>• Final TSF landform is geotechnically and erosionally stable<br>• Geochemistry of tailings is understood and TSF covers acceptably reduce the risk of impacts on surface water and groundwater quality<br>• Monitoring program records long term trends that demonstrate water quality does not exceed agreed criteria |
| | Brunswick Waste Rock Stockpile | • Re-use material for rehabilitation<br>• Area contoured to match existing surface topography<br>• Disturbed pasture lands are restored to a landscape suitable for grazing land use as agreed with landowner<br>• Revegetation of disturbed lands does not introduce noxious weeds, new weed species or increase local weed densities |

| Location | Domain | Rehabilitation objectives |
|---|---|---|
| | | • Disturbed lands are restored suitable for grazing land use as agreed with landowner |
| | Rock Garden Waste Rock Stockpile | • Re-use material for rehabilitation<br>• Area contoured to match existing surface topography<br>• Disturbed Crown Lands are restored to a landscape suitable for recreation/conservation land use (Box-Ironbark forest) as agreed by Parks Victoria or a satisfactorily agreed landform<br>• Revegetation of disturbed lands does not introduce noxious weeds, new weed species or increase local weed densities |
| | Brunswick Pit | • Prevent access to pit crest to safeguard public safety<br>• Pit walls are structurally stable and waste rock stockpiles erosionally stable<br>• Geochemistry of waste rock is understood and confirmed not to require encapsulation<br>• Monitoring program records long term trends that demonstrate water quality does not exceed agreed criteria |

ADVERTISED PLAN

**AE1046.9 Mandalay Resources - Costerfield Operations**
**Figure 7.1. Final Land Use**

Created 2/11/2022 and revised 3/04/2023
CRS: GDA 20 MGA 55
Scale: 1:25,000 @ A3
Page size: A3




*Mineral Resources (Sustainable Development) Act 1990*

Tenement Number: MIN4644

Plan Number: PLN-001702

Work Plan Variation Statutorily Endorsed

Signed:

Delegate of the Department Head

Date: 28/09/2023

- Owned by Mandalay Resources
- Sensitive receptor (residence)
- Vent shaft
- Road
- Existing transmission line
- Relocated transmission line
- Main watercourse
- Watercourse - tributary
- Mineral Licence boundary
- Lot 2 PS404811
- Private land lot boundary
- Township boundary
- Vegetation offset area

**Rehabilitation domains - final land use category**

- Pastoral
- Box Ironbark woodland

**Planning Zone**

- FZ- Farming zone
- PCRZ - Public Conservation and Resource
- TZ - Township
- RLZ - Rural Living Zone
- TRZ2 - Principal Road Network
- PUZ7 - Public Use Zone - Other Public Use

**Crown Land**

- Commonwealth Land (Planning zone category - CA)

Additional data: VIC_TR_Road, VIC_locality_point, VIC_MINTEN, VIC_HY_WATERCOURSE, VIC_HY_WATER_AREA, VIC_TOWNSHIP POLYGON, VIC_POWERLINE, PLM25_Crown_land_POLYGON and PLAN_ZONE wms (http://services.land.vic.gov.au/catalogue/publicproxy/guest/dv_geoserver/wms?VERSION=1.1.1&WIDTH=512&HEIGHT=512&LAYERS=VMPLAN_PLAN_ZONE&STYLES=&SRS=EPSG%3A4283&BBOX=141%2C-39%2C150%2C-34)

ACCENT ENVIRONMENTAL
MANDALAY RESOURCES

## 7.3 Collection and analysis of data

The existing environmental management plan includes the identification, management and monitoring of key operational environmental issues along with corresponding performance indicators and monitoring activities. It is expected that the monitoring program will be readily adapted into a closure and post-closure monitoring program once operations cease.

The existing environmental monitoring program includes:



- dust
- surface water
- groundwater
- noise.

Key aspects of the current monitoring program to continue post rehabilitation include:

- Surface water monitoring including collecting upstream and downstream water quality samples from designated points in waterways potentially affected by the operations.
- Groundwater monitoring including monitoring the effects of mine dewatering activities on groundwater levels and seepage from TSFs.

The monitoring information will provide both baseline environmental data and information on operational impacts that will be used to help identify closure issues, develop rehabilitation and closure procedures, and develop completion criteria. The collection and analysis of data in support of rehabilitation objectives and completion criteria is set out in more detail in Table 8-1 in Section 8.

In addition to monitoring, investigations will be undertaken as required into closure issues and rehabilitation trials will be established to develop and refine rehabilitation procedures.

### 7.3.1 Subsidence monitoring

Subsidence monitoring of the Heathcote-Nagambie Rd has been conducted by MRCO to detect any potential movement due to subsidence. The results submitted to ERR confirmed that subsidence was not of concern for the monitored section of Heathcote-Nagambie Road.

### 7.3.2 Surface and groundwater monitoring

The current operations monitoring program covers matters relevant to both the operation and closure of the Costerfield Operations including:

- EPA-approved monitoring program and compliance limits
- additional groundwater and surface water monitoring programs.

It is expected that the current monitoring program will be readily adapted into a closure and post-closure monitoring program once operations cease.

Routine monitoring of surface water quality in the Wappentake Creek and tributaries will continue after mining and throughout the closure and post-closure period until the relevant performance criteria are satisfied.

Routine monitoring of groundwater quality and levels will continue after mining and throughout the closure and post-closure period until the relevant performance criteria are satisfied.

# 8 Criteria

Completion criteria are qualitative or quantitative principles or standards that measure whether a mining project has met its rehabilitation objectives (ERR 2020a).

The criteria must be sufficiently stringent to ensure that the overall objectives of rehabilitation have been met. They must also be designed to allow effective reporting and auditing to define an endpoint for rehabilitation activities where sites can be handed over to a third party. It is widely accepted (e.g. ANZMEC 2000) that completion criteria should be:

- specific enough to reflect unique set of environmental, social and economic circumstances
- flexible enough to adapt to changing circumstances without compromising objectives
- include environmental indicators suitable for demonstrating that closure efforts and rehabilitation trends are heading in the right direction
- subject to periodic review resulting in modification if required due to changed circumstances or improved knowledge
- based on targeted research which results in more informed decisions.

Completion criteria have been developed for each of the domain-specific rehabilitation objectives set out in Section 7.2 and are listed in Table 8-1, along with the specific environmental aspect to which they relate.

The completion criteria have been developed based on current understanding of the sites and their rehabilitation risks. However, the criteria will be further refined over the remaining mine life based on:

- consultation with landowners and other key stakeholders (see Section 4)
- past rehabilitation outcomes (see Section 5.3)
- the findings of rehabilitation investigations and trials (see Section 6.3.7)
- evaluation of environmental monitoring data (see Section 7.3).

In particular, criteria relating to rehabilitation aspects such as geotechnical stability, erosion control, geochemical stability, revegetation success, and post-closure land uses will be refined based on a process of ongoing stakeholder consultation and a program of further investigations.

*Table 8-1 Completion criteria*

| No | Objective | Applicable domains | Criteria | Milestone and timing of evidence gathering/reporting |
|---|---|---|---|---|
| **1** | No infrastructure remains onsite | All domains | No infrastructure remains onsite, unless authorised by ERR, or third party with ERR agreement (e.g. Parks Victoria) | Decommissioning completed within 12 months of cessation of operations by end post closure year (PCY) 1<br>NB: Active monitoring infrastructure to be removed at relinquishment by PCY 8<br>During operations and closure phases:<br>• Records of stakeholder consultation<br>Prior to MIN relinquishment:<br>• Decommissioning and rehabilitation completion reports<br>• ERR and regulatory agency site inspection |
| **2** | Prevent access to pit crest and portals to safeguard public safety | Augusta Shaft<br>Cuffley Shaft<br>Brunswick Shaft<br>Youle Shaft<br>Augusta Boxcut<br>Brunswick Pit | Portals and Ventilation shafts have been secured in accordance with ERR requirements. Safety bund and security fencing has been erected to prevent public access to pit walls. Floor graded providing a beaching zone at the northern end of Brunswick Pit. | Review of Brunswick Pit closure plan to assess proposed safety features with consideration of pit water levels, battering of pit slopes above pit water levels, installation of rock armouring and provision of a beaching zone by closure by PCY 0. Assessment is to confirm that 3H:1V pit slopes will achieve the designed design acceptance criteria of a Factor of Safety (FoS) of 1.3<br>Access restriction completed within 12 months of cessation of operations by end PCY 1<br>Backfill of Augusta boxcut by the completion of earthworks by end PCY 2<br>Site made safe, stable and compatible with proposed land end use of grazing PCY 8.<br>During operations and closure phases:<br>• Records of stakeholder consultation |

| No | Objective | Applicable domains | Criteria | Milestone and timing of evidence gathering/reporting |
|---|---|---|---|---|
| | | | | Prior to MIN relinquishment:<br>• Decommissioning and rehabilitation completion reports<br>• ERR and regulatory agency site inspection |
| **3** | No contaminated soils or substrates remain on site | Process plant, office, hardstand and infrastructure, including:<br>Augusta infrastructure Areas<br>Augusta Evaporation ponds<br>Brunswick Infrastructure Areas | Contaminated soils or substrate:<br>• remediated to achieve compliance with applicable EPA standards (such as the National Environmental Protection (Assessment of Contaminated Sites) Measure), or<br>• excavated and sent to an appropriate waste disposal facility in accordance with EPA requirements | Assessments and disposal of contaminated material completed within 12 months by end PCY 1<br>During operations and closure phases:<br>• Contamination assessment and remediation reports<br>• EPA contaminated materials transport and disposal certificates (if relevant)<br>Prior to MIN relinquishment:<br>• Surface water and groundwater monitoring results<br>• ERR and regulatory agency site inspection |
| **4** | Area contoured to match existing surface topography | All domains<br>Except:<br>Brunswick Pit, Brunswick TSF<br>Bombay TSF<br>Brunswick West TSF | Final gradients and contours consistent with pre-existing topography and integrate with surrounding topography<br>No pooling of drainage or uncontrolled erosion | Earthworks commence in PCY2 and revegetation is completed within 12 months by end PCY 3<br>Topography confirmed by PCY 3<br>During closure phase:<br>• GIS analysis to confirm final topography/landform and visual inspection prior to revegetation in PCY 3<br>Prior to MIN relinquishment:<br>• ERR and regulatory agency site inspection |
| **5** | Final TSF landforms are geotechnically and erosionally stable | All tailing facilities, including:<br>Brunswick TSF, Bombay TSF, Brunswick West TSF | Design and construction of final TSF landforms has been verified as geotechnically stable and compliant with ANCOLD 2019 requirements by a suitably qualified and experienced TSF specialist | Incorporate information from further investigations into final closure design by PCY 2<br>Final detailed closure design and report by PCY2<br>Earthworks commence in PCY 3 following cessation of tailings deposition (drying period) and revegetation is completed by end PCY 3 |

| No | Objective | Applicable domains | Criteria | Milestone and timing of evidence gathering/reporting |
|---|---|---|---|---|
| | | | Annual geotechnical audits have been undertaken by a suitably qualified and experienced TSF specialist during remaining mine life and closure period, and have confirmed stability of final landform<br>Landform modelling of final landform has predicted erosional stability<br>No ponding of water is observed to occur on top of a TSF<br>No visible erosion gullies, evidence of tunnel erosion or slumping<br>Vegetative groundcover of >50% maintained year-round on slopes | Construction of TSF landforms verified PCY 3<br>Monitoring, annual audits and reports to continue until relinquishment by PCY 8<br>Stability of TSF landforms verified PCY 8<br>During operations and closure phases:<br>• Outcomes of landform assessment and modelling, including how landform design accounts for closure and post-closure erosion and drainage, and how water interacts with slopes, created landforms and catchments after rehabilitation/closure<br>• Detailed design of batters for TSF for decommissioning, rehabilitation and long-term management.<br>• As-completed construction reports<br>• Results of regular TSF risk reviews, geotechnical audits and erosional stability monitoring<br>• Results of vegetation coverage monitoring<br>• Any closure deviations from design explained, justified and approved in advance with new knowledge incorporated that demonstrates there is no threat to objectives of containment or land use<br>• GIS analysis and visual inspection of landforms<br>• Records of stakeholder consultation<br>During post-rehabilitation phase:<br>• Monitoring and reporting of landform stability and percentage vegetation coverage during the 4 years post-rehabilitation period by a land management specialist |

| No | Objective | Applicable domains | Criteria | Milestone and timing of evidence gathering/reporting |
|---|---|---|---|---|
| | | | | • Records of maintenance to repair landform instability or erosion, and to revegetate disturbed/bare areas, during the 4 years post-rehabilitation period<br>Prior to MIN relinquishment:<br>• Summary of geotechnical audit outcomes and erosional stability monitoring<br>• ERR and regulatory agency site inspection |
| **6** | Pit walls are structurally and erosionally stable | Brunswick Pit | The long-term structural stability of the pit walls has been verified by a suitably qualified and experienced geotechnical engineer after completion of works<br>No visible evidence of slumping or erosional instability | Incorporate information from further investigations into final closure design by PCY 1<br>Earthworks commence in PCY 2 and revegetation is completed within 12 months by end PCY 3<br>Long-term structural stability verified PYC 5<br>Monitoring, annual audits and reports continue for 2 years to end PCY 5<br>During operations and rehabilitation phases:<br>• Engineered design and as-completed construction reports<br>• Results of geotechnical and erosional stability monitoring, including prism monitoring program of pit wall stability<br>• Where problems are detected, records of control measures adopted and clear rationale for measures<br>• GIS analysis and visual inspection of landforms<br>• Records of stakeholder consultation<br>During post-rehabilitation phase:<br>• Monitoring and reporting of landform stability during the 4 years post-rehabilitation period |

| No | Objective | Applicable domains | Criteria | Milestone and timing of evidence gathering/reporting |
|---|---|---|---|---|
| | | | | • Records of maintenance to repair landform instability or erosion during the 4 years post-rehabilitation period<br>Prior to MIN relinquishment:<br>• Summary of geotechnical and erosional stability monitoring<br>• ERR and regulatory agency site inspection |
| **7** | Disturbed lands are restored to forested landscape suitable for recreation/ conservation land use (as agreed, where relevant, by Parks Victoria) | All disturbance sites on Crown Land, including:<br>Brunswick Infrastructure<br>Brunswick TSF<br>Bombay TSF<br>Rock Garden Waste Rock Stockpile | Native vegetation on Crown Land is sustainably established on disturbed land using local species agreed to by Parks Victoria<br>Species composition and community structure has been established such that it is (or will become) comparable to that of the surrounding wooded landscape | Incorporate information from further investigations into final closure design by PCY 2<br>Earthworks commence in PCY 2 and revegetation is completed within 12 months by end PCY 3<br>Monitoring, maintenance, surveys and annual reports continue until relinquishment by PCY 8<br>Restored to end landuse by PCY 8<br>During operations and rehabilitation phases:<br>• Reporting of revegetation trial outcomes (trials undertaken to test options and confirm procedures before the need to apply them)<br>During post-rehabilitation phase:<br>• Records (including photographic evidence) of reseeding programs, including species lists, method and date of activities<br>• Monitoring and reporting of revegetation outcomes during the 4 years post-rehabilitation by a land management specialist<br>• Undertaking maintenance to replant losses or increase biodiversity during the 4 years post-rehabilitation<br>• Records of stakeholder consultation<br>Prior to MIN relinquishment: |

| No | Objective | Applicable domains | Criteria | Milestone and timing of evidence gathering/reporting |
|---|---|---|---|---|
| | | | | • Summary of revegetation outcomes<br>• ERR and regulatory agency site inspection |
| **8** | Disturbed lands are restored suitable for grazing landuse | All sites on private land, including:<br>Augusta infrastructure Areas<br>Augusta Evaporation ponds<br>Augusta Boxcut<br>Augusta Waste Rock Stockpiles<br>Brunswick<br>Brunswick Pit<br>Brunswick Waste Rock Stockpiles<br>Brunswick Core yard<br>Brunswick West TSF | Vegetation establishment consistent with land use | Incorporate information from further investigations into final closure design by PCY 2<br>Earthworks commence in PCY 2 and revegetation is completed within 12 months by end PCY 3<br>Formal survey report at end of quarterly monitoring end PCY 5<br>Detailed survey report at end of 6 monthly monitoring end PCY 7<br>Monitoring, maintenance, surveys and annual reports continue until relinquishment by PCY 8<br>Restored to end landuse by PCY 8<br>During operations and rehabilitation phases:<br>• Reporting of revegetation trial outcomes (trials undertaken to test options and confirm procedures before the need to apply them)<br>During post-rehabilitation phase:<br>• Records (including photographic evidence) of reseeding programs, including species lists, method and date of activities<br>• Records of stakeholder consultation<br>During post-rehabilitation phase:<br>• Monitoring and reporting of revegetation outcomes during the 4 years post-rehabilitation period by a land management specialist<br>• Records of maintenance to replant during the 4 years post-rehabilitation period |

| No | Objective | Applicable domains | Criteria | Milestone and timing of evidence gathering/reporting |
|---|---|---|---|---|
| | | | | Prior to MIN relinquishment:<br>• Summary of geotechnical and erosional stability monitoring<br>• Summary of revegetation outcomes<br>• ERR and regulatory agency site inspection |
| **9** | Revegetation of disturbed lands does not introduce noxious weeds, new weed species or increase local weed densities | All domains | No State prohibited weeds (listed on the Agriculture Victoria website (agriculture.vic.gov.au) or Weeds of National Significance (listed on the Weeds Australia website weeds.org.au) present in rehabilitated land<br>No weed species present that are not also present in comparable, nearby land (where the weeds on the nearby land have not been introduced by the mining operation)<br>Density of individual weed species does not exceed that of comparable, nearby land (where the weeds on the nearby land have not been introduced by the mining operation) | Earthworks commence in PCY 2 and revegetation is completed within 12 months by end PCY 3<br>Monitoring and maintenance commence following revegetation and continue until relinquishment by PCY 8<br>During operations and rehabilitation phases:<br>• Records (incl. photographic) of weed occurrence, prevalence and eradication during operations<br>• Development of biosecurity procedures for vehicle hygiene prior to rehabilitation of disturbed lands and records of implementation<br>• Records of stakeholder consultation<br>During post-rehabilitation phase:<br>• Records of weed occurrence, prevalence and eradication during the 4 years post-rehabilitation period by a land management specialist<br>Prior to MIN relinquishment:<br>• Summary of weed management outcomes<br>• ERR and regulatory agency site inspection |
| **10** | Geochemistry of tailings is understood and TSF covers acceptably reduce the risk of impacts on | All tailing storage facilities, including:<br>Brunswick TSF<br>Bombay TSF | The geochemistry of the tailings has been characterised sufficiently to understand geochemical risk<br>TSF covers have been designed, constructed and revegetated to | Incorporate information from further investigations into final closure design by PCY 2<br>Final detailed closure design and report by PCY2 |

| No | Objective | Applicable domains | Criteria | Milestone and timing of evidence gathering/reporting |
|---|---|---|---|---|
| | surface water and groundwater quality | Brunswick West TSF | effectively manage the identified geochemical risk<br>A surface water and groundwater monitoring program are in place that is able to confirm that geochemical risks are being effectively managed<br>Surface water and groundwater monitoring results are consistent with the indicators and objectives of the Environment Reference Standard (ERS) under the *Environment Protection Act 2017* | Earthworks commence in PCY 3 following cessation of tailings deposition (drying period) and revegetation is completed by end PCY 3<br>Monitoring and annual reports to continue from closure PCY 0 until relinquishment by PCY 8<br>NB: Active monitoring points to be removed prior to relinquishment PCY 8<br>During operations and closure phases:<br>• Tailings geochemical assessment reports<br>• Detailed engineering design of TSF cover systems, showing how TSF meets design criteria for closure and post-closure including how water interacts with covers and tailings after rehabilitation/closure<br>• Materials mass balance showing availability and sourcing of cover materials<br>• As-completed construction reports<br>• Any closure deviations from design explained justified and approved in advance with new knowledge incorporated that demonstrates there is no threat to objectives of containment or land use<br>• Results of surface water and groundwater quality monitoring program and consistency with ERS indicators and objectives<br>• Records of stakeholder consultation<br>During post-rehabilitation phase:<br>• Monitoring and reporting of surface water and groundwater quality during the 4 years post-rehabilitation period<br>Prior to MIN relinquishment: |

| No | Objective | Applicable domains | Criteria | Milestone and timing of evidence gathering/reporting |
|---|---|---|---|---|
| | | | | • Summary of surface water and groundwater quality monitoring<br>• ERR and regulatory agency site inspection |
| **11** | Monitoring program records long term trends that demonstrate water quality does not exceed agreed criteria | All tailing storage facilities, including:<br>Brunswick TSF<br>Bombay TSF<br>Brunswick West TSF | A surface water and groundwater monitoring program are in place that is able to confirm that geochemical risks are being effectively managed<br>Surface water and groundwater monitoring results are consistent with the indicators and objectives of the Environment Reference Standard (ERS) under the *Environment Protection Act 2017* | Monitoring and annual reports to continue from closure PCY 0 until relinquishment by PCY 8<br>NB: Active monitoring points to be removed prior to relinquishment PCY 8<br>During operations and closure phases:<br>• Results of surface water and groundwater quality monitoring program and consistency with ERS indicators and objectives<br>• Records of stakeholder consultation<br>During post-rehabilitation phase:<br>• Monitoring and reporting of surface water and groundwater quality during the 4 years post-rehabilitation period<br>Prior to MIN relinquishment:<br>• Summary of surface water and groundwater quality monitoring<br>• ERR and regulatory agency site inspection |

# 9 Schedule for rehabilitation milestones

## 9.1 Progressive rehabilitation

Costerfield Operations consists of underground mining operations where ore is recovered from underground while waste rock is backfilled in stopes for local stability and tailings is placed in a tailings storage facility.

The disturbed surface areas are limited in size (total approximately 71 ha) and are typically active sites occupied by fixed plant, infrastructure and facilities and not available for rehabilitation until site closure.

Progressive rehabilitation is an important component of site environmental management and a requirement under section 81 of the MRSD Act. The first opportunity for major progressive rehabilitation will likely occur following the decommissioning of the Brunswick TSF. This will allow the site to be rehabilitated and will provide an opportunity to undertake rehabilitation trials (including both cover and revegetation trials).

Decommissioning of the Brunswick TSF is currently scheduled to occur in 2025/2026. The next opportunity will likely follow in 2026/2027 with the decommissioning of the Bombay TSF.

The rehabilitation earthworks for these TSFs will use material from the rock stockpiles at the Rock Garden, Brunswick and Augusta waste rock stockpiles. At this stage the Rock Garden, Brunswick and Augusta (partially) waste rock stockpiles may also be available to be rehabilitated once the stockpiles are consumed. Further progressive rehabilitation could be undertaken as facilities are no longer operational and with each campaign the rehabilitation concepts and details will be further refined. At closure it would be anticipated that the only TSF that would require decommissioning and rehabilitation is the Brunswick West TSF.

### 9.1.1 Season-related activities

Table 9-1 shows the seasons in which rehabilitation works need to be completed to minimise adverse impacts of earthworks and promote a high degree of success in revegetation.

*Table 9-1 Seasons for activities*

| Activity | Autumn | Winter | Spring | Summer |
|---|---|---|---|---|
| **Seed collection** | | | | X |
| **Plant propagation** | | | X | X |
| **Final shaping** | X | | | |
| **Soil placement** | X | | | |
| **Ripping** | X | | | |
| **Tubestock planting** | X | X | | |
| **Direct seeding** | X | X | X | |

## 9.2 Construction sequence for final rehabilitation works

The construction sequence for rehabilitation works comprises two main phases – a decommissioning phase and an earthworks phase.

The likely construction sequence, integrated across the domains and assuming that progressive rehabilitation of the Brunswick and Bombay TSFs and the Rock Garden and Brunswick Waste Rock Stockpiles has occurred, has been identified as follows:

- decommissioning and remediation
- landform shaping and erosion control
- bulk earthworks and materials
- topsoil management and soil conditioning
- revegetation.

Refer to the Domain Action Plans in Appendix B for additional details regarding rehabilitation actions.

### 9.2.1 Decommissioning overview and schedule

Decommissioning will involve the removal of all equipment and infrastructure, with the exception of the Augusta water dams or other facilities/infrastructure to be retained for future use. Only those light vehicle tracks and monitoring equipment necessary for monitoring and maintenance are currently anticipated to remain at the site following decommissioning. The removal of surface facilities and site remediation will clear all disturbed sites of hazards and allow final rehabilitation activities to proceed.

MRCO will obtain consent from the landowners and any relevant regulatory authorities that any infrastructure that is to remain after mining is in a safe and acceptable condition. Such infrastructure will be maintained as appropriate by MRCO until handover.

The proposed schedule for the removal of plant and equipment will include:

- demobilisation of mobile plant, rolling stock and temporary facilities
- decommissioning of fixed plant, including decontamination where required and the removal and disposal of hazardous materials
- demolition, refurbishment or reuse of buildings or facilities, including a description of expected waste and disposal methods.

A detailed schedule will be prepared for the removal/demolition of supporting infrastructure within each domain to provide a framework for management. The relevant actions from this will be included in the Detailed Decommissioning and Closure Plan and will include:

- remove all portable plant, equipment and rubbish from Augusta site
- secure the portal at Augusta
- remove all portable plant, equipment and rubbish from Brunswick site
- secure the portal at Brunswick
- remove all portable plant, equipment and rubbish from the Cuffley and Youle ventilation shafts

- secure the ventilation shafts at Augusta, Cuffley, Brunswick and Youle
- assessment of contamination
- remove and dispose of contaminated material.

### 9.2.2 Decommissioning activities



Expected decommissioning activities are outlined below.

General

General decommissioning activities will include:

- removal of fuels, waste oils and other hydrocarbons
- removal of chemicals and processing reagents
- selling of equipment, infrastructure and buildings
- demolition and removal of unsold infrastructure
- selling/recycling of material (e.g. scrap steel, pipelines, concrete)
- disposal of contaminated materials in accordance with EPA requirements.

Site services

It is envisaged that electricity services to any remaining infrastructure will be removed prior to the commencement of building demolition works. Other services such as telecommunication and water supply will also be removed

Buildings and fixed plant

All buildings and fixed plant (including workshops, office, storage sheds, etc.) will be demolished and removed from the site. Where appropriate, the materials recovered during demolition will be sold for re-use or recycled. It is envisaged that concrete footings and pads (where not sold for recycling) along with other potential inert building waste will be broken up and buried on site in a TSF or the boxcut.

Redundant plant or equipment

As part of closure, if not already undertaken, any redundant plant or equipment will either be sold to scrap dealers or disposed of at an appropriate landfill facility by a licensed waste contractor in accordance with EPA requirements.

Other infrastructure

MRCO will obtain consent from the landowners that any infrastructure that is to remain after operations cease, is in a safe and acceptable condition and will be maintained as appropriate by MRCO until handover.

### 9.2.3 Remediation

MRCO's Environmental Management System (EMS) includes safeguards and responses to ensure contamination sources and high-risk activities do not result in pollution of soil and/or groundwater. As a result, it is not anticipated that any significant level of contamination of the site will occur. However, minor levels of contamination requiring remediation and/or offsite removal and disposal

are likely to be present. Testing for contamination will be undertaken as part of the closure process and any contamination identified will be managed (e.g. by on-site remediation and/or disposal at a registered landfill) in accordance with EPA requirements.

Dam liners

HDPE liners will be removed and disposed of within contained structures such as a previous specified water dams and/or taken to a licenced landfill.

Buildings, storage areas and fixed plant

Where potential contamination may have occurred as a result of site activities (e.g. re-fuelling areas, workshops, etc.), appropriate investigations will be undertaken to determine the presence and extent of any potential contamination (e.g. hydrocarbons) and determine the appropriate management in accordance with EPA requirements.

Removal of sediments/contaminated material

Any remaining sediments/sludge/contaminated material remaining at closure will be scraped-up and either re-processed or disposed of within contained structures such as a TSF, or a previous specified water dam.

### 9.2.4 Final rehabilitation overview

The bulk of rehabilitation activities will occur following the decommissioning phase of the operation and will be undertaken as part of the final rehabilitation works, including the following activities:

- making voids, portals and shafts safe
- bulk earthworks and capping
- reshaping final landforms and drainage
- topsoiling
- re-seeding and planting
- erosion control.



### 9.2.5 Underground mine workings

On completion of mining, surface access to the underground mining works by shafts or declines will be permanently closed off to the public and the site made secure, as follows:

- The boxcut will be backfilled, which will seal the Augusta mine portal.
- The Brunswick mine portal will be sealed.
- A concrete slab will be installed over ventilation and emergency egress shafts (see Appendix C).
- The underground workings will be backfilled with waste rock (down to 4 level, including crosscut to E-lode at 1 level) to prevent subsidence.
- The underground workings will then be allowed to fill naturally with groundwater. There will be no discharge of groundwater offsite.

### 9.2.6 Landform shaping and erosion control

Rehabilitation will be undertaken to ensure a safe and stable landform that is compatible with the surrounding landscape. In general, the concept for the final landscape is to reform the sites as close as possible to the topography that existed prior to disturbance, as follows:

- Infrastructure, waste rock storage, boxcut and mine dam areas (including the evaporation pond) will be returned to natural surface level.
- The TSFs and pit will remain as permanent changes to the pre-mining landform.
- The rehabilitation and closure of TSFs and voids will be subject to specific detailed planning for safety and stability reasons.

Steep slopes, clearance of vegetation, failure to adequately revegetate and inadequate drainage controls can cause runoff and erosion problems. The control of runoff and erosion is best achieved by:

- reducing slope angles of constructed landforms
- minimising exposed areas (i.e. areas with low to no vegetation cover)
- installing cutoff drains to direct stormwater away from disturbed areas
- appropriate design and construction of exit drains to direct stormwater from the site and reduce flow velocities
- construction of sediment traps and dams to minimise sediment discharge from the site.

The landform design will detail drainage and erosion control measures. As a general guide, drains and sediment traps will be designed for a one-in-100 year AEP critical rainfall event.

### 9.2.7 Infrastructure areas

Unless assessed as being contaminated, infrastructure areas made available for rehabilitation following final decommissioning will be treated in accordance with the rehabilitation prescriptions relevant to the final land-use plan, such as ripping, replacement of topsoil and re-establishment of cover species.

#### Roads, tracks and other compacted areas

The rehabilitation of tracks and roads should only be undertaken following agreement with the landowner or land manager as to whether the road or track should be retained after operations cease.

The hardstand areas around the Augusta administration buildings, stores area and electrical workshop will be ripped up with any waste material being placed in a TSF or the boxcut. Other hardstands, roads subject to rehabilitation, offices and workshop areas will be cleared and ripped.

Infrastructure located in the boxcut (including the maintenance workshop) will be removed prior to backfilling the boxcut.

Other highly compacted areas such as loading areas, carparks and stockpile pads may require special treatment, such as deep ripping or removal of compacted material, prior to respreading of topsoil.

Evaporation dams

Dams will be drained and the material in the embankments will be pushed back into the excavation. Accumulated sediments will be transferred to central dam and the sediments will be contained within in the HDPE liner and encapsulated on site in the HDPE liner before it being covered by the embankment material. Areas will be graded to natural levels.

### 9.2.8 Waste storages and voids

Waste rock storage and ROM pad

Waste rock material will be removed, used as backfill or in cover construction, and the areas stripped back to natural surface levels. The top 0.2 m of the ROM pad will be scraped off and run through the Processing Plant.

Voids

The Augusta boxcut is to be backfilled to natural surface level with waste rock and oxidised material.

The perimeter of the Brunswick Pit will be cleared, a 2.0 metre high earthen safety bund constructed around it, and a 1.8 metre security fence topped with barbed wire erected.

If either Augusta or Brunswick access to the underground workings become redundant there is an opportunity to commence the closure activities for either the Augusta Boxcut or Brunswick Pit.

If access via the Brunswick portal is no longer required. MRCO can investigate the possibility of sealing the portal and commence battering the pit slope to 3H:1V.

Post mining, a void is to remain above the groundwater recharge height in the pit. The modelled groundwater recovery level will be 178.0 AHD resulting in a maximum pit depth of approximately 14 m. A beaching zone at northern end of pit will be constructed to aid egress. Shafts will be rehabilitated as outlined in Section 9.2.5.

### 9.2.9 Tailing Storage Facilities

The proposed cover design for the TSFs is envisaged to be a gently domed landform graded at 1% from the centre point for the Bombay and Brunswick TSFs and 5% for the Brunswick West TSF. The TSFs will also include the following measures:

- The existing embankment slopes of Brunswick and Bombay TSFs shall be reduced to 1:3 (V:H).
- The embankment slopes of Brunswick West TSF shall remain as constructed 1:4 (V:H) slope.
- A suitably qualified engineer shall develop a detailed design for an earthen cover over the tailings and for the rehabilitation of the external embankments on closure. It is currently anticipated that a layer of inert material and topsoil will cap the tailings (to an approximate depth of 1 m).
- The inert material will likely be excavated waste rock from the Augusta mine and will undergo geochemical characterisation to confirm its suitability for use in the final landform.

The detailed design of the TSF rehabilitation will be incorporated into the Detailed Decommissioning and Closure Plan. The detailed design will take into account the findings of cover and revegetation trials, geochemical investigations and geotechnical assessments.

TSF drying period

- leave tailing material exposed to dry to form a suitable strength crust within 2-3 years from cessation of deposition.

TSF stage 2

- material for rehabilitation from stockpiles for covering tailings
- reshape to provide suitable drainage and minimise erosion risk
- topsoil, trim, scarify and seed disturbed areas as required.

### 9.2.10 Bulk earthworks materials

The mass balance for materials available to be used in bulk earthworks is shown in the tables below. The tables show:

- sources and volumes of waste rock and topsoil
- volumes of waste rock and topsoil required to rehabilitate mine facilities
- the allocation of sources to meet rehabilitation needs.

### Waste rock

Approximately 769,550 $m^3$ of waste rock will be removed from current storage areas during rehabilitation, with the material used for backfill and covering TSFs as shown in Table 9-2.

*Table 9-2 Waste Rock Inventory*

| Location | Quantity | Destination Domain | | | | | |
|---|---|---|---|---|---|---|---|
| | $m^3$ | 1a | 4ug | 4 | 7 | 8 | 9 |
| **Augusta Waste Rock Stockpile** | **188,000** | | 14,000 | 25,500 | 109,000 | 39,500 | |
| **Augusta Noise Bund** | **87,000** | | | 87,000 | | | |
| **Augusta Evaporation Ponds/Storage Dams** | **123,500** | 123,500 | | | | | |
| **Brunswick Waste Rock Stockpile** | **16,000** | | | | 16,000 | | |
| **Brunswick Pit Oxidised Waste Stockpile** | **43,850** | | | | | 43,850 | |
| **Brunswick Pit Waste Rock Stockpile** | **173,500** | | | | 13,500 | | 160,000 |
| **Rock Garden Waste Stockpile** | **53,000** | | | | | 53,000 | |
| **Road base recovered from onsite roads** | **4,200** | | | | 4,200 | | |
| **Source to be confirmed** | **81,000** | | | | | | 81,000 |
| **Total** | **769,550** | **123,000** | **14,000** | **112,500** | **142,700** | **136,350** | **241,000** |



Key to destination Domains:

| | |
|---|---|
| Domain 1a | Augusta Evaporation Ponds/Storage Dams |
| Domain 4ug | Underground mine backfill |
| Domain 4 | Boxcut backfill |
| Domain 5 | Brunswick Infrastructure Areas |
| Domain 7 | Brunswick TSF |
| Domain 8 | Bombay TSF |
| Domain 9 | Brunswick West TSF |

Note: The Brunswick West TSF will require 210,000 $m^3$ of earthfill and 31,000 $m^3$ of rockfill generated largely from the Brunswick Pit Waste Rock Stockpile and other onsite sources. Any short fall in material will need to be imported and an imported materials management plan will be required.

### Topsoil

Approximately 70,800 $m^3$ of topsoil will be respread across all major areas of disturbance as shown in Table 9-3.

*Table 9-3 Topsoil Inventory*

| Location | Quantity | Destination Domain | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $m^3$ | 1 | 1a | 2a | 3 | 4 | 5 | 7 | 8 | 9 | 10 | 11 | 12 |
| **Augusta Noise Bund** | **2,700** | | | | 2,700 | | | | | | | | |
| **Augusta Evaporation Ponds 1** | **2,000** | 2,000 | | | | | | | | | | | |
| **Augusta Evaporation Ponds 2** | **13,400** | 3,400 | 10,000 | | | | | | | | | | |
| **Splitters Creek 1** | **11,200** | | | 500 | 1,100 | 2,000 | 2,500 | 1,700 | | | 3,400 | | |
| **Core Yard** | **2,600** | | | | | | | | | | 2,600 | | |
| **Brunswick TSF** | **5,000** | | | | | | | 5,000 | | | | | |
| **Bombay TSF** | **8,600** | | | | | | | | 7,000 | | | | 1,600 |
| **Brunswick West TSF** | **25,300** | | | | | | | 2,200 | 2,200 | 18,500 | | 2,400 | |
| **Total** | **70,800** | **5,400** | **10,000** | **500** | **3,800** | **2,000** | **2,500** | **8,900** | **9,200** | **18,500** | **6,000** | **2,400** | **1,600** |

Key to destination Domains:

| | |
|---|---|
| Domain 1 | Augusta Mine Site |
| Domain 1a | Augusta Evaporation Ponds/Storage Dams |
| Domain 2a | Cuffley Shaft |
| Domain 3 | Augusta Waste Rock Stockpile |
| Domain 4 | Augusta Boxcut |
| Domain 5 | Brunswick Plant Site |
| Domain 7 | Brunswick TSF |
| Domain 8 | Bombay TSF |
| Domain 9 | Brunswick West TSF |
| Domain 10 | Brunswick Waste Rock Stockpile |
| Domain 11 | Rock Garden Waste Stockpile |
| Domain 12 | Brunswick Pit |

Note: The Brunswick West TSF will require 18,500 $m^3$ of topsoil for rehabilitation, however the topsoil surplus generated during construction will be 40,500 $m^3$. A further 6,800 $m^3$ of this material has been allocated to be used in Domains 7, 8 and 11.

### 9.2.11 Topsoil management and soil conditioning

#### Subsoil conditioning

*Compaction*

Prior to re-spreading of the topsoil, the subsoil should be scarified to break up any compacted areas and to enable the appropriate keying of the two soils. Lightly compacted soils should be scarified to a depth of 50 to 100 mm and heavily compacted soils to a minimum depth of 300 mm, ensuring all ripping and cultivation operations occur along the contour.

*Soil structure*

Prior to re-spreading the topsoil, laboratory testing of subsoil should be undertaken to confirm pH, salinity, and sodicity. Application of gypsum onto the subsoil may be required where there are dispersive sub-soils, or soil has become compacted or 'hard setting' as a result of construction earthworks, or where subsoil has inadvertently been brought to the surface and mixed with topsoil. The addition of gypsum will reduce the effects of soil 'crusting' and improve the friability of soil. This will improve water infiltration into plant roots, and therefore improve germination responses. Gypsum should be applied directly to the subsoil before topsoil is replaced.

Depending on soil test results agricultural lime may also need to be applied at calculated rates to ensure subsoil pH is within a range that plants are able to establish successfully.

#### Topsoil management

Topsoil management will be undertaken as follows:

- Topsoil will be stripped progressively ahead of construction.
- Where possible, topsoil will be stripped when moist to help maintain soil structure and to reduce dust generation.
- Stockpiles will be generally no greater than two metres high to maximise surface exposure and biological activity.
- Stockpiles will be shaped to minimise erosive runoff and protected from upgradient surface flows by cut-off drains.
- Stockpiles to be kept longer than three months will be sown with a suitable cover crop to minimise soil erosion and invasion of weed species.
- Weed growth will be monitored and, if necessary, controlled.
- Prior to re-spreading, weed growth will be scalped from the top of the stockpiles to minimise the transport of weeds into rehabilitated areas.
- Stockpile locations will be identified on mine plans to minimise the potential for unauthorised use or disturbance.

#### Topsoil re-spreading

Topsoil re-spreading will be undertaken as follows:

- All contractor machinery used to handle and transport topsoil will be washed down both prior to and at the completion of works to minimise the risk of transfer of weeds.
- Stockpiled topsoil will be re-spread evenly over the whole disturbance area.
- Topsoil will not be re-spread when wet, to avoid excessive compaction.

- At all times topsoil respreading will be undertaken so that no visible dust leaves site.
- Topsoil will be placed at the top of a slope and spread down slope to a minimum depth of approximately 100 mm.

Where topsoil is insufficient to sustain plant growth, or if topsoil is unavailable, soil amelioration may be required. Soil ameliorants such as gypsum, wood and hay mulch, biosolids, municipal waste composts and other organic wastes are utilised based on availability. Soil ameliorants can prevent surface crusting, increase moisture and organic content, and buffer surface temperatures to improve germination.

*Fertiliser*

To ensure soil fertility is adequate to encourage successful germination and establishment of pasture in areas to be returned to agriculture, it may be necessary to apply phosphorous (in the form of superphosphate). Soil laboratory testing should be undertaken to determine the correct rate of phosphorous application.

*Weeds*

Weed controls, such as applying pre- and post-emergent weed sprays, may be necessary for the reinstated topsoil. Advice should be sought from an agronomist.

### 9.2.12 Revegetation

Revegetation is to be established to produce sustainable woodland and grazing land uses. Revegetation will be undertaken as follows:

- Revegetation will be undertaken from autumn to spring.
- After surface soil amelioration and surface preparation is completed for any given area, revegetation will commence as soon as practicable.
- Seed and tubestock supply will preferentially be of local provenance.
- Seed collected onsite will be incorporated into the revegetation mix or propagated to produce tubestock for planting.

Box Ironbark Woodland

The post-closure land use for Crown Land requires rehabilitation to achieve Box Ironbark Woodland. This will be undertaken as follows:

- The revegetation process will aim to re-establish Box Ironbark Woodland on designated rehabilitation areas, consistent with the surrounding vegetation.
- A suitable species list will be prepared with advice from an ecologist and DELWP.
- Revegetation will be undertaken via a combination of direct seeding and tubestock planting.
- Species selection will include a combination of overstorey, middlestorey and understorey strata.

Provision of habitat resources

The habitat resources will be incorporated into rehabilitation as follows:

- Nesting boxes and structures (benefiting local mammals - Phascogale and avian wildlife) will be provided in suitable locations within the rehabilitated site.

- Large woody debris and hollow bearing timber will be placed (both vertical and horizontal) within revegetated areas.

Pasture

The post-closure land use for private land requires the re-establishment of pastures. Pasture should be established as soon as practicable to provide ground cover and reduce the likelihood of erosion. Pasture establishment will be undertaken as follows:

- Topsoil will be spread to a depth of approximately 200 mm.
- Logs, rocks or other large materials will be removed from the area.
- The area will be seeded using a mix of pasture and legume species blended with an appropriate application rate of fertiliser.
- A suitable species list will be prepared with input from the landowner.
- Fertiliser will be applied at the time of sowing and as required during the rehabilitation maintenance period.

## 9.3 Timeframes

### 9.3.1 Progressive rehabilitation

The indicative timeframes for progressive rehabilitation and post-rehabilitation activities are as follows and shown in Table 9-5:

- studies on the design of TSF rehabilitation – prior to closure
- final design report – prior to rehabilitation
- decommissioning TSFs – six months
- drying period for Brunswick/Bombay TSF tailings material (last deposition) – 2 years
- final earthworks stage – six months
  - Brunswick/Bombay TSF (shape and cover)
  - Rock Garden/Brunswick/Augusta (partial) waste rock stockpile (as they are reused)
- Post closure monitoring – 4 years
  - Revegetation failure
  - Revegetation success.

*Table 9-4 Progressive rehabilitation activities indicative timeline*

| Item | Year | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2022 | 2023 | 2024 | 2025 | 2026 | 2028 | 2029 | 2030 | 2031 |
| **Brunswick TSF** | | | | | | | | | |
| **Incorporate information from further investigations* into closure design** | | | | | | | | | |
| **Final detailed closure design report** | | | | | | | | | |
| **Decommissioning** | | | | | | | | | |
| • **Brunswick TSF infrastructure** | | | | | | | | | |
| • **Brunswick TSF** | | | ***Drying period*** | | | | | | |
| • **Brunswick Waste Rock Stockpile** | | | | | | | | | |
| **Earthworks & revegetation** | | | | | | | | | |
| • **Brunswick TSF** | | | | | | | | | |
| • **Brunswick Waste Rock Stockpile** | | | | | | | | | |
| **Monitoring** | | | | | | | | | |
| • **Earthwork monitoring (monthly)** | | | | | | | | | |
| • **Post-closure monitoring (quarterly)** | | | | | | | | | |
| • **Post-closure monitoring (6 monthly)** | | | | | | | | | |
| **Bombay TSF** | | | | | | | | | |
| **Incorporate information from further investigations* into closure design** | | | | | | | | | |
| **Final detailed closure design report** | | | | | | | | | |
| **Decommissioning** | | | | | | | | | |
| • **Bombay TSF infrastructure** | | | | | | | | | |
| • **Bombay TSF** | | | ***Drying period*** | | | | | | |
| • **Rock Garden Waste Stockpile** | | | | | | | | | |
| **Earthworks & revegetation** | | | | | | | | | |
| • **Bombay TSF** | | | | | | | | | |
| • **Rock Garden Waste Stockpile** | | | | | | | | | |
| **Monitoring** | | | | | | | | | |

| Item | Year | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2022 | 2023 | 2024 | 2025 | 2026 | 2028 | 2029 | 2030 | 2031 |
| • Earthwork monitoring (monthly) | | | | | | | | | |
| • Post-closure monitoring (quarterly) | | | | | | | | | |
| • Post-closure monitoring (6 monthly) | | | | | | | | | |

* The closure design will take into account the findings of cover and revegetation trials, geochemical investigations and geotechnical assessments (Refer to Section 6.3).

### 9.3.2 Cessation of mining activities

The assumed timeframes for rehabilitation and post-rehabilitation activities are as follows and shown in Table 9-5:

- decommissioning at All sites – 1 years
- earthworks stage at All sites (with exception of Brunswick West TSF) – 1 year
- drying period for Brunswick West tailings material (last deposition) – 2 years
- final earthworks stage for Brunswick West TSF (shape and cover) – six months
- decommissioning and earthwork - monthly monitoring and maintenance – 2 years
- initial rehabilitation establishment - quarterly monitoring and maintenance – 2 years
- post-rehabilitation development - six monthly monitoring and maintenance – 2 years.

*Table 9-5 Closure activities timeline*

| Item | Year after cessation of operations | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | -1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| **Incorporate information from further investigations* into final closure design** | | | | | | | | | |
| **Decommissioning** | | | | | | | | | |
| • **All sites (except TSF)** | | | | | | | | | |
| • **Brunswick West TSF infrastructure** | | | | | | | | | |
| • **Brunswick West TSF** | | | *Drying period* | | | | | | |
| **Earthworks & revegetation** | | | | | | | | | |
| • **Augusta site** | | | | | | | | | |
| • **Brunswick site** | | | | | | | | | |
| • **Cuffley Shaft site** | | | | | | | | | |
| • **Youle Shaft site** | | | | | | | | | |

| Item | Year after cessation of operations | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | -1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| **Monitoring** | | | | | | | | | |
| • **Earthwork monitoring (monthly)** | | | | | | | | | |
| • **Post-closure monitoring (quarterly)** | | | | | | | | | |
| • **Post-closure monitoring (6 monthly)** | | | | | | | | | |
| **Brunswick West TSF site** | | | | | | | | | |
| **Incorporate information* from further investigations into final closure design** | | | | | | | | | |
| **Final detailed closure design and report** | | | | | | | | | |
| **Earthworks & revegetation** | | | | | | | | | |
| • **Brunswick West TSF site** | | | | | | | | | |
| **Monitoring** | | | | | | | | | |
| • **Earthwork monitoring (monthly)** | | | | | | | | | |
| • **Post-closure monitoring (quarterly)** | | | | | | | | | |
| • **Post-closure monitoring (6 monthly)** | | | | | | | | | |
| **Relinquishment** | | | | | | | | | |

* The closure design will take into account the findings of cover and revegetation trials, geochemical investigations and geotechnical assessments (Refer to Section 6.3).

## 9.4 Post-rehabilitation monitoring and maintenance

### 9.4.1 Monitoring

Monitoring of rehabilitation will determine whether rehabilitation objectives and requirements are being achieved. In particular, performance against 'completion criteria' should be monitored during and following rehabilitation. Rehabilitation monitoring will include revegetation monitoring for both pastures and native vegetation.

#### Revegetation monitoring

All sites subject to revegetation during rehabilitation will be monitored as follows:

- Quarterly inspections for erosion, weed invasion, vermin and vandalism with results being recorded and remedial action taken as required. The quarterly inspections will continue for a period of 18 to 24 months following initial planting.
- 18 to 24 months following initial planting, a survey of vegetation establishment and other relevant aspects will be conducted.

- After the formal survey site inspections will be conducted at six monthly intervals for a two year period.
- Two years after the formal survey a detailed survey will be undertaken of both flora and fauna. The result of this survey will be used to determine the need for ongoing monitoring.

Outcomes of the rehabilitation inspection and any mitigation actions that are identified as part of the inspection are to be recorded. Where necessary, rehabilitation procedures will be amended accordingly with the aim to continually improve rehabilitation standards.

### Subsidence

Subsidence monitoring of the Heathcote-Nagambie Rd has been conducted by MRCO to detect any potential movement due to subsidence. The results submitted to ERR confirmed that subsidence was not of concern for the monitored section of Heathcote-Nagambie Road.

### Surface and groundwater monitoring

The current operations monitoring program covers matters relevant to both the operation and closure of the Costerfield Operations including:

- EPA-approved monitoring program and compliance limits
- additional groundwater and surface water monitoring programs.

It is expected that the current monitoring program will be readily adapted into a closure and post-closure monitoring program once operations cease.

Routine monitoring of surface water quality in the Wappentake Creek and tributaries will continue after mining and throughout the closure and post-closure period until the relevant performance criteria are satisfied.

Routine monitoring of groundwater quality and levels will continue after mining and throughout the closure and post-closure period until the relevant performance criteria are satisfied.

The rehabilitation and post-rehabilitation monitoring program has been developed based on the rehabilitation risk assessment and is set out in Table 9-6.

*Table 9-6 Monitoring during rehabilitation and post-rehabilitation phases*

| Aspect | Monitoring | Frequency | Locations | Duration# | Post-rehabilitation risk |
|---|---|---|---|---|---|
| **Public safety** | Visual monitoring | Quarterly | Shafts, portal and pit fencing | 2 years | Low risk |
| **Slope failure** | Visual and prism monitoring | Quarterly | Brunswick Pit walls<br>TSF embankments | 2 years<br>4 years | Low risk |
| **Erosion** | Visual monitoring | Bi-monthly and after 25 mm rainfall event | TSF covers and embankments | 4 years | Low risk |

| Aspect | Monitoring | Frequency | Locations | Duration# | Post-rehabilitation risk |
|---|---|---|---|---|---|
| **Water quality** | Sampling and analysis* | Monthly during rehabilitation, Quarterly post-rehabilitation | >20 locations including surface water and groundwater | 4 years | Low risk |
| **Drainage diversions** | Visual monitoring | Quarterly and after 25 mm rainfall event | All | 2 years | Low risk |
| **Erosion** | Visual monitoring | Quarterly | Revegetated areas | 2 years | Low risk |
| **Weed outbreaks** | Visual monitoring | Quarterly | Revegetated areas | 2 years | Low risk |
| **Revegetation failure** | Visual monitoring | Quarterly | Revegetated areas | 2 years | Low risk |
| | Survey of vegetation establishment | After 2 years | Revegetated areas | | |
| **Revegetation success** | Visual monitoring | 6 mthly | Revegetated areas | 2 years# | Low risk |
| | Survey of vegetation establishment | After 2 years | Revegetated areas | | |

* assumes field analysis for pH and conductivity and sample collection and analysis for arsenic, and a suite of general water quality parameters.

# Revegetation success monitoring commences after Revegetation failure monitoring is completed.

### 9.4.2 Maintenance of rehabilitation

Undertaking maintenance activities on rehabilitated areas is important to ensure erosion control is effective and revegetation is successful. Maintenance of revegetation will be required, in the form of replanting or reseeding in failed areas, weed control, watering, pest control and installation/repair of tree guards and fencing for protection from grazing. Rehabilitation maintenance will be guided by the results of the monitoring program.

The following activities will be undertaken as part of rehabilitation maintenance:

- conduct inspections
- manage erosion issues
- maintain drains and water/sediment control structures
- re-establishment of degraded or failed vegetation
- weed control
- prevent and manage damage from pests, vehicles and plant.

Once rehabilitation is stable, supports final land uses, and satisfies completion criteria (as determined by monitoring), additional maintenance will not be required.

### 9.4.3 Intervention

Where revegetation efforts are found to be failing, the following intervention methods may be investigated for suitability:

- undertaking a soil assessment to identify any nutrient deficiencies, and applying an appropriate fertiliser / soil ameliorant, at an appropriate rate
- re-seeding with a different and more appropriate seed mix
- growing of tube-stock and hand planting hardened seedlings, where tree species are identified as being depauperate on rehabilitation areas.
- mulching at time of planting tube-stock and hardened seedlings.

Where slopes are found to be unstable, with erosion evident, the following intervention methods may be investigated for suitability:

- irrigate in-filled areas to improve revegetation success
- re-profile (this should be seen as a last resort).

# 10 Post-rehabilitation risk identification and assessment

As set out in the Guidelines (ERR 2020a), the MRSD (MI) Regulations require operators to identify and assess the risks that the rehabilitated land may continue to pose after rehabilitation is complete. Such post-rehabilitation risks are the residual risks that remain after ERR has assessed that all the rehabilitation criteria in the rehabilitation plan have been met and the site is suitable for relinquishment.

## 10.1 Regulatory requirements

In relation to risk assessment, under the MRSD (MI) Regulations (ERR 2020a):

> *"Regulation 43(2)(f) requires a rehabilitation plan to include an identification and assessment of relevant risks that the rehabilitated land may pose to the environment, to any member of the public or to land, property or infrastructure in the vicinity of the rehabilitated land, including—*
>
> *(i) the type, likelihood and consequence of the risks; and*
>
> *(ii) the activities required to manage the risks; and*
>
> *(iii) the projected costs to manage the risks; and*
>
> *(iv) any other matter that may be relevant to risks arising from the rehabilitated land.*
>
> *Relevant risks are defined in Regulation 43(5) as risks that may require monitoring, maintenance, treatment or other ongoing land management activities after rehabilitation is complete".*

## 10.2 Risk process

The post-rehabilitation risk assessment process adopted for this report follows the risk identification and assessment framework detailed in the Guidelines (ERR 2020a).

The aim of the process is to identify and assess the residual risks that the rehabilitated land may pose to the environment, to any member of the public, or to land, property or infrastructure in its vicinity. Such residual risks may require action or incur a cost (or ongoing costs) after rehabilitation is complete. The assessment is to identify site-specific issues, constraints or characteristics requiring specific management to ensure that stated rehabilitation objectives can (continue to) be achieved after rehabilitation criteria have been met.

## 10.3 Post-rehabilitation risk assessment

*The post-rehabilitation risk assessment template from the Guidelines (ERR 2020a) has been adapted for use to summarise post-rehabilitation risks, as shown in*

Table 10-1.

Likelihood, consequence, and risk rating tables are provided in Appendix D following the criteria outlined in Preparation of Work Plans and Work Plan Variations – Guideline for Mining Projects (ERR 2020b). A risk register, expanding upon, is provided in Appendix D, using the risk register template from ERR (2020a).

*The likelihood and consequence ratings listed in are post-treatment (i.e. they assume that the 'activities to manage risk' have been implemented).*

Table 10-2 provides the reasoning for the risk ratings.

*Table 10-1 Post-rehabilitation risk assessment*

| No | Risk | Activities to manage risk | Likelihood | Consequence | Treated risk | Projected costs to manage risk* |
|---|---|---|---|---|---|---|
| **1** | Public safety – access to underground workings resulting in injury | Shafts and portals will be sealed<br>Boxcut will be backfilled<br>Brunswick Pit lake | Not applicable | Not applicable | *De minimis* risk following backfilling | None |
| **2** | Public safety – access to Brunswick Pit crest resulting in injury | 2 metre high safety bund located 5 metres from pit crest<br>1.8 metre security fence outside safety bund<br>Grade floor in the north end of Brunswick Pit to allow egress from pit lake<br>Batter Brunswick Pit slope above 175 m RL at 3H:1V<br>Pit lake water level invert at 178 m RL (maximum of 14 metres below pit crest) | Rare | Critical | High risk | Maintain fence after site relinquishment (replace fence every 25 years 800m @ $59/m ~$47,200) |
| **3** | Slope failure – geotechnical instability causing failure of pit walls | Ensure the geotechnical stability of final landforms, including water dam embankments, Brunswick Pit walls, crests and underground workings | Unlikely | Insignificant | Low risk | None |

| No | Risk | Activities to manage risk | Likelihood | Consequence | Treated risk | Projected costs to manage risk* |
|---|---|---|---|---|---|---|
| | | Batter Brunswick Pit slope above 175 m RL at 3H:1V to ensure long term stability<br>Installation of rock armouring at the pit lake water level | | | | |
| **4** | Slope failure – geotechnical instability causing failure of TSF embankments | Prepare TSF Closure Plans, including measures to ensure long-term geotechnical stability of TSF embankment and tailings mass<br>Capping and reshaping<br>Revegetation types are compatible with embankment integrity<br>Compliance with ANCOLD 2019 | Unlikely | Major | High risk | Potential need for ongoing removal of self-sown tree saplings to maintain cover integrity (every 3-5 years 24 ha of "Weed management" @ $590/Ha ~$14,160) |
| **5** | Water quality – drainage containing contaminants from TSFs | Mine waste materials are regularly tested and have been found to be non-acid forming<br>Reagents present low risk to the environment<br>Cyanide not used in processing | Unlikely | Moderate | Medium risk | Potential need for ongoing removal of self-sown tree saplings to maintain cover integrity (cost as above) |

| No | Risk | Activities to manage risk | Likelihood | Consequence | Treated risk | Projected costs to manage risk* |
|---|---|---|---|---|---|---|
| | | Cease tailings deposition<br>Cover system including low permeability layer<br>Cover system and revegetation types are compatible<br>Water shedding final surface | | | | |
| **6** | Water quality – drainage containing contaminants from underground workings | Non-mining waste materials to be disposed in appropriate manner – within a contained structure or removal to an appropriate landfill facility<br>Proper storage and handling of hazardous materials and in-situ remediation or licensed disposal of contaminated soils<br>Groundwater table expected to rebound close to pre-mining levels when dewatering ceases at end of mining, minimising long term oxidation of wallrock and therefore geochemical risk | Unlikely | Minor | Low risk | None |

| No | Risk | Activities to manage risk | Likelihood | Consequence | Treated risk | Projected costs to manage risk* |
|---|---|---|---|---|---|---|
| **7** | Re vegetation failure – vegetation not sustainable | Seeding with local species<br>Plan season for earthworks, seed collection, propagation and planting appropriately<br>Undertake revegetation trials | Rare | Insignificant | Low risk | None |
| **8** | Introduction of weeds | Equipment hygiene/ weed control | Unlikely | Minor | Low risk | None |
| **9** | Erosion – causing damage to TSF embankments | Capping and reshaping<br>Drainage controls<br>Revegetation<br>Monitoring and maintenance until landform stable | Unlikely | Minor | Low risk | None |
| **10** | Water quality – drainage containing sediment from erosion of rehabilitated surfaces | Return topography to natural ground levels<br>Revegetate as soon as practicable<br>Conduct cover and revegetation trials<br>Producing a free-draining, non-eroding surface | Unlikely | Minor | Low risk | None |

| No | Risk | Activities to manage risk | Likelihood | Consequence | Treated risk | Projected costs to manage risk* |
|---|---|---|---|---|---|---|
| | | Revegetate as soon as practicable to limit erosion and sedimentation<br>Conduct revegetation trials<br>Maintenance and monitoring of revegetation | | | | |

*Post-relinquishment of MIN

*Table 10-2 Reasoning for post-rehabilitation risk ratings*

| No | Risk | Reasoning |
|---|---|---|
| **1** | Public safety – access to underground workings resulting in injury | Although the potential consequence of a member of the public gaining access to the underground workings (major injury/fatality) is critical, the proposal to decommission the Augusta portal by backfilling and the Brunswick portal by sealing and allowing a pit lake to form that will cover the Brunswick portal entrance, effectively removes this as a risk. |
| **2** | Public safety – access to pit crests resulting in injury | The potential consequence of a member of the public gaining access to the Brunswick Pit (major injury/fatality) is critical. The proposal to isolate the risk by bunding and fencing the Brunswick Pit as well as battering the pit slopes above the pit lake water level to 3H:1V. These controls effectively reduce but cannot eliminate this as a risk. There will be a requirement for fencing to be continued to be maintained after MIN relinquishment. |
| **3** | Slope failure – geotechnical instability causing failure of pit walls | The current state of the pit walls is considered safe for mining operations. The pit slopes will be battered at 3H:1V above the pit lake water level and a rock armouring zone be constructed at the modelled pit lake water level. The stability of the pit walls will be assessed to ensure the long term pit slopes at 3H:1V are safe and stable. The assessment will provide recommendations for the final floor profile as well as further any reduction in pit slopes or installation of catchment bunds. |
| **4** | Slope failure – geotechnical instability causing failure of TSF embankments | All tailing storage facilities were designed and constructed to contemporary standards. The preparation of TSF Closure Plans, including measures to ensure long-term geotechnical stability of TSF embankment and tailings mass will provide modern-day recommendations at the time of the closure of the facilities.<br>The proposed final buttressing and any required re-shaping of the Brunswick and Bombay TSF embankments is expected to further increase their long-term stability. The design of the final slope of the TSF embankments, using 3H:1V for the Brunswick and Bombay TSFs and 4H:1V for the Brunswick West TSF, is expected to effectively mitigate the risk of geotechnical failure. The closed TFSs will also be compliant with the requirements of ANCOLD 2019.<br>The long-term compatibility of embankment vegetation (both planned and self-seeded) with embankment stability will be assessed. It is expected that the embankments will be sufficiently stable to accommodate self-seeded vegetation, such as deep-rooted trees without a loss of structural integrity. However, if required, provision will be made for long-term ongoing maintenance of embankment vegetation. Post-rehabilitation slope failure is therefore considered unlikely and, if it occurs, to be major in nature. MRCO proposes commissioning a specialist assessment of the stability of the embankments that will be used to inform final closure planning. |

| No | Risk | Reasoning |
|---|---|---|
| **5** | Water quality – drainage containing contaminants from TSFs | The main risk of post-rehabilitation water contamination from the TSF is considered to be the potential for AMD to occur. As discussed below, the risk of impacts from AMD are considered to be low.<br>The results of the geochemical testing showed that the maximum contamination concentration limits defined by EPA (EPA 2020) were only exceeded for the arsenic content from the Brunswick tailings (2/3 samples), which were believed to have been deposited in the mid 2000's.<br>The more recent samples collected from Bombay (deposited around 2010-2011) had arsenic concentrations lower than the maximum concentration limits. In consideration that there has been very little change to the ore body and processing methods since 2011, the Bombay tailings are considered to be more representative of the future tailings that will be deposited into Brunswick West TSF.<br>Ongoing testing is required to confirm the chemical characteristics and non-acid forming nature of tailings materials and a final specialist assessment of AMD is proposed prior to final rehabilitation.<br>Notwithstanding the low AMD risk, the TSF covers will be designed such that they can accommodate vegetation (both planned and self-seeded) over the long-term without loss of cover integrity. It may be that self-seeded, deep-rooted vegetation adversely affects the functional integrity of the cover. If so, provision will be made for long-term ongoing maintenance of cover vegetation. |
| **6** | Water quality – drainage containing contaminants from underground workings | Site water monitoring in general does not indicate any major presence of AMD (such as might be evidenced by low pH, elevated metals concentrations and high salinity) so this risk is considered low.<br>Water quality potentially could drop temporarily if dewatering ceases (as would occur under the current rehabilitation scenario due to the backfilling of the Augusta portal and sealing of the Brunswick portal) and the rebounding groundwater comes into contact with oxidised sulfides in the exposed wallrock, resulting in acid and metalliferous (AMD) drainage inputs into the water, lowering pH and raising the level of metals such as antinomy and arsenic. However, AMD risk is considered low and there are no nearby beneficial users of groundwater. |
| **7** | Re vegetation failure – vegetation not sustainable | Based on the natural revegetation of the area, and in the absence of contamination such as may prevent/impede plant growth, it is considered highly unlikely that the area will not revegetate.<br>Revegetation of native vegetation using seed from local species, planning the seasons for earthworks, seed collection, propagation and planting and adjusting methods based on the outcomes of revegetation trials will enhance the likelihood of successful revegetation of Box Ironbark Woodland. |

| No | Risk | Reasoning |
|---|---|---|
| | | The re-introduction of pasture species can follow the local practices of the region as agreed with the land owners. |
| **8** | Introduction of weeds | The open woodland vegetation in the area already contains many common weeds and the adjacent farmland provides a source of weeds. The main post-rehabilitation weed risk is that new weeds will be introduced due to site activities and spread to the surrounding vegetation.<br>It is assumed that weeds will be managed during the rehabilitation phase through the adoption of standard equipment hygiene controls, and managed during the post-rehabilitation monitoring and maintenance phase by the application of weed controls such as targeted spraying. Such measures are expected to minimise the risk of introducing new weeds to the surrounding environment. |
| **9** | Erosion – causing damage to TSF embankments | All TSFs were designed and constructed to contemporary standards. The preparation of TSF Closure Plans, including measures to ensure long-term geotechnical stability of TSF embankment and tailings mass will provide modern-day recommendations at the time of the facilities closure.<br>Erosion could potentially cause damage to the TSF embankments, leading to slumping and loss of containment. This risk is increased by the presence of dispersive soils in the area. Ponding near the crests of the TSFs could lead to tunnel erosion through the embankments and concentrated flow down the embankments as a result of inadequate shaping and drainage controls could cause gully erosion. Effective capping, reshaping and revegetation, along with appropriate drainage controls and post-closure monitoring and maintenance, are expected to effectively minimise this risk.<br>This risk can also be effectively mitigated by final design and shaping, including the placement, if required, of rock armouring. It is noted that the upstream drainage has minimal catchment.<br>Due to the consolidated nature of the tailings, it is unlikely that any substantial loss of containment would result even if erosion and slumping was to expose the tailings. |
| **10** | Water quality – drainage containing sediment from erosion of rehabilitated surfaces | Revegetation should be promoted as soon as practicable to limit erosion and sedimentation. Rehabilitation trials will inform the methods and procedures providing the best outcomes for revegetation.<br>This risk can also be effectively mitigated by final landscape design and shaping to reinstate the natural drainage pattern over disturbed areas, including the installation of rock armouring, if required. |

# 11 Financial costing and provision for closure

## 11.1 Closure costing methodology

Closure and rehabilitation costs have been calculated for the operations, in accordance with ERR requirements, including the document Establishment and Management of Rehabilitation Bonds for the Mining and Extractive Industries (ERR 2021a). These costs will be reviewed regularly as factors influencing rehabilitation liability change. Such factors include increases or decreases to the un-rehabilitated disturbance area (e.g. due to project expansion or progressive rehabilitation), and changes to rehabilitation concepts or activities.

Key cost items include:

- decommissioning
- sealing underground access
- reshaping slopes and embankments
- covering tailings material
- revegetation re-establishment
- monitoring and maintenance.



## 11.2 Closure cost assumptions

The closure cost provisioning for the operations was undertaken based on the following assumptions:

- the operations will be rehabilitated as approved in the WPVs for MIN4644
- there will be opportunities for future progressive rehabilitation during the operational phase with the decommissioning of the current TSFs
- the rehabilitation is based on the existing facilities and current disturbance areas
- the final land use objectives and completion criteria will be fully met by the approved rehabilitation methodologies
- all built infrastructure will be decommissioned.

## 11.3 Current financial assurance estimate

An updated rehabilitation bond estimate was prepared using applicable rates within the current version of the ERR bond calculator (ERR 2021a), released on 16 March 2021.

In 2022, the estimated rehabilitation liability was assessed for MIN4644 to be $9.7M (including $3.0M in management & contingencies).

The Brunswick West TSF domain will add $1.4M (not including Third Party Project Management & Contingencies) to the total.

In addition, MRCO maintains internal provisioning to ensure that adequate funds are available to meet closure commitments using the company's existing workforce and resources.

# 12 Plan review

The Rehabilitation Plan will undergo routine internal revision, as required, in response to:

- changes in legislation or WPV approval requirements
- changes in site activities, operations, facilities or footprint (e.g. see Section 2.1.4)
- the findings of rehabilitation studies and trials
- the results of environmental monitoring
- completion of progressive rehabilitation activities
- the outcomes of stakeholder consultation
- improvements in the knowledge of rehabilitation practice or technologies
- opportunities for improvements to the plan being identified.

Notwithstanding the above, the Rehabilitation Plan will be fully updated every three years or as required following consultation with ERR.

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ACCENT ENVIRONMENTAL

# Appendix A: Environmental policy

ADVERTISED PLAN

MANDALAY RESOURCES

# MANDALAY RESOURCES CORPORATION

(the "**Company**")

## ENVIRONMENTAL POLICY

## PURPOSE

One of our six core Values is:

***"RESPONSIBILITY-- We are responsible for our actions and their consequences, operating with social and environmental responsibility and promoting sustainable development."***

Following from this is one of our Key Success Factors:

**"*Our environmental impact is minimized and causes no permanent harm."***

This Policy is designed to guide all employees in pursuing their shared responsibility with the Company to produce this environmental outcome in ways that are consistent with local laws, permitting and regulation and that are commercially reasonable.

## PRINCIPLES

Mandalay Resources is committed to maintaining the highest level of integrity in its corporate responsibilities toward resource development and environmental stewardship. Mandalay is committed to environmental protection throughout the exploration, development, operation and eventual closure and rehabilitation of each of its projects by applying sound judgment, by meeting or exceeding legislative requirements and by minimizing adverse impacts its activities may have on the environment.

## GUIDELINES

To achieve these goals, Mandalay and each of its subsidiaries will:

- Be responsible for its actions and their consequences on the environment.
- Instill the ethics of environmental responsibility through education and communication with all employees, contractors, consultants and suppliers.
- Instill in all employees the recognition that environmental management is an important priority of the Company and integrate environmental considerations into all mine exploration, development, operation and closure planning.
- Implement and maintain ethical business practices and an effective risk management system, including an up-to-date timeline of all permits, expiration

dates, and planned permit renewal activities.

- As part of its design and operating philosophy, to the extent practicable and commercially reasonable, minimize potential adverse impacts on the natural environment, for example, including, but not limited to:

    - minimizing land disturbances in the design, construction and operation of our projects with the goal, to the extent practicable and commercially reasonable, of remediating disturbed areas in such a way that they can revert to their original state or to some other beneficial use.

    - maximizing energy efficiency of our mining and process equipment to reduce absolute energy needs per unit of output;

    - reviewing options and alternatives to utilize renewable energy and low-carbon energy sources;

    - minimizing water use and recycling water as much as possible;

    - minimizing discharges (reportable or otherwise) and conducting prompt remediation and required regulatory reporting should they occur;

    - reducing use of consumables and reusing or recycling them where practical;

    - reducing degradation of equipment through wear and damage that causes needs for premature capital equipment replacement.

- Evaluate environmental performance by conducting operational and environmental monitoring programs required by law, as well as independent third party audits and other monitoring activities not necessarily required by law but that may be useful in measuring our performance and identify opportunities for improvement.

- Keep up-to-date with changes and potential changes to environmental regulations and evolving government guidelines.

- Keep up to date on technological developments that could be used to mitigate or avoid impacts.

- Encourage conservation and pollution prevention measures by requiring contractors and suppliers to provide operational guidelines that outline their own procedures and responsibilities to reduce, recycle and reuse materials when working on Mandalay-related activities.

- Assess environmental conditions regularly at all stages of mine development and closure in order to identify issues or areas in need of attention and to establish strategies for their management.

- Be consistent with the current state of practice in the industry for environmental protection and management.

- Implement effective and transparent engagement and communication with our stakeholders when significant environmental issues arise. Respond to concerns in a timely and productive manner, identifying concerns, and where Mandalay activities are the cause, taking corrective measures to alleviate the concerns and prevent their recurrence.

- Mandalay will ensure that it maintains feasible reclamation plans at each site as well as the adequate required financial reserves to reclaim each site after completion of commercial activities.

## ENVIRONMENTAL REPORTING AND MONITORING

Mandalay views adherence to these environmental guidelines as a continual improvement process. Mandalay managers will report to executive management on a timely basis, and at minimum on a monthly basis all government-reportable environmental incidents, and instances of non-compliance with environmental permits according to their local jurisdictions, together with likely consequences and committed remedial actions.

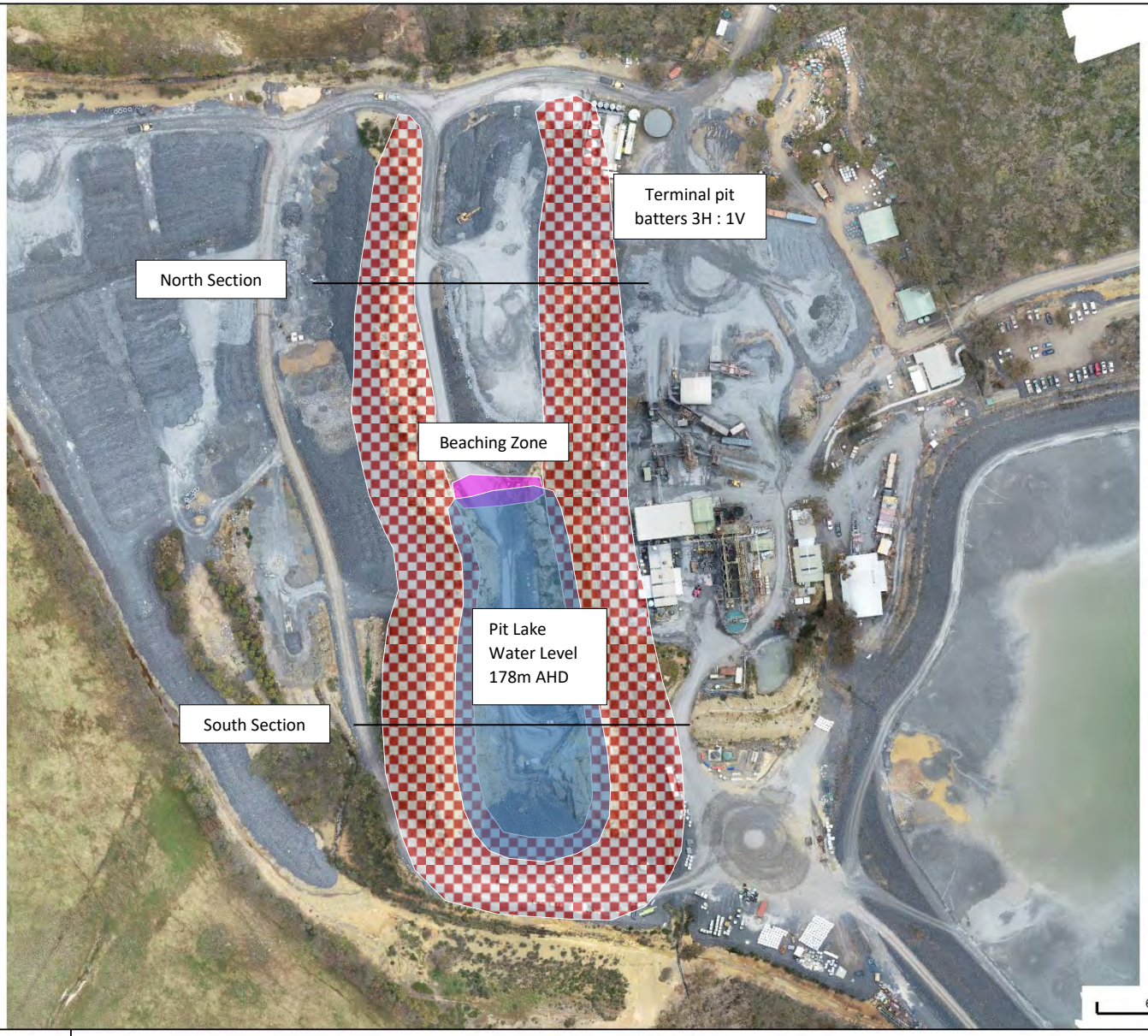
## NON-COMPLIANCE

Failure to comply with this policy may lead to disciplinary action, up to and including termination of employment.

ACCENT ENVIRONMENTAL

# Appendix B: Modified landforms

# ADVERTISED PLAN




LEGEND

Water

Extent of 3:1 batter

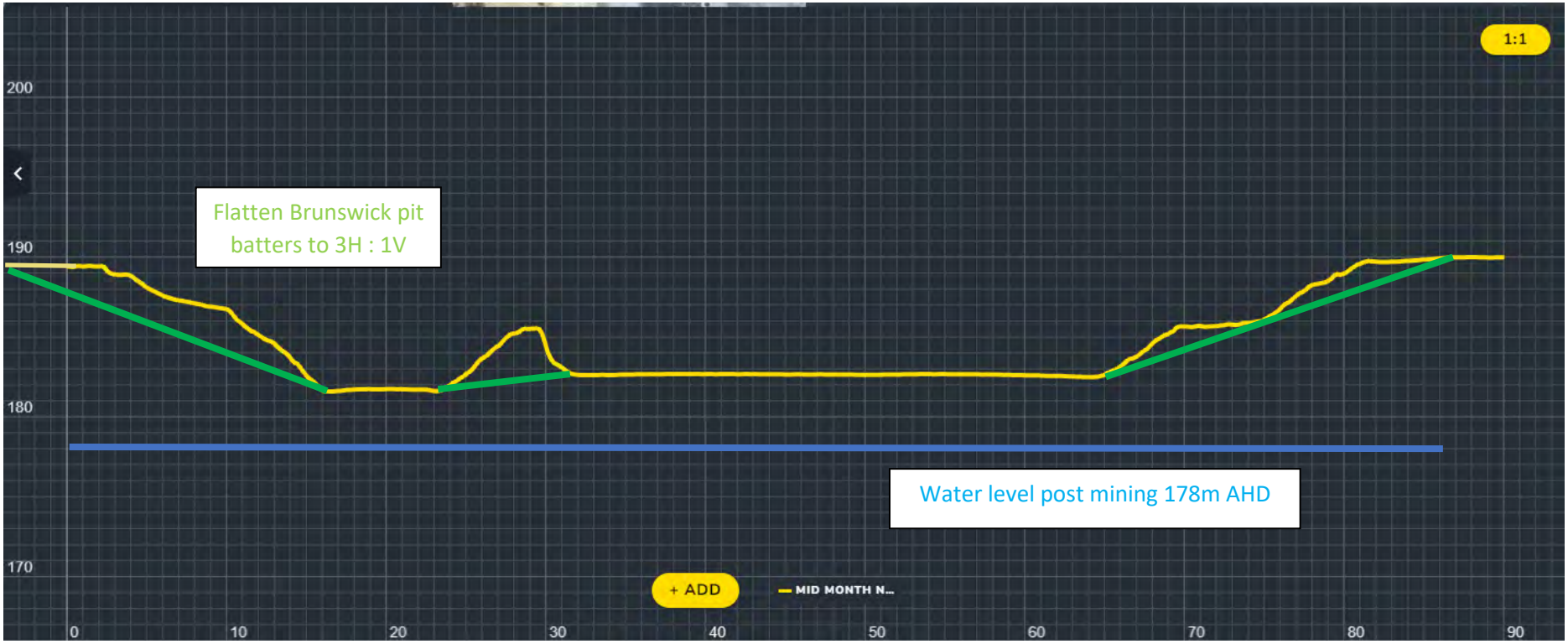
Beaching Zone

MANDALAY RESOURCES

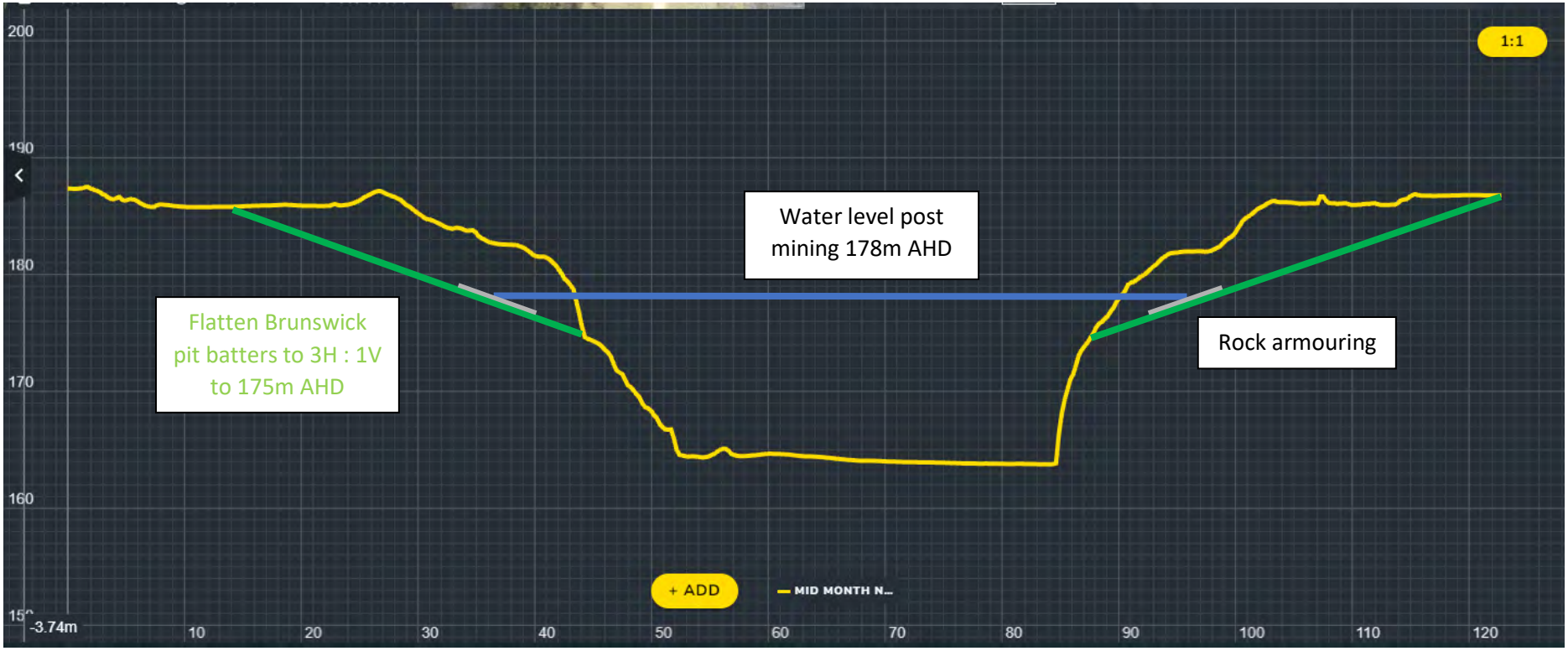
**Site:** Mandalay AHD
**Survey:** Mid Month Nov 231122
**File Created:** Jun 30, 2023

propeller

**Brunswick Pit Rehabilitation - Section North**

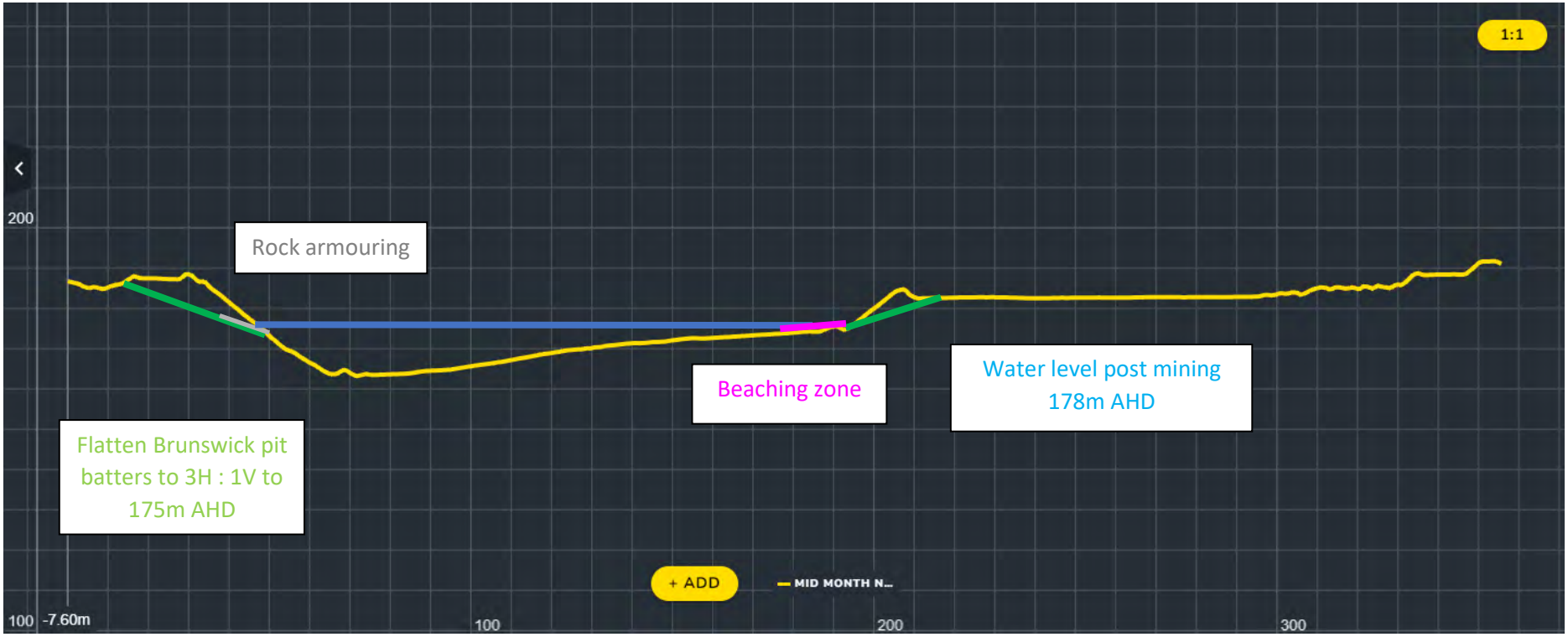


**Brunswick Pit Rehabilitation - Section South**




ADVERTISED PLAN

**Brunswick Pit Rehabilitation - Long Section**




ADVERTISED
PLAN

LEGEND:

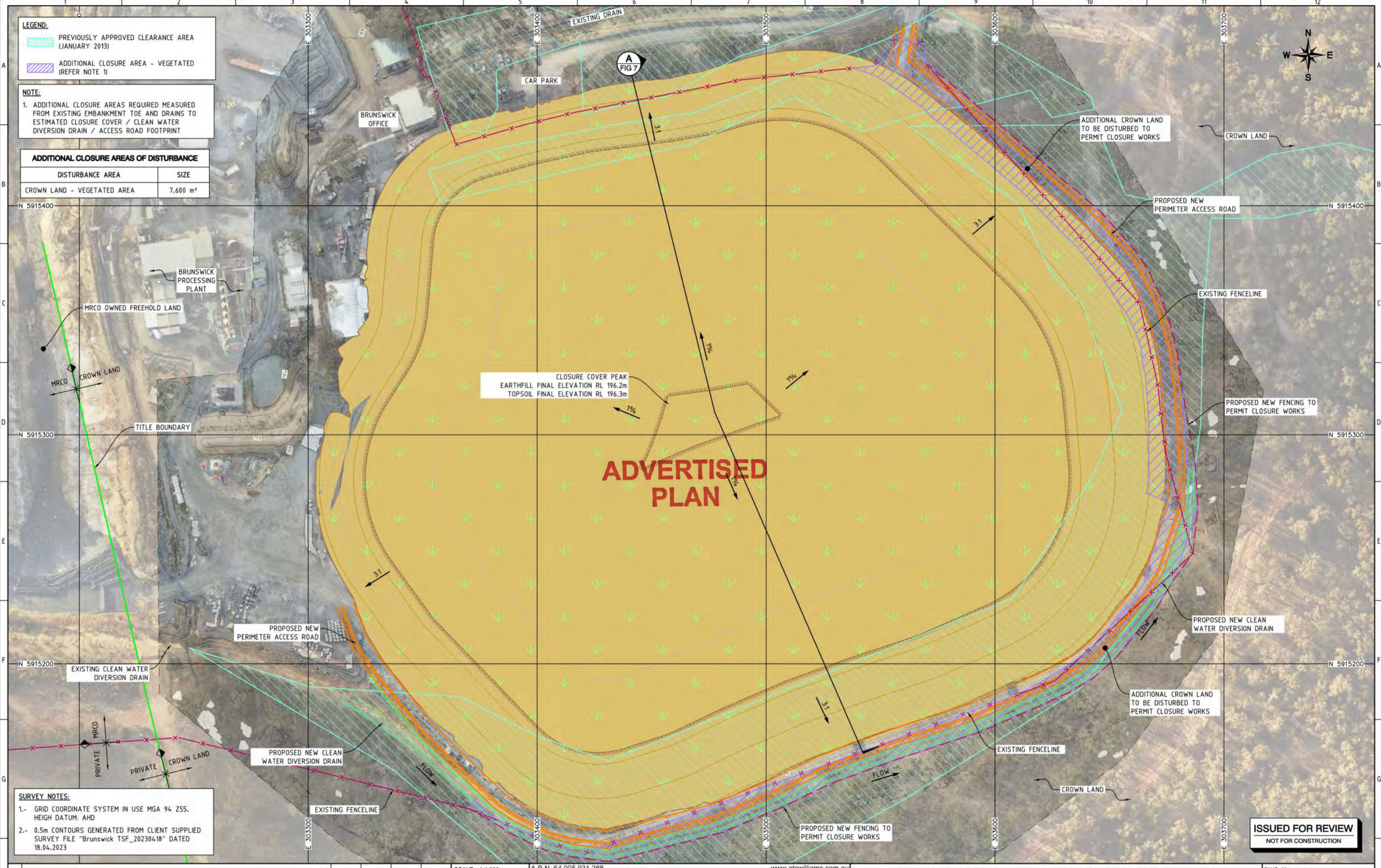
- PREVIOUSLY APPROVED CLEARANCE AREA (JANUARY 2013)
- ADDITIONAL CLOSURE AREA - VEGETATED (REFER NOTE 1)

NOTE:

1. ADDITIONAL CLOSURE AREAS REQUIRED MEASURED FROM EXISTING EMBANKMENT TOE AND DRAINS TO ESTIMATED CLOSURE COVER / CLEAN WATER DIVERSION DRAIN / ACCESS ROAD FOOTPRINT

**ADDITIONAL CLOSURE AREAS OF DISTURBANCE**

| DISTURBANCE AREA | SIZE |
|---|---|
| CROWN LAND - VEGETATED AREA | 7.600 m² |




SURVEY NOTES:

1.- GRID COORDINATE SYSTEM IN USE MGA 94 Z55. HEIGH DATUM: AHD

2.- 0.5m CONTOURS GENERATED FROM CLIENT SUPPLIED SURVEY FILE "Brunswick TSF_20230418" DATED 18.04.2023

ISSUED FOR REVIEW
NOT FOR CONSTRUCTION

| No. | DESCRIPTION | DATE | DRAWN | CHECK'D | APPR'D |
|---|---|---|---|---|---|

| | |
|---|---|
| SCALE: | 1:1,500 |
| JOB No. | 109014.15 |
| DATE | 23.06.23 |
| DESIGN | AC |
| DRAWN | AC |
| CHECKED | - |
| APPROVED | - |

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**MANDALAY RESOURCES COSTERFIELD OPERATIONS**
**COSTERFIELD GOLD MINE**

**BRUNSWICK TAILINGS STORAGE FACILITY**
**CLOSURE CONCEPT**
**GENERAL LAYOUT**

DWG. No.
**FIGURE 7**

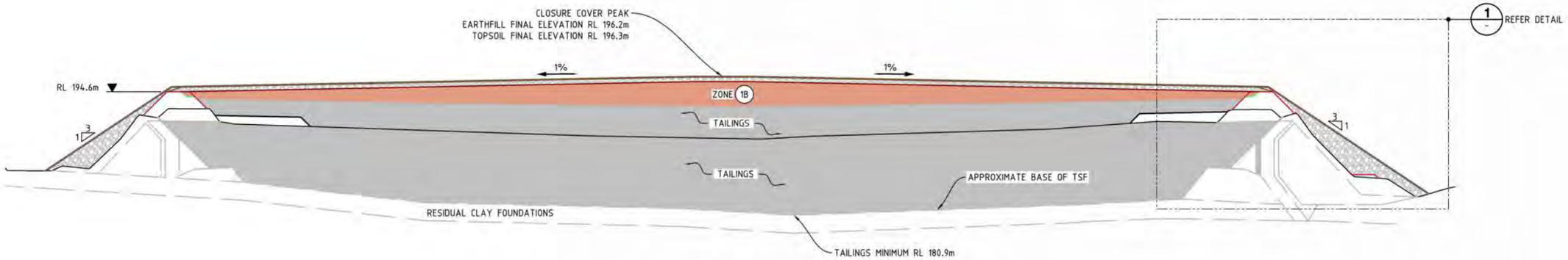
| SHEET SIZE | A3 | Rev. | 0 |
|---|---|---|---|



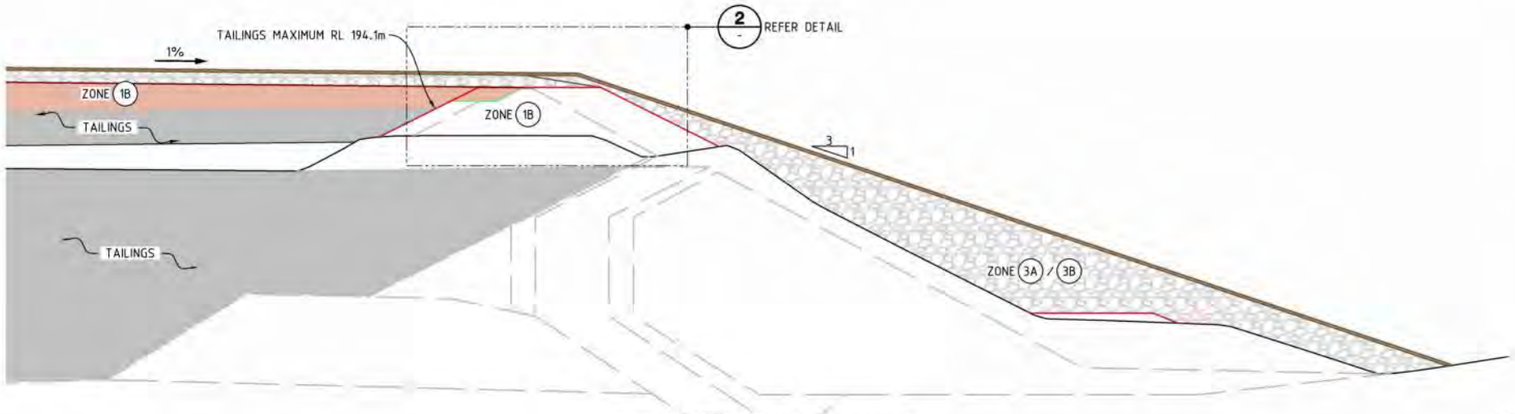
SHEET 1 OF 1

K:\Projects\109\109014 Costerfield Mine, Costerfield\15 New TSF Investigation and Design\CADD\CAD\Closure Plans\Figure 7@B - Brunswick Closure Layout & Sections.dwg Monday 26, June 2023 10:03:09

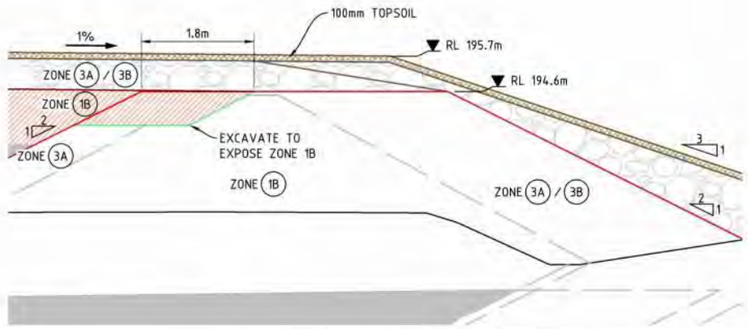
ADVERTISED PLAN




SECTION A CLOSURE CONCEPT
SCALE 1:1,000 (H) 1:500 (V)
FIG 8




DETAIL 1 CLOSURE CONCEPT
SCALE 1:250




DETAIL 2 CLOSURE CONCEPT
SCALE 1:100

ISSUED FOR REPORTING
NOT FOR CONSTRUCTION

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| SCALE: | 1:1,500 |
| JOB No. | 109014.15 |
| DATE | 13.06.23 |
| DESIGN | AC |
| DRAWN | AC |
| CHECKED | - |
| APPROVED | - |

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MANDALAY RESOURCES COSTERFIELD OPERATIONS
COSTERFIELD GOLD MINE

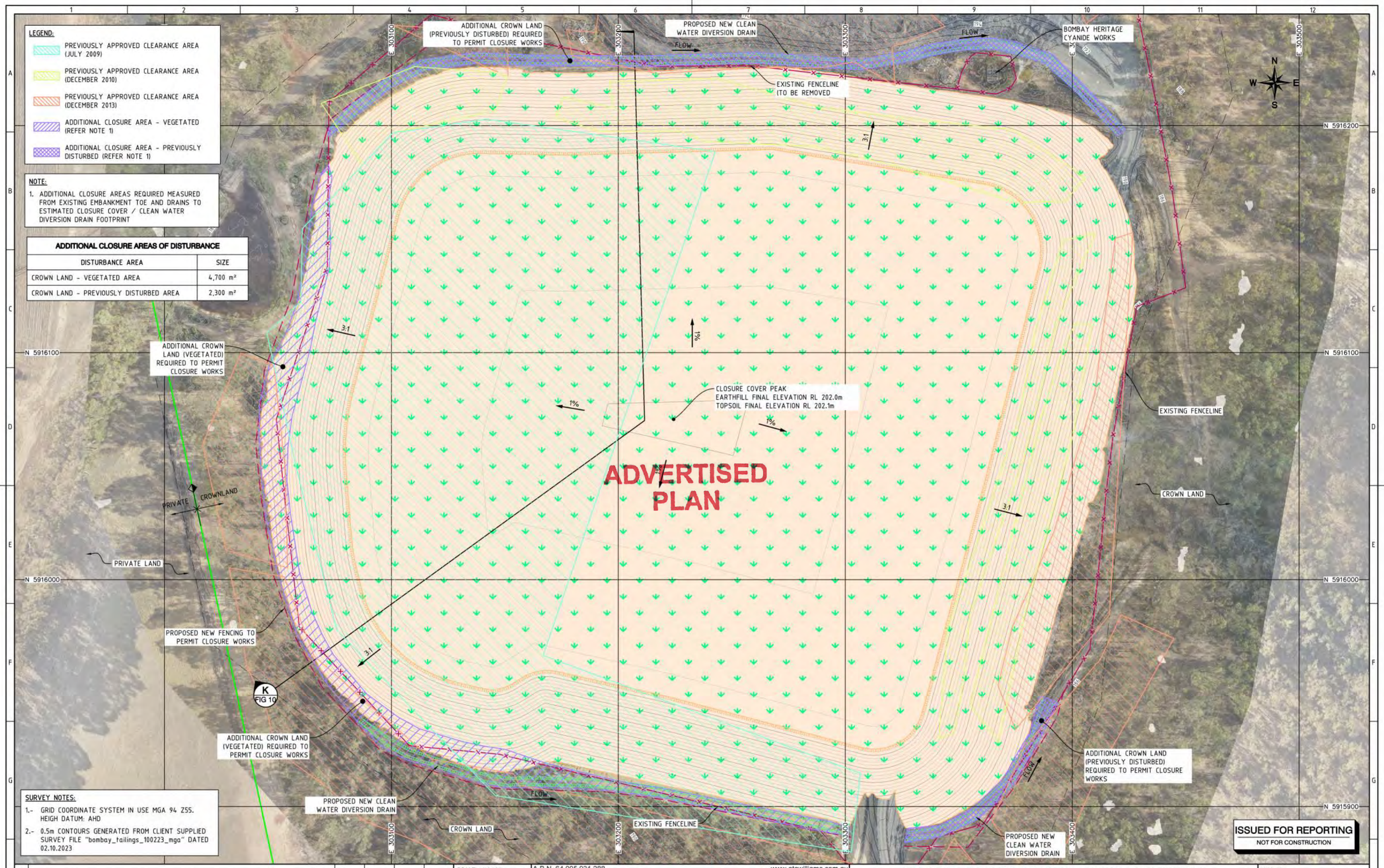
BRUNSWICK TAILINGS STORAGE FACILITY
CLOSURE CONCEPT
SECTIONS & DETAILS

DWG. No.
FIGURE 8

| SHEET SIZE | A3 | Rev. | 0 |
|---|---|---|---|



SHEET 1 OF 1




**ADDITIONAL CLOSURE AREAS OF DISTURBANCE**

| DISTURBANCE AREA | SIZE |
|---|---|
| CROWN LAND - VEGETATED AREA | 4,700 m² |
| CROWN LAND - PREVIOUSLY DISTURBED AREA | 2,300 m² |

SURVEY NOTES:

1.- GRID COORDINATE SYSTEM IN USE MGA 94 Z55. HEIGH DATUM: AHD

2.- 0.5m CONTOURS GENERATED FROM CLIENT SUPPLIED SURVEY FILE "bombay_tailings_100223_mga" DATED 02.10.2023

| No. | DESCRIPTION | DATE | DRAWN | CHECK'D | APPR'D |
|---|---|---|---|---|---|

| | |
|---|---|
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| JOB No. | 109014.15 |
| DATE | 23.06.23 |
| DESIGN | AC |
| DRAWN | AC |
| CHECKED | - |
| APPROVED | - |

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# MANDALAY RESOURCES COSTERFIELD OPERATIONS
# COSTERFIELD GOLD MINE

## BOMBAY TAILINGS STORAGE FACILITY
## CLOSURE CONCEPT
## GENERAL LAYOUT

DWG. No.

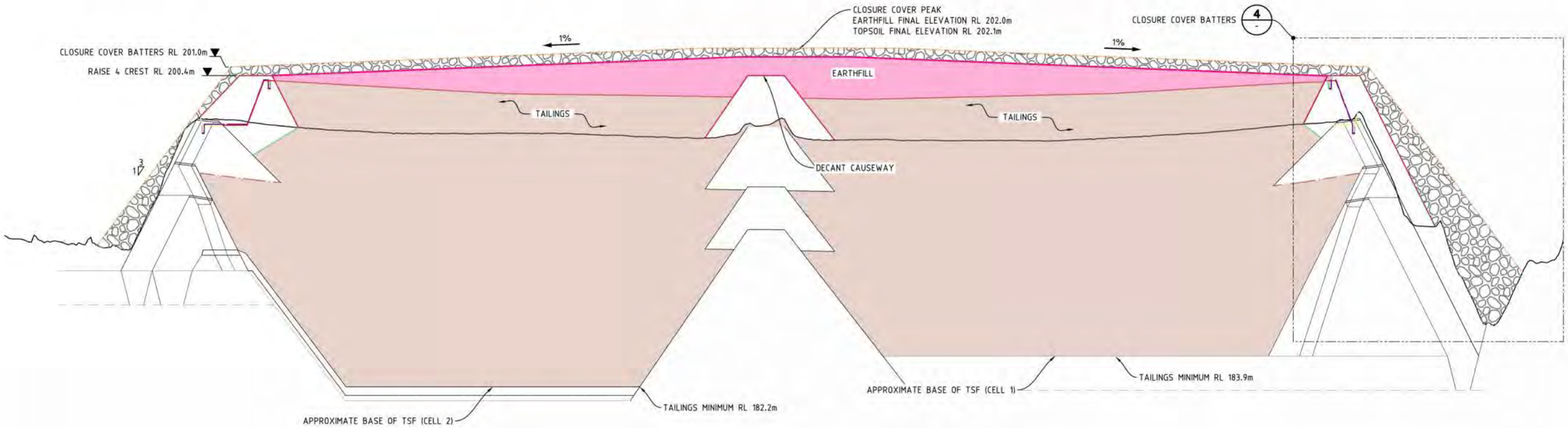
**FIGURE 9**

| SHEET SIZE | A3 | Rev. | 0 |
|---|---|---|---|

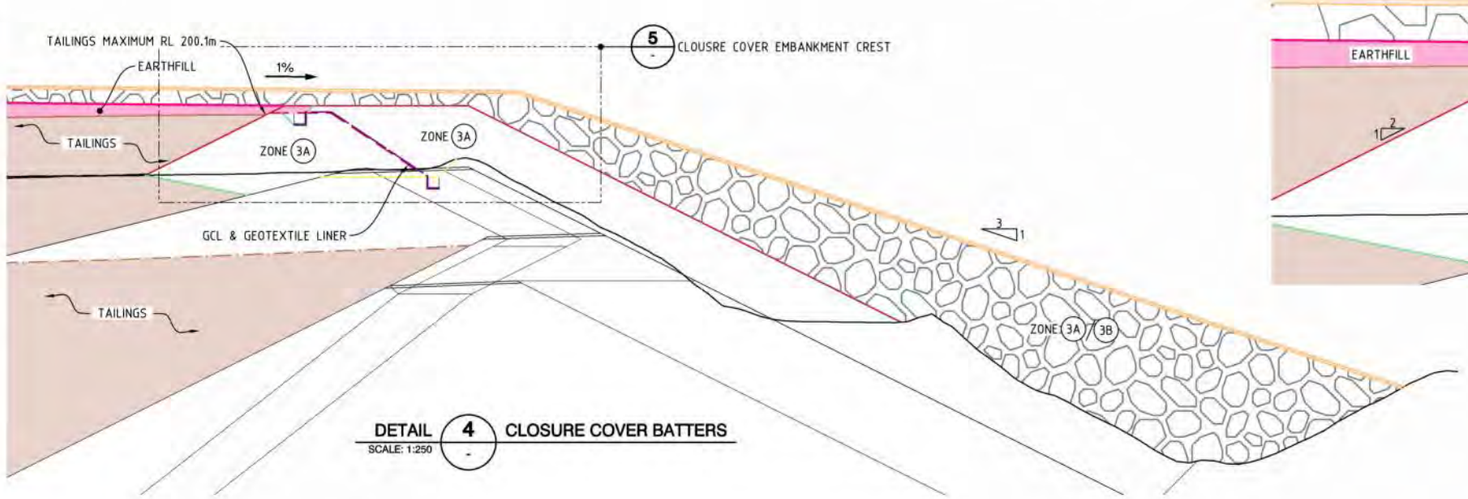


SHEET 1 OF 1

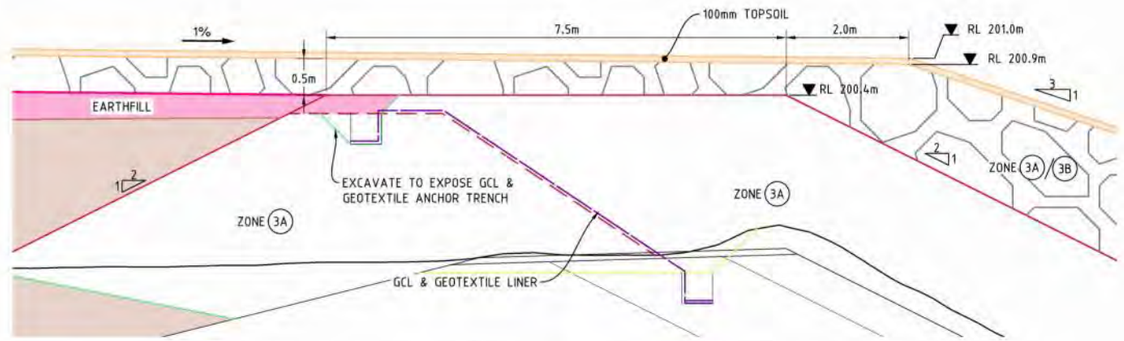
ADVERTISED PLAN




SECTION K FIG 9 CLOSURE CONCEPT
SCALE 1:1,000 (H) 1:250 (V)




DETAIL 4 CLOSURE COVER BATTERS
SCALE: 1:250




DETAIL 5 CLOSURE COVER EMBANKMENT CREST
SCALE: 1:100

ISSUED FOR REPORTING
NOT FOR CONSTRUCTION

| No. | DESCRIPTION | DATE | DRAWN | CHECK'D | APPR'D |
|---|---|---|---|---|---|

| | |
|---|---|
| SCALE: | AS SHOWN |
| JOB No. | 109014.12 |
| DATE | 21.11.21 |
| DESIGN | AC |
| DRAWN | AC |
| CHECKED | - |
| APPROVED | - |

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MANDALAY RESOURCES COSTERFIELD OPERATIONS
COSTERFIELD GOLD MINE

BOMBAY TAILINGS STORAGE FACILITY
EMBANKMENT RAISE 4 DETAILED DESIGN
CLOSURE CONCEPT SECTIONS

DWG. No. FIGURE 10

SHEET SIZE A3 Rev. A



SHEET 1 OF 1

ACCENT ENVIRONMENTAL

# Appendix C: Domain Action Plans

## Domain 1: Augusta Infrastructure Areas

| Domain 1: Augusta Infrastructure Areas | | | |
|---|---|---|---|
| **Description** | Augusta Offices & buildings (incl. training room and crib rooms) | | |
| **Status** | Active | **Owner** | Tobin family |
| **Current area of disturbance** | 5.4 ha | **Final area to be disturbed** | 5.4 ha |
| **Closure date** | 2028 | **Infrastructure to be retained** | Some roads and creek crossing TBC |
| **Final Landuse** | Pasture | **Area for final landuse** | 5.4 ha |
| **Completion criteria** | Safe stable landform<br>Non-polluting<br>Self-sustaining vegetation<br>Support post-closure land use | | |
| **Closure activities** | | | |
| **Facility** | **Activities** | | |
| **Augusta Offices & buildings (including training room and crib rooms)** | Offices and other buildings are portable and will be sold or returned to hire company.<br>Non-portable buildings (such as store, compressor shed, workshop etc.) will be with sold or demolished and removed as waste, and/or recycled.<br>All services and concrete footings will be removed.<br>The concrete will be crushed and either sold for recycling or placed as backfill in the Augusta boxcut, or Brunswick West/Bombay TSFs. | | |
| **Roads** | All roads (except the bitumen road onto the Augusta Site) are assumed to be ripped and graded. However, the landowner may choose to retain these and the waterway crossing.<br>The material (if to be removed) will be stripped back and placed in the boxcut or Brunswick West/Bombay TSFs. | | |
| **Mine Dam and Silt Ponds** | Water to be evaporated and sludge/silt will be removed and placed into the Bombay or Brunswick West TSF.<br>The dam and ponds will be backfilled to natural surface level. | | |
| **Power lines** | Power lines and poles to be disconnected and removed. | | |
| **General** | Ripping compacted areas<br>Graded to natural surface levels and then topsoiled<br>Seeded with grazing pasture grasses | | |
| **Remediation or waste disposal** | Stripping contaminated soil if required | | |
| **Material** | None | **Topsoil** | 5,400 $m^3$ |
| **Post-closure activities** | Rehabilitation maintenance and monitoring | | |

| | | | |
|---|---|---|---|
| | Erosion<br>Revegetation (pasture)<br>Weed management<br>Drain management<br>Surface water monitoring | | |
| **Monitoring start** | 2028 | **Finish** | 2032 |
| **Assumptions** | Site is free of contamination<br>Topsoil from Augusta Central Dam topsoil stockpile (3,400 $m^3$) and Central Dam stockpile (2,000 $m^3$) | | |

## Domain 1a: Augusta Evaporation Ponds/Storage Dams

| Domain 1a: Augusta Evaporation Ponds/Storage Dams | | | |
|---|---|---|---|
| **Description** | Evaporation Ponds/Storage Dams | | |
| **Status** | Active | **Owner** | Tobin family |
| **Current area of disturbance** | 10.0 ha | **Final area to be disturbed** | 10.0 ha |
| **Closure date** | 2028 | **Infrastructure to be retained** | Dam(s) TBC |
| **Final Landuse** | Pasture | **Area for final landuse** | 10.0 ha |
| **Completion criteria** | Safe stable landform<br>Non-polluting<br>Self-sustaining vegetation<br>Support post-closure land use | | |
| **Closure activities** | | | |
| **Facility** | **Activities** | | |
| **Augusta Evaporation Ponds/Storage Dams** | Landowner has the option to retain or remove water dams.<br>**Decommission dams**<br>All pipelines will be removed and re-used/recycled/disposed of.<br>Once the water is fully evaporated, the sediments will be contained within in the HDPE liner in the central dam and encapsulated on site.<br>The eastern and western dam HDPE liners will be removed and taken to a licenced landfill.<br>The material in the embankments will be pushed back into the excavation and compacted. | | |
| **Pipeline to Splitters Creek** | All pipelines will be removed and re-used/recycled/disposed of. | | |
| **General** | Ripping compacted areas<br>Graded to natural surface levels and then topsoiled<br>Seeded with grazing pasture grasses | | |
| **Remediation or waste disposal** | | | |
| **Material** | 123,500 $m^3$ | **Topsoil** | 10,000 $m^3$ |
| **Post-closure activities** | Rehabilitation maintenance and monitoring<br>Erosion<br>Revegetation (pasture)<br>Weed management<br>Drain management<br>Surface water monitoring | | |
| **Monitoring start** | 2028 | **Finish** | 2032 |
| **Assumptions** | Site is free of contamination<br>Backfill material - central (50,000 $m^3$), west (45,000 $m^3$), east (28,500 $m^3$)<br>Topsoil from Augusta Central Dam topsoil stockpile (10,000 $m^3$) | | |

## Domain 2: Augusta Shafts

| Domain 2: Augusta Shafts | | | |
|---|---|---|---|
| **Description** | Both Augusta fresh air intake shafts | | |
| **Status** | Active | **Owner** | Tobin family |
| **Current area of disturbance** | <0.1 ha | **Final area to be disturbed** | <0.1 ha |
| **Closure date** | 2028 | **Infrastructure to be retained** | None |
| **Final Landuse** | Pasture | **Area for final landuse** | <0.1 ha |
| **Completion criteria** | Safe stable landform | | |
| **Closure activities** | | | |
| **Facility** | **Activities** | | |
| **Underground Mine** | All underground equipment and mobile plant will be sold.<br>The underground mine will be backfilled with waste rock (down to 4 level). | | |
| **Noise Bund** | The Noise Bund will be removed and stripped back to natural surface.<br>Material from the noise bund comprises oxidized material and soil.<br>These materials will be identified and separated.<br>All fill material will be used to backfill the Augusta boxcut.<br>Topsoil will be used across the Augusta site<br>Install concrete slabs over shaft | | |
| **Remediation or waste disposal** | None | | |
| **Material** | None | **Topsoil** | None |
| **Post-closure activities** | None | | |
| **Monitoring start** | None | **Finish** | None |
| **Assumptions** | | | |

## Domain 2a: Cuffley Shaft

| Domain a2: Cuffley Shaft | | | |
|---|---|---|---|
| **Description** | Cuffley exhaust shaft | | |
| **Status** | Active | **Owner** | Mandalay |
| **Current area of disturbance** | 0.5 ha | **Final area to be disturbed** | 0.5 ha |
| **Closure date** | 2028 | **Infrastructure to be retained** | None |
| **Final Landuse** | Residential | **Area for final landuse** | 0.5 ha |
| **Completion criteria** | Safe stable landform | | |
| **Closure activities** | | | |
| **Facility** | **Activities** | | |
| **Cuffley shaft** | Non-portable buildings (such as sub shed) will be with sold or demolished and removed as waste, and/or recycled.<br>All services and concrete footings will be removed.<br>The concrete will be crushed and either sold for recycling or placed as appropriate in the Augusta boxcut, or Brunswick West/Bombay TSF.<br>Install concrete slab over shaft | | |
| **Remediation or waste disposal** | None | | |
| **Material** | None | **Topsoil** | 500 $m^3$ |
| **Post-closure activities** | None | | |
| **Monitoring start** | None | **Finish** | None |
| **Assumptions** | Topsoil from Splitters Creek topsoil stockpile (500 $m^3$) | | |

## Domain 3: Augusta Waste Rock Stockpile

| Domain 3: Augusta Waste Rock Stockpile | | | |
|---|---|---|---|
| **Description** | Waste rock storage | | |
| **Status** | Active | **Owner** | Tobin family |
| **Current area of disturbance** | 3.8 ha | **Final area to be disturbed** | 3.8 ha |
| **Closure date** | 2028 | **Infrastructure to be retained** | None |
| **Final Landuse** | Pasture | **Area for final landuse** | 3.8 ha |
| **Completion criteria** | Safe stable landform<br>Non-polluting<br>Self-sustaining vegetation<br>Support post-closure land use | | |
| **Closure activities** | | | |
| **Facility** | **Activities** | | |
| **Waste Rock Landform** | Waste rock material will be removed and used as capping/backfill and stripped back to natural surface. | | |
| **General** | Ripping compacted areas<br>Graded to natural surface levels and then topsoiled<br>Seeded with grazing pasture grasses | | |
| **Remediation or waste disposal** | None | | |
| **Material** | None | **Topsoil** | 3,800 $m^3$ |
| **Post-closure activities** | Rehabilitation maintenance and monitoring<br>Erosion<br>Revegetation (to restore pasture)<br>Weed management<br>Drain management<br>Surface water monitoring | | |
| **Monitoring start** | 2028 | **Finish** | 2032 |
| **Assumptions** | Site not available for progressive rehabilitation.<br>Site is free of contamination<br>Topsoil from Augusta Noise bund (2,700 $m^3$) and Splitters Creek topsoil stockpile (1,100 $m^3$) | | |

## Domain 4: Augusta Boxcut

| Domain 4: Augusta Boxcut | | | |
|---|---|---|---|
| **Description** | Boxcut (incl. workshops and refuelling bay) | | |
| **Status** | Active | **Owner** | Tobin family |
| **Current area of disturbance** | 2.0 ha | **Final area to be disturbed** | 2.0 ha |
| **Closure date** | 2028 | **Infrastructure to be retained** | None |
| **Final Landuse** | Pasture | **Area for final landuse** | 2.0 ha |
| **Completion criteria** | Safe stable landform<br>Non-polluting<br>Self-sustaining vegetation<br>Support post-closure land use | | |
| **Closure activities** | | | |
| **Facility** | **Activities** | | |
| **Boxcut** | Boxcut will be backfilled to natural surface level.<br>All concrete footings within the boxcut could remain in-situ or be placed in the Bombay/Brunswick West TSF. | | |
| **General** | Ripping compacted areas<br>Graded to natural surface levels and then topsoiled<br>Seeded with grazing pasture grasses | | |
| **Remediation or waste disposal** | Residual waste oils or fuel will be removed offsite by a licensed contractor.<br>Any impacted soils from the refuelling area or truck parking bays will be transported to a licensed facility or placed into the Bombay/Brunswick West TSF (depending on quality against EPA IWRG guidelines). | | |
| **Material** | 126,500 $m^3$ | **Topsoil** | 2,000 $m^3$ |
| **Post-closure activities** | Rehabilitation maintenance and monitoring<br>Erosion<br>Revegetation (pasture)<br>Weed management<br>Drain management<br>Surface water monitoring | | |
| **Monitoring start** | 2028 | **Finish** | 2032 |
| **Assumptions** | Contamination tests indicate a low level of contamination<br>Backfill Box Cut - Noise Bund (87,000 $m^3$), Waste rock (25,500 $m^3$) and Box Cut u/g (14,000 $m^3$)<br>Topsoil from Splitters Creek topsoil stockpile (2,000 $m^3$) | | |

## Domain 5: Brunswick Infrastructure Areas

| Domain 5: Brunswick Infrastructure Areas | | | |
|---|---|---|---|
| **Description** | Processing plant and infrastructure incl. cements silo and RO Plant | | |
| **Status** | Active | **Owner** | Crown land |
| **Current area of disturbance** | 3.3 ha | **Final area to be disturbed** | 3.3 ha |
| **Closure date** | 2028 | **Infrastructure to be retained** | None |
| **Final Landuse** | Nature reserve | **Area for final landuse** | 3.3 ha |
| **Completion criteria** | Safe stable landform<br>Non-polluting<br>Self-sustaining vegetation<br>Support post-closure land use | | |

| Closure activities | |
|---|---|
| **Facility** | **Activities** |
| **Processing Plant** | All reagents in processing plant will be returned to the supplier, removed and placed in the Bombay/Brunswick West TSF or taken to a licenced disposal facility.<br>All flotation tanks and associated buildings with either sold or recycled as scrap metal.<br>The top 0.3 m in the area (or as necessary) around the process plant will be stripped and placed in the Bombay/Brunswick West TSF.<br>Concrete slabs will be crushed and either sold for recycling or placed in the Brunswick TSF. |
| **Mill Workshop and Administration Buildings** | The Administration Buildings and crib rooms around the mill are portable and will be removed and sold or returned to hire company.<br>The Workshop Building will also be sold.<br>All concrete footings will be removed, crushed and either sold for recycling or placed in the Brunswick West/Bombay TSF. |
| **ROM Pad and Mobile Crushing Plant** | All ore will be processed.<br>The mobile crushing plant will be sold.<br>The top 0.2 m of the ROM will be scraped off and processed. |
| **Laydown area** | The shipping containers will be removed and sold. |
| **Mill Stormwater Dam** | The Mill Pond will be dried out and any sediment will be removed and placed in the Brunswick West TSF. |
| **Groundwater Bores** | Groundwater monitoring bores will be decommissioned and grouted by licenced contractor, after appropriate monitoring period determined by regulators. |
| **Roads around site** | All roads (except the bitumen road onto the Augusta Site) are assumed to be ripped and graded. However, the landowner may choose to retain these. |

| | | | |
|---|---|---|---|
| | The material (if to be removed) will be stripped back and placed in the boxcut or Brunswick TSF.<br>All road base will be removed and placed in either the Bombay or Brunswick West TSF. | | |
| **Surface drainage** | Structural water management works to be completed to manage surface water flow including; banks, drains, rock lined waterways, sediment dams. | | |
| **General** | Ripping compacted areas<br>Graded to natural surface levels and then topsoiled<br>Fertiliser application<br>Revegetated with Box Ironbark species | | |
| **Remediation or waste disposal** | All reagents in processing plant will be returned to the supplier, removed and placed in the Bombay TSF or taken to a licenced disposal facility.<br>The top 0.3 m in the processing plant area (or as necessary) around the process plant will be stripped and placed in the Bombay TSF.<br>The top 0.2 m of the ROM will be scraped off and processed. | | |
| **Material** | None | **Topsoil** | 2,500 $m^3$ |
| **Post-closure activities** | Rehabilitation maintenance and monitoring<br>Erosion<br>Revegetation (pasture)<br>Weed management<br>Drain management<br>Surface water monitoring | | |
| **Monitoring start** | 2028 | **Finish** | 2032 |
| **Assumptions** | Contamination tests indicate a low level of contamination<br>Topsoil from Splitters Creek topsoil stockpile (2,500 $m^3$) | | |

## Domain 5a: Brunswick Core yard

| Domain 5a: Brunswick Core yard | | | |
|---|---|---|---|
| **Description** | Core yard | | |
| **Status** | Active | **Owner** | Mandalay |
| **Current area of disturbance** | 2.75 ha | **Final area to be disturbed** | 2.75 ha |
| **Closure date** | 2028 | **Infrastructure to be retained** | None |
| **Final Landuse** | Pasture | **Area for final landuse** | 2.75 ha |
| **Completion criteria** | Safe stable landform<br>Non-polluting<br>Self-sustaining vegetation<br>Support post-closure land use | | |
| **Closure activities** | | | |
| **Facility** | **Activities** | | |
| **Exploration Core Shed and Core Storage Yard** | The Exploration Core Sheds will be sold along with the infrastructure inside.<br>The concrete foundations will be removed, crushed and placed in the Bombay or Brunswick West TSF.<br>ERR will be contacted to determine whether any core is to be kept by the State Government.<br>Unwanted core will be disposed of in Brunswick West TSF.<br>Core trays will go to licenced landfill.<br>Land will be ripped (if required) and seeded with grazing pasture grasses. | | |
| **General** | Ripping compacted areas<br>Fertiliser application<br>Seeded with grazing pasture grasses | | |
| **Remediation or waste disposal** | None | | |
| **Material** | None | **Topsoil** | None |
| **Post-closure activities** | Rehabilitation maintenance and monitoring<br>Erosion<br>Revegetation (pasture)<br>Weed management<br>Drain management<br>Surface water monitoring | | |
| **Monitoring start** | 2028 | **Finish** | 2032 |
| **Assumptions** | Site is free of contamination | | |

## Domain 6: Brunswick Shaft

| Domain 6: Brunswick Shafts | | | |
|---|---|---|---|
| **Description** | Brunswick fresh air intake shaft<br>Historic shafts (Bombay) | | |
| **Status** | Active | **Owner** | Crown |
| **Current area of disturbance** | <0.1 ha | **Final area to be disturbed** | <0.1 ha |
| **Closure date** | 2028 | **Infrastructure to be retained** | None |
| **Final Landuse** | Pasture | **Area for final landuse** | <0.1 ha |
| **Completion criteria** | Safe | | |
| **Closure activities** | | | |
| **Facility** | **Activities** | | |
| **Historic Bombay Shaft** | Shaft has secure steel cap. Six foot security fence with barbed wire to be erected around perimeter (Completed). | | |
| **Brunswick Shaft** | Install concrete slab over shaft | | |
| **Remediation or waste disposal** | None | | |
| **Material** | None | **Topsoil** | None |
| **Post-closure activities** | None | | |
| **Monitoring start** | None | **Finish** | None |
| **Assumptions** | | | |

## Domain 6a: Youle Shaft

| Domain 6a: Youle Shaft | | | |
|---|---|---|---|
| **Description** | Youle exhaust shaft | | |
| **Status** | Active | **Owner** | Mandalay |
| **Current area of disturbance** | <0.1 ha | **Final area to be disturbed** | <0.1 ha |
| **Closure date** | 2028 | **Infrastructure to be retained** | None |
| **Final Landuse** | Residential | **Area for final landuse** | <0.1 ha |
| **Completion criteria** | Safe stable landform | | |
| **Closure activities** | | | |
| **Facility** | **Activities** | | |
| **Youle shaft** | Youle evase will be with sold or demolished and removed as waste, and/or recycled.<br>All services and concrete footings will be removed.<br>The concrete will be crushed and either sold for recycling or placed as appropriate in the boxcut, or Brunswick West TSF.<br>Install concrete slab over shaft | | |
| **Remediation or waste disposal** | None | | |
| **Material** | None | **Topsoil** | None |
| **Post-closure activities** | None | | |
| **Monitoring start** | None | **Finish** | None |
| **Assumptions** | | | |

## Domain 7: Brunswick Tailings Storage Facility

| Domain 7: Brunswick Tailings Storage Facility | | | |
|---|---|---|---|
| **Description** | Tailings Storage Facility (not active) | | |
| **Status** | Closed | **Owner** | Crown land |
| **Current area of disturbance** | 11.0 ha | **Final area to be disturbed** | 11.0 ha |
| **Closure date** | 2025 | **Infrastructure to be retained** | None |
| **Final Landuse** | Nature reserve | **Area for final landuse** | 11.0 ha |
| **Completion criteria** | Safe stable landform<br>Non-polluting<br>Self-sustaining vegetation<br>Support post-closure land use | | |
| **Closure activities** | | | |
| **Facility** | **Activities** | | |
| **Brunswick TSF** | Minimum 1m cap of waste rock/oxidised material.<br>Contour outer embankment slope to 3H:1V. | | |
| **General** | Graded and then topsoiled<br>Planted/seeded with light covering of Box Ironbark species. | | |
| **Remediation or waste disposal** | None | | |
| **Material – waste rock** | 142,700 $m^3$ | **Topsoil** | 8,900 $m^3$ |
| **Post-closure activities** | Rehabilitation maintenance and monitoring<br>Erosion<br>Revegetation (pasture)<br>Weed management<br>Drain management<br>Surface water monitoring | | |
| **Monitoring start** | 2025 | **Finish** | 2029 |
| **Assumptions** | Site is available for progressive rehabilitation post decommissioning in 2025.<br>TSF is not a contamination risk and does not need a designed and engineered cap to prevent AMD seepage<br>Capping from Brunswick Pit Waste Rock Stockpile (13,500 $m^3$), Brunswick TSF Waste Rock Stockpile (16,000 $m^3$), Recovered road base (4,200 $m^3$) & Augusta Waste Rock Stockpile (109,000 $m^3$)<br>Topsoil from Brunswick TSF capping stockpile (5,000 $m^3$), Splitters Creek stockpile (1,700 $m^3$) and Brunswick West TSF topsoil stockpile (2,200 $m^3$) | | |

## Domain 8: Bombay Tailings Storage Facility

| Domain 8: Bombay Tailings Storage Facility | | | |
|---|---|---|---|
| **Description** | Tailings Storage Facility (operational) | | |
| **Status** | Active | **Owner** | Crown land |
| **Current area of disturbance** | 11.8 ha | **Final area to be disturbed** | 11.8 ha |
| **Closure date** | 2026 | **Infrastructure to be retained** | None |
| **Final Landuse** | Nature reserve | **Area for final landuse** | 11.8 ha |
| **Completion criteria** | Safe stable landform<br>Non-polluting<br>Self-sustaining vegetation<br>Support post-closure land use | | |
| **Closure activities** | | | |
| **Facility** | **Activities** | | |
| **Bombay TSF** | TSF will receive crushed concrete, road base from around the site and sediments from the mine silt ponds and stormwater dam.<br>Minimum 1m cap of waste rock/oxidised material.<br>Contour outer embankment slope to 3H:1V. | | |
| **General** | Graded and then topsoiled<br>Planted/seeded with light covering of Box Ironbark species. | | |
| **Remediation or waste disposal** | None | | |
| **Material – waste rock** | 136,350 $m^3$ | **Topsoil** | 9,200 $m^3$ |
| **Post-closure activities** | Rehabilitation maintenance and monitoring<br>Erosion<br>Revegetation (pasture)<br>Weed management<br>Drain management<br>Surface water monitoring | | |
| **Monitoring start** | 2025 | **Finish** | 2029 |
| **Assumptions** | Site is potentially available for progressive rehabilitation post decommissioning 2026.<br>TSF is not a contamination risk and does not need a designed and engineered cap to prevent AMD seepage<br>Capping from Brunswick Pit Oxidised Waste Stockpile (43,850 $m^3$) and Bombay TSF Waste Rock Stockpile (53,000 $m^3$). Rock from Augusta Waste Rock Stockpile (39,500 $m^3$) separated out and is located in 'other' to allow haulage distance to be accounted for. | | |

| | |
|---|---|
| | Topsoil from Bombay TSF topsoil stockpile (7,000 $m^3$) and Brunswick West TSF topsoil stockpile (2,200 $m^3$) |

## Domain 9: Brunswick West Tailings Storage Facility

| Domain 9: Brunswick West Tailings Storage Facility | | | |
|---|---|---|---|
| **Description** | Tailings Storage Facility | | |
| **Status** | To be constructed | **Owner** | Private land |
| **Current area of disturbance** | 0 ha | **Final area to be disturbed** | 11.8 ha |
| **Closure date** | 2028 | **Infrastructure to be retained** | None |
| **Final Landuse** | Pasture | **Area for final landuse** | 11.8 ha |
| **Completion criteria** | Safe stable landform<br>Non-polluting<br>Self-sustaining vegetation<br>Support post-closure land use | | |
| **Closure activities** | | | |
| **Facility** | **Activities** | | |
| **Brunswick West TSF** | TSF will receive crushed concrete, road base from around the site and sediments from the mine silt ponds and stormwater dam.<br>Shape to create domed water shedding landform with 5% grade.<br>Minimum 1.8m cap of fill materials over tailings increasing in thickness of the earthfill material towards the centre of the TSF.<br>Topsoil depth 0.3 m.<br>NB: During construction establish outer embankment slope to 4H:1V, topsoil and revegetated. | | |
| **General** | Graded and then topsoiled<br>Seeded with grazing pasture grasses | | |
| **Remediation or waste disposal** | None | | |
| **Material – Earthfill** | 210,000 $m^3$ | **Topsoil** | 18,500 $m^3$ |
| **Rockfill** | 31,000 $m^3$ | | |
| **Post-closure activities** | Rehabilitation maintenance and monitoring<br>Erosion<br>Revegetation (pasture)<br>Weed management<br>Drain management<br>Surface water monitoring | | |
| **Monitoring start** | 2030 | **Finish** | 2034 |
| **Assumptions** | TSF is not a contamination risk and does not need a designed and engineered cap to prevent AMD seepage | | |

| | |
|---|---|
| | The conceptual design for the Brunswick West TSF will require 210,000 $m^3$ of earthfill and 31,000 $m^3$ of rockfill generated largely from the Brunswick Pit Waste Rock Dump (160,000 $m^3$) and other onsite sources. Any short fall in material will need to be imported (81,000 $m^3$).<br>Topsoil from Brunswick West TSF topsoil stockpile (18,500 $m^3$). |

## Domain 10: Brunswick Waste Rock Stockpile

| Domain 10: Brunswick Waste Rock Stockpile | | | |
|---|---|---|---|
| **Description** | Waste rock storage and ROM Pad | | |
| **Status** | Active | **Owner** | Mandalay |
| **Current area of disturbance** | 6.0 ha | **Final area to be disturbed** | 6.0 ha |
| **Closure date** | 20282028 | **Infrastructure to be retained** | None |
| **Final Landuse** | Pasture | **Area for final landuse** | 6.0 ha |
| **Completion criteria** | Safe stable landform<br>Non-polluting<br>Self-sustaining vegetation<br>Support post-closure land use | | |
| **Closure activities** | | | |
| **Facility** | **Activities** | | |
| **Waste Rock Landform** | Waste rock material will be removed and used as capping/backfill and stripped back to natural surface. | | |
| **General** | Ripping compacted areas<br>Graded to natural surface levels and then topsoiled<br>Fertiliser application<br>Seeded with grazing pasture grasses | | |
| **Remediation or waste disposal** | None | | |
| **Material** | None | **Topsoil** | 6,000 $m^3$ |
| **Post-closure activities** | Rehabilitation maintenance and monitoring<br>Erosion<br>Revegetation (pasture)<br>Weed management<br>Drain management<br>Surface water monitoring | | |
| **Monitoring start** | 2028 | **Finish** | 2032 |
| **Assumptions** | Site is potentially available for progressive rehabilitation post earthworks for Brunswick TSF 2028.<br>Site is free of contamination<br>Topsoil from Splitters Creek topsoil stockpile (3,400 $m^3$) and core yard stockpiles (2,600 $m^3$ ) | | |

## Domain 11: Rock Garden Waste Stockpile

| Domain 11: Rock Garden Waste Stockpile | | | |
|---|---|---|---|
| **Description** | Waste rock storage | | |
| **Status** | Active | **Owner** | Crown land |
| **Current area of disturbance** | 2.4 ha | **Final area to be disturbed** | 2.4 ha |
| **Closure date** | 2027 | **Infrastructure to be retained** | None |
| **Final Landuse** | Nature reserve | **Area for final landuse** | 2.4 ha |
| **Completion criteria** | Safe stable landform<br>Non-polluting<br>Self-sustaining vegetation<br>Support post-closure land use | | |
| **Closure activities** | | | |
| **Facility** | **Activities** | | |
| **Waste Rock Landform** | Waste rock material will be removed and used as capping/backfill and stripped back to natural surface. | | |
| **General** | Ripping compacted areas<br>Graded to natural surface levels and then topsoiled<br>Fertiliser application<br>Seeded with grazing pasture grasses | | |
| **Remediation or waste disposal** | None | | |
| **Material** | None | Topsoil | 2,400 $m^3$ |
| **Post-closure activities** | Rehabilitation maintenance and monitoring<br>Erosion<br>Revegetation (pasture)<br>Weed management<br>Drain management<br>Surface water monitoring | | |
| **Monitoring start** | 2028 | **Finish** | 2032 |
| **Assumptions** | Site is potentially available for progressive rehabilitation post earthworks for Bombay TSF 2027.<br>Site is free of contamination<br>Topsoil from Brunswick West TSF topsoil stockpile (2,400 $m^3$) | | |

## Domain 12: Brunswick Pit

| Domain 12: Brunswick Pit | | | |
|---|---|---|---|
| **Description** | Pit | | |
| **Status** | Active | **Owner** | Mandalay |
| **Current area of disturbance** | 1.6 ha | **Final area to be disturbed** | 1.6 ha |
| **Closure date** | 2028 | **Infrastructure to be retained** | None |
| **Final Landuse** | Pasture/Void | **Area for final landuse** | TBC |
| **Completion criteria** | Safe stable landform | | |
| **Closure activities** | | | |
| **Facility** | **Activities** | | |
| **Pit** | The perimeter of Brunswick Pit will have perimeter earthen bunding, screening and a six foot high security fence topped with barbed wire erected.<br>Topsoil and vegetation to screen fence line whilst maintaining access to fence line.<br>Backfilled pit area to be contoured | | |
| **Portal (if constructed)** | The entrance to the decline will be sealed (backfilled with waste rock and/or have a concrete plug) as per ERR requirements. | | |
| **General** | Ripping compacted areas<br>Graded surface and then topsoiled<br>Fertiliser application<br>Seeded with pasture grasses | | |
| **Remediation or waste disposal** | None | | |
| **Material** | none | **Topsoil** | 1,600 $m^3$ |
| **Post-closure activities** | Existing trees and vegetation to be maintained.<br>Allowance made for second year fertiliser application | | |
| **Monitoring start** | 2028 | **Finish** | 2032 |
| **Assumptions** | Materials available to complete earthworks<br>Topsoil from Bombay TSF topsoil stockpile (1,600 $m^3$) | | |

ACCENT ENVIRONMENTAL

# Appendix D: Concrete slab for sealing shafts

# ADVERTISED PLAN

## OBJECTIVE

The objectives of this program are to :

- Manage risks to public health and safety
- Conserve items of heritage value
- Provide a consistent approach to risk management

Concrete slabs are to be provided to cover exposed shafts and prevent access when retention of the visual aspects of the shaft is not warranted. Provision is to be made for ventilation through the slab.

## DESIGN FEATURES

- Slabs are to be seated on a firm foundations
- Vent pipes are to be provided to allow for ventilation of gases and fluctuations of air and water pressure.
- Ply or ribbed steel sheet deck and reinforcing to be assembled away from the shaft.
- Ribbed steel sheet deck to manufacturers specifications. Steel supporting beams to engineers specification.
- Regional mine warning sign to be located adjacent to site.
- Surface drainage to be directed beyond the foundation footprint.

## MATERIALS

Reinforcing mesh and bars to conform with AS/NZS 4671
Concrete to conform with AS3600
Concrete to be - for trafficked areas 32 Mpa
- for untrafficked areas 20 Mpa

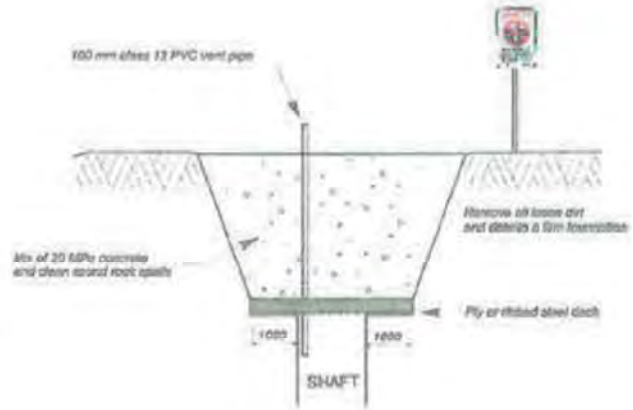
Max. nominal aggregate size
- for slabs 20 mm
- conical plugs 40 mm

Slump 80 mm
Concrete cover to reinforcement
- Top mesh or bars - 60 mm
- Ply or ribbed steel deck sheets - 50 mm
- Ground - 60 mm

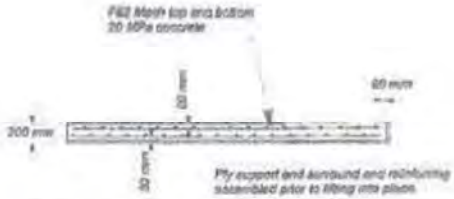
PVC Vent pipe Class 12 to AS/NZS 1477

## CONSTRUCTION

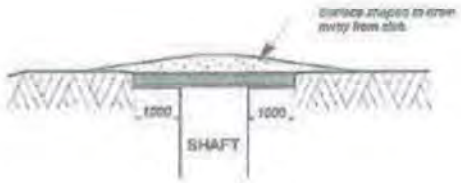
- Formwork and reinforcing to be assembled away from the shaft and lifted into place with a crane or other suitable plant to avoid unnecessary worker activity around the shaft.
- The edges of the shaft are to have all loose material removed and be excavated and trimmed to provide a minimum width of 1.0 metres of stable level foundation on all sides of the shaft.
- Any personnel working in the vicinity of the shaft must be harnessed.



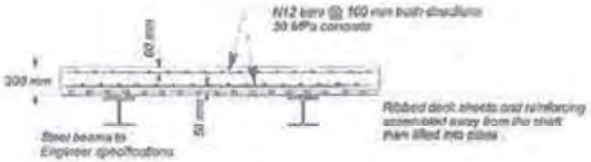

CONCRETE CONICAL PLUG - where surface expression is wide




CONCRETE SLAB - Non Trafficked




CONCRETE SLAB SECTION




CONCRETE SLAB - Trafficked

| REVISION | | | SCALE | TREVOR CLARK & ASSOC. (AUST.) PTY LTD. | CLIENT DSE | TITLE CONCRETE SLABS OVER SHAFTS | DRAWING No. DSE-DM-0607 |
|---|---|---|---|---|---|---|---|
| | | | DESIGNED TTC | | PROJECT ABANDONED MINES RISK MANAGEMENT | | DRAWING SIZE A3 |
| | | | DRAWN TMC | | | | SHEET 4 OF 4 |
| | | | CHECKED | | | | |
| DATE | | | APPROVED | | | | |

ACCENT ENVIRONMENTAL

# Appendix E:
# Risk assessment tables

## Risk assessment tables

Likelihood, consequence, and risk rating tables are provided in Table 13-1, Table 13-2 and Figure 13.1 following the criteria outlined in the Guidelines (ERR 2020b).

*Table 13-1 Consequence categories and definition (ERR 2020b)*

| Category | Definition |
|---|---|
| **Critical** | Hazard has critical impact, in terms of severity and/or duration.<br>Treatment or remediation effort is required, although some effects may be irreversible.<br>Remediation of environmental contamination would require significant private and public resources.<br>Hazard event would be the subject of widespread community outrage. |
| **Major** | Hazard has major impact, in terms of severity, duration and/or frequency of occurrence. Treatment or remediation effort is required. Some effects may be irreversible.<br>Remediation of environmental contamination would require significant private and public resources.<br>Hazard event would be the subject of widespread community concern. |
| **Moderate** | Hazard has moderate, noticeable impact, in terms of severity, duration and/or frequency of occurrence. Moderate treatment or remediation effort may be required.<br>Hazard event would be the subject of limited community concern. |
| **Minor** | Hazard is perceived but has minor and typically temporary effects. Some remediation may be required. |
| **Insignificant** | Impacts are barely recognised and/or quickly recovered from. No specific remediation required. |

*Table 13-2 Likelihood categories and description (ERR 2020b)*

| Category | Definition |
|---|---|
| **Rare** | Highly unlikely, but the risk event may occur in exceptional circumstances. (likelihood <5%). |
| **Unlikely** | The risk event could occur at some time. (likelihood 5% to 30%). |
| **Possible** | The risk event might occur at some time. (likelihood >30% to 70%). |
| **Likely** | The risk event will probably occur in most circumstances. (likelihood >70% to 90%). |
| **Almost certain** | The risk event is expected to occur in most circumstances. (likelihood >90%). |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Likelihood** | **Almost Certain** | **Medium** | **High** | **Very High** | **Very High** | **Very High** |

| | | | | | |
|---|---|---|---|---|---|
| Likely | Medium | Medium | High | Very High | Very High |
| Possible | Low | Medium | Medium | High | Very High |
| Unlikely | Low | Low | Medium | High | High |
| Rare | Low | Low | Medium | Medium | High |
| | Insignificant | Minor | Moderate | Major | Critical |

**Consequence**

*Figure 13.1 Risk matrix showing classification of risk ratings (ERR 2020a)*