3 Water Street Red Hill 4059
T: +61 7 3368 1033
E: information@ardent-group.com.au
W: ardent-group.com.au
ABN: 38 609 696 764

Progressive Rehabilitation and Closure Plan

Title of the Project: Mt Garnet Dalcouth Project
Tenure Number: ML 4349 and ML 20547
EA Number: EPVL00864413
EA Holder Name: MGT Minerals Pty Ltd t/a Huntore Australia Pty Ltd
EA Holder Contact Details: c/- Ardent Group Pty Ltd, PO Box 320, Red Hill QLD 4059

Document ID Number: MGT-006 PRCP
Version Number: 3
Date of Submission: 16 February 2024

Document Control Sheet

Ardent Group Pty Ltd	
Street Address:	3 Water Street, Red Hill Qld 4059
Postal Address:	PO Box 320 Red Hill Qld 4059
Phone:	+61 7 3368 1033
Email:	Information@ardent-group.com.au
Web:	www.ardent-group.com.au

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Title:	Progressive Rehabilitation and Closure Plan – MGT Minerals Pty Ltd, t/a Huntore Australia Pty Ltd		
Project Manager:	Richard Davis		
Author:	Lana Shoesmith / Richard Davis		
Client:	MGT Minerals Pty Ltd		
Client Contact:	James Moonier		

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Department					X		X		

1 Table of Contents

Maps and Figures

Tables

Appendices

Abbreviations

ADT	Articulated Dump Truck
BOM	Bureau of Meteorology
DES	Department of Environment, Science and Innovation
EA	Environmental Authority EPVL00864413
EP Act	*Environmental Protection Act 1994*
ERA	Environmentally Relevant Activity
ESA	Environmentally Sensitive Area
ESC	Erosion and Sediment Control
EVs	Environmental Values
HSU	Hydro stratigraphic units
ML	Mining Lease
MNES	Matter of National Environmental Significance
MSES	Matter of State Environmental Significance
NUMA	Non-use Management Area
NAF	Non-acid Forming
PMLU	Post-mining Land Use
PRCP	Progressive Rehabilitation and Closure Plan
RE	Regional Ecosystem
ROM	Run-of-Mine
TRC	Tablelands Regional Council
WRD	Waste Rock Dump

PART A – REHABILITATION PLANNING PART

1. INTRODUCTION

1.1 Background

Ardent Group Pty Ltd (Ardent Group) has been engaged by MGT Minerals Pty Ltd (MGT Minerals), to prepare a transitional Progressive Rehabilitation and Closure Plan (PRCP) for the "Dalcouth" Project (the Project) in accordance with the requirements of the *Environmental Protection Act 1994* (EP Act).

This transitional PRCP is applicable to Mining Leases (ML) 4349 and ML 20547. The current version of the Environmental Authority EPVL00864413 (EA) was issued to MGT Minerals, the owner and operator of the Project, on 22 July 2022. MGT Minerals acquired the mining leases in 2018.

The EA authorises carrying out Environmentally Relevant Activity (ERA) 31 Mineral Processing 2(a) "Processing, in a year, the following quantities of mineral products, other than coke – 1000t to 1000t"; Non-Scheduled Mining Activity – Mining Lease; and under Schedule 3 of the *Environmental Protection Regulation 2019*: 19 "Mining metal ore, other than metal ore mentioned in items 11,12,14,15,16,17 or 18".

1.2 Purpose of the PRCP

In accordance with the stated purpose outlined under Section 126B of the *Environmental Protection Act 1994* (EP Act), the PRCP:

> (a) specifies a plan for how and where environmentally relevant activities will be carried out on land in a way that maximises the progressive rehabilitation of the land to a stable condition; and
> (b) provides for the condition to which the holder must rehabilitate the land before the authority may be surrendered.

This PRCP has been addresses the requirements of Sections 126C and 126D of the EP Act and has been prepared in accordance with the *Guideline Progressive Rehabilitation and Closure Plans (PRC Plans) (DES 17 March 2021)*.

The PRCP comprises two parts:
Part A – Rehabilitation Planning Part, which includes the following:

- Provide a description of:
  - each resource tenure, including the area of each tenure, that applies to the PRCP.
  - the relevant activities to which the application relates.
  - the likely duration of the relevant activities.
- A description of how and where the mining activities will be carried out.
- Details of consultation undertaken in relation to the preparation of the PRCP and ongoing consultation in relation to any required rehabilitation required under the PRCP.
- Details of how the proposed Post-Mining Land Uses ('PMLUs') are consistent with community consultation and relevant plans for the land of the local government, the State and Commonwealth.
- Proposed methods and techniques for rehabilitating the land to a stable condition in a way that supports the rehabilitation milestones under the proposed PRCP Schedule.

- Identifies any risks of a stable condition for land not being achieved and specifies methods to manage or minimise the identified potential risks.

Part A is to justify and support the proposed PRCP Schedule.

Part B – PRCP Schedule, which includes a proposed PRCP schedule that complies with section 126D of the EP Act and includes the following:

- Nomination of either a PMLU or NUMA for all land within the relevant resource tenures, including land uses for undisturbed land.
- Identification of when land becomes available for rehabilitation or improvement.
- Rehabilitation or management milestones to achieve the PMLU or NUMA outcomes
- Milestone criteria that demonstrate when each milestone has been completed.
- Completion dates for each milestone to be achieved
- Any conditions considered necessary or desirable.

The PRCP schedule becomes a legally binding and enforceable instrument with which the Project must comply.

1.3 Proposed Post Mining Land Use (PMLU) Overview

In accordance with the definitions of section 750 of the Environmental Protection Act, it is considered that the Environmental Authority is the land outcome document. This is included in Appendix 2. The EA does not define the post mining land use, rather in table F1 it states that a rehabilitation goal is "able to sustain an agreed post-mining land use".

The PMLU for most of the project area is **grazing**. This PMLU of grazing was previously described in the EA amendment applications by MGT in 2018 and 2020. This proposed use was deemed acceptable by DES at the time of assessment of the applications.

A small area is proposed as **infrastructure** to include existing telecommunications and power infrastructure assets owned by external parties (Telstra and Ergon).

This report outlines the background (Section 2), rehabilitation planning information (section 3), consultation (section 4) and details the rationale of the PMLU selection in section 5.

2 Background Information

2.1 Location

The Project is located approximately 11km north of Mount Garnet (Figure 1). ML 4349 and ML 20547 are located within two parcels of leasehold land, Lot 230 on AP4557 and Lot 220 on CP903610 (Figure 2), which cover 18.0000Ha and 1163.3955Ha in area, respectively.

0 10 20 30 40 50

Kilometers

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Mount Veteran Overview

N
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GDA94, Geographic

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Figure 1
Regional Location of Project

Legend

- Mining Lease Boundary
- Highway
- Secondary Road

Drawn By: Chris Schlebusch

Requested by: Richard Davis

Date: 24/07/2020

Sheet No.
RTPL_ARD_MGT001_MAP_0005_B

Data sources:
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Path: S:\Plans\Project_Specific\Ardent\MGT001\RTPL_ARD_MGT001_MAP_0005_A Project Location.mxd

0 100 200 300 400 500

Meters

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Mount Veteran Overview

N W E S

GDA94, MGA Zone 55

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Figure 2
Mining Lease and Land Title

Drawn By: Chris Schlebusch

Requested by: Richard Davis

Date: 17/07/2020

Sheet No.
RTPL_ARD_MGT001_MAP_0004_A

- Mining Lease Boundary
- Property Boundary
- Powerline
- Farm Road
- Camp
- Laydown
- Building

Data sources:
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©Geoscience Australiai

Path: S:\Plans\Project_Specific\Ardent\MGT001\RTPL_ARD_MGT001_MAP_0004_A A3L Mt Veteran Site Overview.mxd

2.2 Tenure to which PRCP relates

Details of the ML's, which are the subject of this PRCP, are outlined in Table 1.

Table 1: Mining Tenement Details ML 4349 and ML 20547

Specifications	Details	Details
ML Number	4349	20547
Tenement name	Mt Veteran	Summer Hills
Grant Date	28 March 1985	23 January 2013
Expiry Date	31 March 2027	31 January 2034
Area	18.0000 Ha	1163.3955 Ha
Environmental Authority	EPVL00864413	EPVL00864413
Purpose	Treatment plant / mill site, water supply	Gold, Tin Ore, Tungsten / Wolfram / Scheelite
Minerals	Antimony Ore, Bismuth Ore, Copper Ore, Gold, Lead Ore, Palladium, Platinum, Silver Ore, Tantalum / Tantalite, Tin Ore, Tungsten / Wolfram / Scheelite, Zinc Ore	Gold, Tin Ore, Tungsten / Wolfram / Scheelite

The environmental authority is included as Appendix 2.

2.3 Property Description

The Project is located entirely within two parcels of leasehold land. The real property description and current ownership is provided in **Table *2***.

Table 2 Real Property Description Underlying ML 4349 and ML 20547

Specifications	Land Parcel 1	Land Parcel 2
ML	4349	20547
Background Tenure	Lot 230 on AP4557	Lot 220 on CP903610
Tenure type	Leasehold	Rolling Term Lease
Registered Lessee / Owner	Simon Garry William Renshaw Rosemary Anne Burtenshaw	Garth Anthony Dunford
Local government area	Tablelands Regional Council	Tablelands Regional Council

2.4 Primary Mine Features/Infrastructure on Site

As shown in Figure 3, the primary (existing) mine features associated with the mining activities are:

- Dalcouth Pit (Mt Veteran tenement).

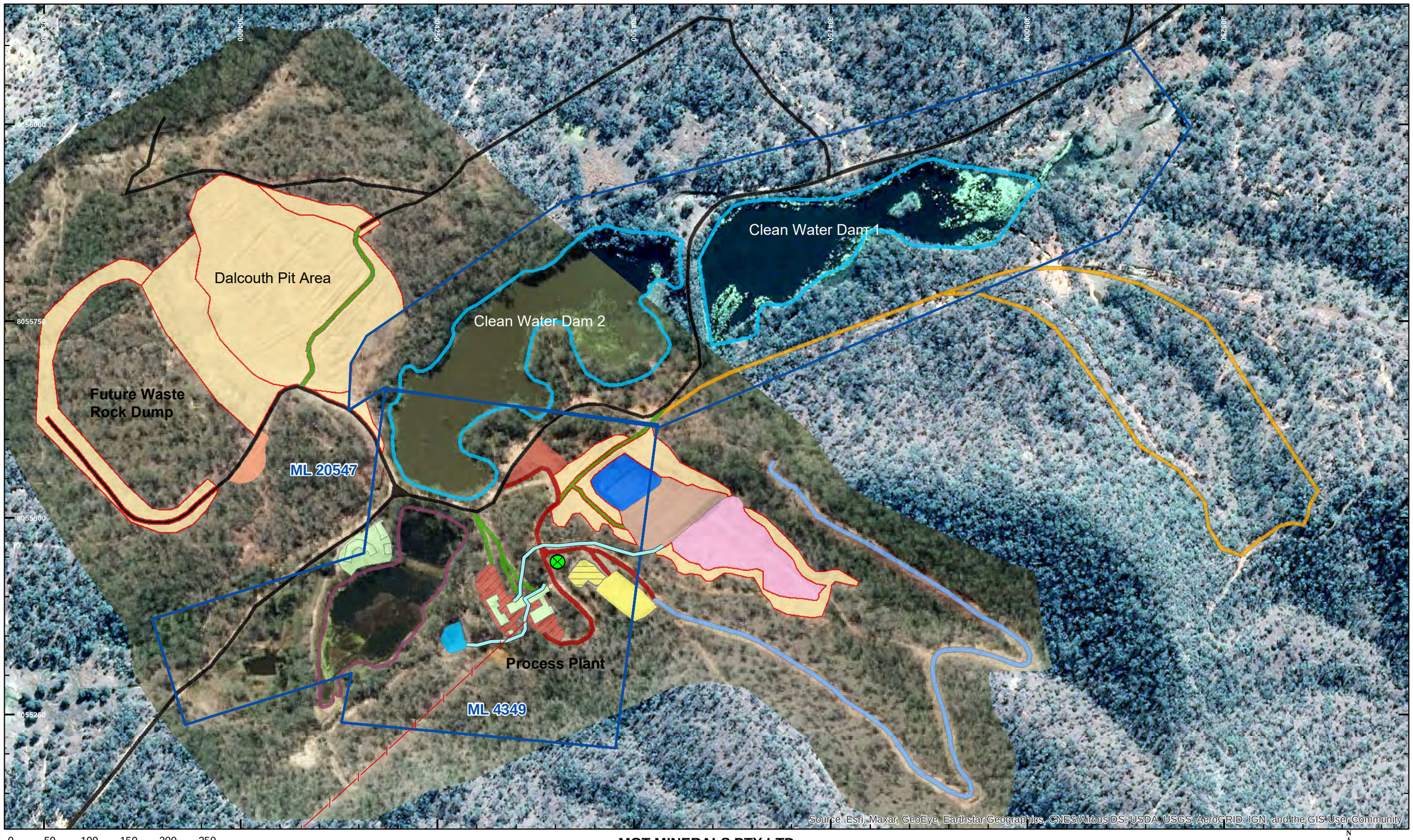
- Waste Rock Dump (perimeter disturbance only).
- Work area between Dalcouth Pit and waste dump.
- Transport infrastructure.
- Office and Camp.
- Process plant.
- ROM pad
- Tailings storage facility (TSF) – existing and new.
- Haul road.
- Access roads.
- Clean water dam 1.
- Clean water dam 2.
- Process water ponds.
- Settling pond.
- Plant pond.

Summerhill Pit area has not yet been disturbed.

No tailings are deposited in the new tailings dam at present. The construction of the new tailings dam is not yet completed.

Clean water dam 1 existed before the grant of the ML and is not located on the granted ML 20547, however is listed as an authorised mining activity and location in Table A1 of the EA.

Clean water dam 2 existed before the grant of the ML and is partly located on ML 4349, but is not located on ML20547, however is listed as an authorised mining activity and location in Table A1 of the EA.



0 50 100 150 200 250

Meters

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Mount Veteran Overview

N W E S

GDA94, MGA Zone 55

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Figure 3 - Existing Disturbance Footprint

Drawn By:	Chris Schlebusch
Requested by:	Jacob Arnold
Date:	29/06/2021

Sheet No.
RTPL_ARD_MGT001_MAP_0010_A

- Mining Lease Boundary
- Office and Camp
- ROM Pad
- Laydown - ROM
- Laydown - Plant
- Laydown - General
- Transport Infrastructure
- Farm Road
- Service Road
- Haul Road
- Exploration Road
- Cleared Land
- Existing TSF
- TSF Wall
- New TSF
- Clear Water Dam
- Plant Pond - Wet Process
- Process Water / Settling Pond
- Diversion Drain
- Powerline
- Pipeline
- Communication Tower

Data sources:
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Path: S:\Plans\Project_Specific\Ardent\MGT001\RTPL_ARD_MGT001_MAP_0010_A A3L Mt Veteran Disturbance Footprint.mxd

2.5 Type of Mining Operation

The Project is a level 2 mining operation which involves the mining of hard rock tin/tungsten deposits and reprocessing of historic tailings located within ML 20547 and processing at the Mount Veteran Mill located on ML 4349.

Since the transfer of the ML's to MGT Minerals, the Project has been under care and maintenance whilst appropriate approvals have been obtained and construction of the new tailings storage facility (TSF) is partially completed.

MGT Minerals will develop an open cut tin mine on the Dalcouth deposit, which was mined intermittently as far back as the 1940's; and develop the Summerhill pit. The Project is currently in pre-production care and maintenance and preparing to commence mining in 2025.

The open cut mining will utilise excavators, front end loaders and Articulated Dump Truck (ADT) type trucks for hauling. The material does not require any drilling and blasting for the first 20m of the operation while mining the weathered or oxide zone; however, some ripping by excavators fitted with ripping and breaking equipment is likely to be required.

All material from the mineralised veins will be mined, screened and crushed using an in-pit screening and crushing mobile plant before hauling the product to the stockpile or Run of Mine (ROM) pad situated at the process plant. All screened and crushed material will be hauled by 40 tonne ADT trucks to the destination for ore sorting and processing. Topsoil will be stored as a safety berm around the pit rim for later use in the rehabilitation stage of the Project. Other waste rock mined from the Summerhill Pit will be used to form the TSF wall. Low grade ore (approximately 34,850t) will be stockpiled within the current Dalcouth Waste Rock Dump area, together with the low-grade ore from the Dalcouth Pit.

The product will be transported to Townsville Port via the inland road system.

2.6 Proposed Duration of Mining Operation

The Project is currently in care and maintenance. The recommencement of mining will be dependent upon a number of factors including tin market forecasts and review of mine design.

MGT is shortly to embark on additional resource definition drilling. This information will be used to refine the proposed mine plan. The time for the resource drilling to be completed, followed by relevant geochemical and geotechnical test work will take until Q3 2023. Updated resource estimation and mine planning will likely be completed in early 2024. Should there be material changes to the mine design, there is likely to be a need to amend the existing environmental authority.

It is likely that material changes to the mine design will result in an amendment of the EA which could be considered a major amendment and therefore the approval process could conservatively take 12 months from the time of application.

For this reason, MGT has proposed in this PRC Plan a re-commencement date of mining in 2025.

ML4349 has been granted until 31/3/2027; and ML 20547 until 31/1/2034. Mining activities past these dates will require the renewal of the mining lease. For the purpose of this PRC Plan it has been assumed that such renewal is granted.

A resource assessment has been undertaken in 2019 (RHC Mining Consultants, 2019). This has defined the following internal resource estimate for Dalcouth at a 0.02 Sn% cut-off:

- Measured - 645kt @ 0.15% Sn
- Indicated – 605kt @ 0.11% Sn
- Inferred – 507kt @ 0.16% Sn
- Total – 1756kt @ 0.14% Sn

A "loose" internal resource estimate for Summer Hill at a 0.02 Sn% cut-off yielded the following:

- Measured - 0kt @ 0.0% Sn
- Indicated – 594kt @ 0.31% Sn
- Inferred – 618kt @ 0.24% Sn
- Total – 1213kt @ 0.27% Sn

The Project will consist of two open cut pits, Dalcouth Pit and Summerhill Pit. Co-incident with the start of mining, will be the recovery of historically mined cassiterite located in the Existing Tailings Storage Facility Storage Facility (TSF). The resource in the Existing TSF is mostly under the shallow water. There will be no pit and no topsoil removed before recovering this resource.

Mine Planning by MGT engineers has resulted in the proposed mine sequence and duration is shown in Table 3, showing stages and volumes for each pit.

Table 3 Proposed Mining Sequence and Duration

Mining Area	Floor RL (m, AHD)	Resource (m^3)	Resource (tonnes)	Commence Mining	Complete Mining	Landform Completed	Rehabilitation Completed
Existing TSF	na	10,000	26,023	2025	2025	2026	2033
Dalcouth Stage 1	725	89,657	233,322	2025	2026	2033	2041
Dalcouth Stage 2	715	142,843	377,376	2026	2027		
Dalcouth Stage 3	692.5	157,806	433,446	2027	2028		
Dalcouth Stage 4	675	70,964	198,696	2029	2030		
Summerhill Stage 1	760	136,563	371,450	2025	2027	2029	2037

(Resource includes high, medium and low grade ore)

The length of time following the completion of mining at Dalcouth until the landform is completed reflects

the time taken to backfill the pit from the waste rock dump, re-profile the waste rock dump and overall landform.

The mine plan has estimated the following volumes of resource, waste rock and topsoil during the planned staged mining of the resource.

Table 4 Mining Stages and Estimated Volumes

Mining Area	Pit Surface Area (ha)[1]	Pit Design Total Volume (m^3) [2]	Resource Volume (m^3)	Waste Volume (m^3)	Topsoil Volume (m^3)
Existing TSF	NA	NA	10,000	Nil	Nil (refer note 3)
Dalcouth Stage 1	4.7	487,951	89,657	398,294	5,165 [4]
Dalcouth Stage 2	NA (within stage 1 footprint)	1,456,522	142,843	341,442	Nil (within stage 1 footprint)
Dalcouth Stage 3		2,390,371	157,806	309,118	
Dalcouth Stage 4		2,778,033	70,964	122,868	
Summerhill Stage 1	3.79	631,101	136,563	477,413	4,454

Note 1; Pit surface area includes safety bund and ring road.
Note 2; Pit volume is the cumulative total volume of the pit, at end of each stage.
Note 3; Approximately 9,000m^3 of material in Existing TSF embankment that can be repurposed as growth media.
Note 4; All topsoil is recovered during Stage 1 of mining (i.e. maximum pit extent)

The material balance for waste rock generated from Dalcouth and Summerhill Pits is outlined in ***Table 5*** (from Ausrocks 2024, in Appendix 5).

Table 5 Pit Waste Rock Material Balance

Classification	Item	Volume (m3)	Comment
Waste Rock Generated	Summer Hill Pit Waste (to 760mRL)	477,414	Based on MGT supplied data
	Dalcouth Pit Waste	1,171,722	Based on MGT supplied data
Waste Rock Used in Rehabilitation	Dalcouth Pit Backfill	1,074,739	Calculated from Pit base to Final Landform
	Proposed TSF Capping	139,996	Calculated from Proposed TSF Surface to Final Landform
	Existing TSF	-	recontouring only, no fill
	Ancillary works	37,000	Estimate only, road maintenance, safety

Classification	Item	Volume (m3)	Comment
			bunding, stormwater management, minor fill as required etc
Balance of Waste Rock	Remainder for storage in Waste Rock Dump	397,401	Surplus waste from pit backfill & other works

3 Rehabilitation Planning

3.1 Baseline Information

3.1.1 Climate

3.1.1.1 Current Climate

The climate of the Project is sub-tropical with warm to hot wet summers and cooler dry winters.

The closest rainfall recording site to the project is at Mount Garnet Post Office (Bureau of Meteorology Station number 31046), approximately 11.5km south-southwest of the Project at an elevation of 658 m Australian Height Datum (AHD). This station has a continuous rainfall record from March 1901 to August 2022.

At this station mean monthly rainfall varies between 6.8 mm in September to a high of 199.4 mm in February, as shown in Table 6. Annual rainfall during the period 1901 to 2021 has varied between 238.6mm in 1915 to 1,452.6 mm in 1991 with a mean annual value of 819.7 mm (BOM, 2022).

The closest BoM station that is operational and recording a full range of climate data, including evaporation, is at Walkamin Research Station (station 031108). This station is approximately 57 km north-east of the Project and at an elevation of 594 m AHD. This weather station opened in 1965 and has rainfall records for the period 1965 to 2021 and temperature records from 1968 to 2021.

Mean monthly values for evaporation and minimum and maximum temperatures for Station 031108 are shown in Table *6*.

Key climatic data indicate the Project area experiences a distinct wet season with the highest rainfall occurring during the summer months (December to March) and drier periods in the winter and early spring months (June to October). Average annual evaporation (around 1,850 mm) is considerably higher than average annual rainfall, except for the period January to March, with the latter period being when precipitation recharge to groundwater is likely to occur.

Table 6 Climate data for Mt Garnet

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Rainfall (mm) #31046	184.0	199.4	134.5	41.0	24.1	20.5	12.0	33.6	8.3	22.1	58.9	120.1
Mean Rainfall (mm) #031108	225.6	242.7	205.1	53.3	27.3	18.5	13.3	10.3	8.7	23.2	69.2	121.5
Mean daily evaporation (mm) #031108	5.6	4.9	4.8	4.4	3.8	3.5	3.7	4.4	5.7	6.5	6.6	6.2

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean maximum temperature (°C) #031108	30.1	29.3	28.2	26.7	25.1	23.7	23.4	24.9	27.2	29.4	30.6	30.8
Mean minimum temperature (°C) #031108	20.3	20.5	19.7	18.2	16.2	14.0	13.1	13.4	14.8	16.7	18.5	19.8

Source: BOM Climate Data Online, 2022

3.1.1.2 Long-term Climate Projections

The long-term climate projections are important to understand when planning for rehabilitation. The mean annual temperature for the Tablelands Regional Council (TRC) is predicted to rise by approximately 1.0°C by 2030 and by approximately 3.5 °C by 2090, as shown in Figure 4.

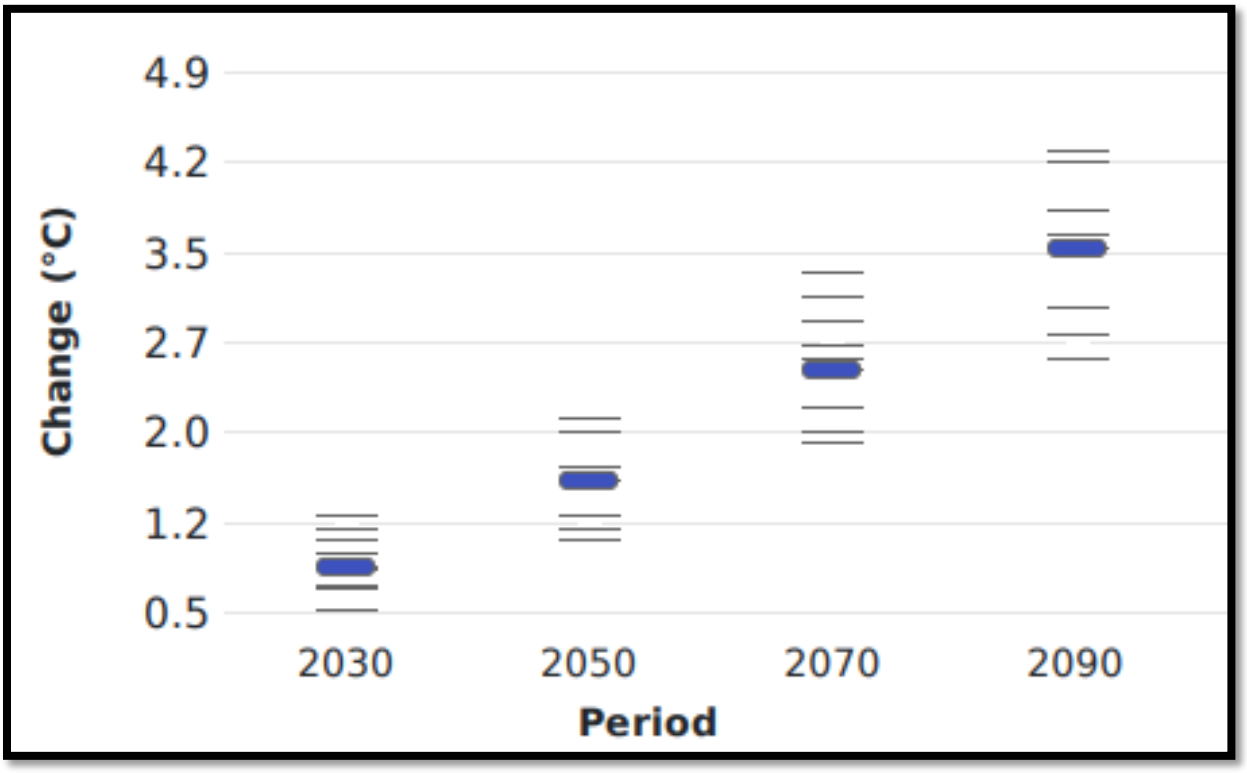


Figure 4 Mean temperature for annual season (based on 1986 to 2005 reference period)

(Queensland Government, 2022)

The maximum 1-day precipitation for the Tablelands Regional Council is predicted to decline approximately 0.5mm/day averaged for the annual rainfall season as shown in Figure 5.

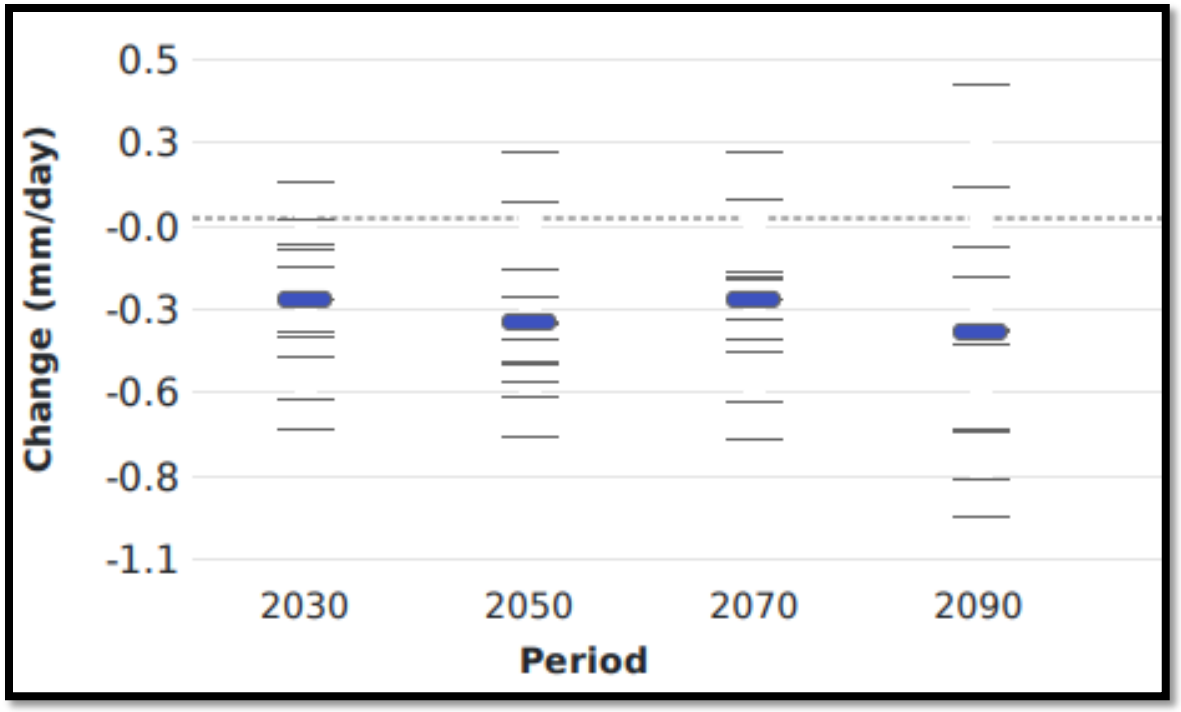
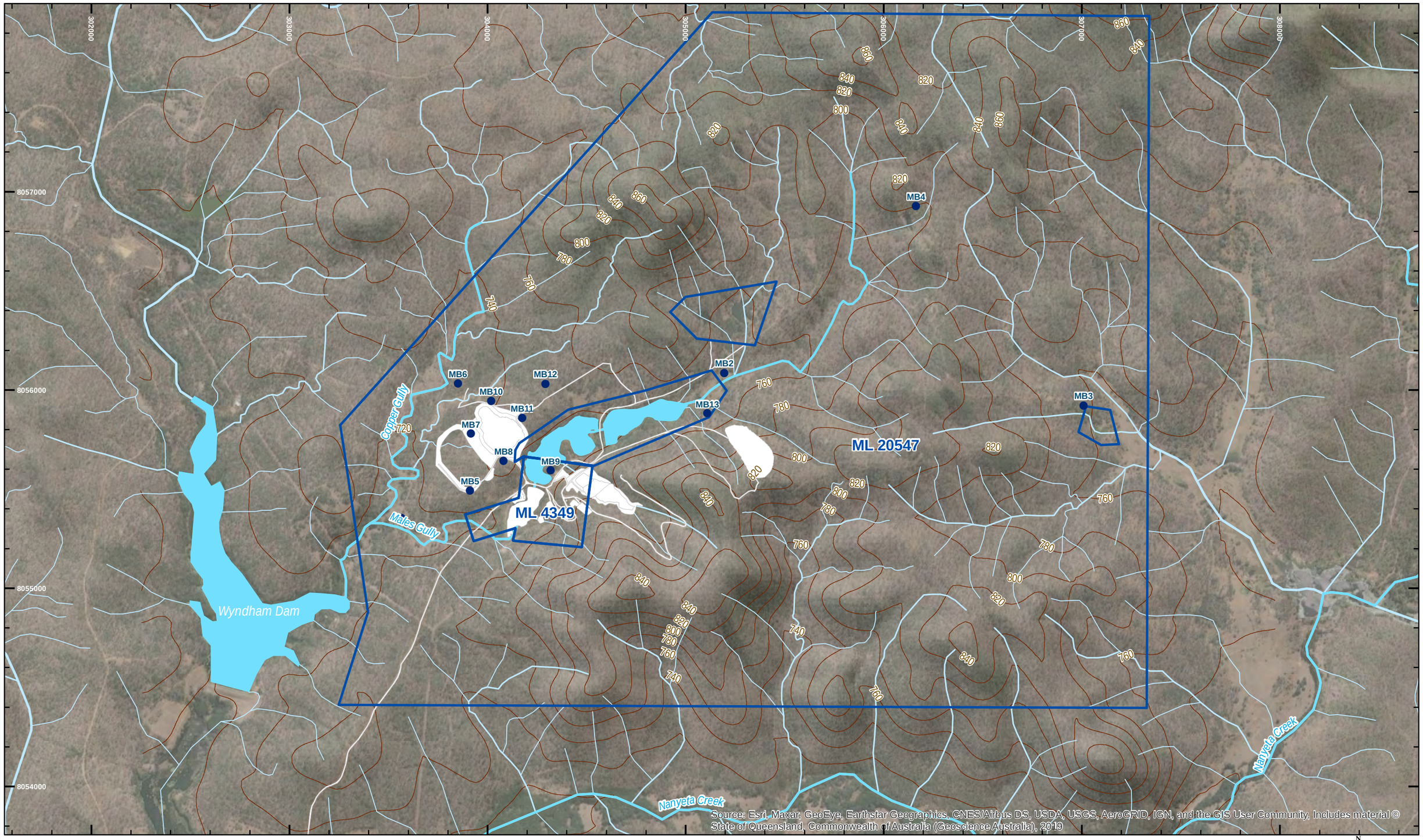


Figure 5 Maximum 1-day precipitation for annual season (based on 1986 to 2005 reference period)

(Queensland Government, 2022)

3.1.2 Topography

The Project is situated near to the Great Divide within the upper reaches of the Herbert River catchment, approximately 4 km south of the Herbert River northern catchment boundary (Figure 6). The area is characterised by small valleys and ridges, with the Dalcouth deposit located in the bottom of the Males Creek valley at a surface elevation of between 740 to 750 m AHD. North-east to south-west trending ridges bound the Males Creek valley on both its northern and southern sides. To the south, the land rises to approximately 850 m AHD and to the north it rises to about 860 m AHD.



0 200 400 600 800 1,000

Meters

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Mount Veteran Overview

N W E S

GDA2020, MGA Zone 55

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Figure 6 - General Topography and Drainage

Drawn By:	Chris Schlebusch
Requested by:	Richard Davis
Date:	15/07/2021

Sheet No.
RTPL_ARD_MGT002_MAP_0008_A

- Mining Lease Boundary
- Project Footprint
- Watercourse
- Elevation Contour
- Groundwater Monitoring Bore

Data sources:
Elevation = SRTM from QDR DEM, Webservice 2021-07015
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3.1.3 Geological setting

3.1.3.1 Regional Geology

The Dalcouth deposit is located within the Hodgkinson-Broken River Fold Belt, which is part of the larger Tasman Fold Belt system of eastern Australia. The Hodgkinson-Broken River Fold Belt is largely composed of a continental margin quartz to intermediate turbidite sequence, which was strongly deformed during Silurian to Devonian tectonic events, forming complex north to south and northeast to southwest trending faults, folds and thrusts (MGT Minerals 2018).

Mid-Carboniferous to late-Permian granitic intrusions and associated silicic intrusive strata underlie and outcrop throughout much of the region. Tin mineralisation is largely restricted to intrusive roof top alteration zones, extending into adjacent country rocks (MGT Minerals 2018).

3.1.3.2 Site Geology

The local geology and the main existing elements of the project are shown in Figure 7.

The Dalcouth pit is situated within Hodgkinson Formation strata. Carboniferous age Elizabeth Creek Granite (part of the O'Briens Creek Supersuite) was intruded beneath this and the contact between the two dips to the west. The Nanyetta Volcanics are extrusive igneous rocks that were extruded to overlie the Hodgkinson Formation to the southwest.

Tin mineralisation of the Summerhill deposit is hosted in Hodgkinson Formation turbiditic sandstones and siltstones. The sediments have been strongly deformed into complexly faulted northwest-southeast, north-south and northeast-southwest trending folds. A rhyolite intrusive is spatially associated with the mineralisation. The rhyolite is associated with the three main mineralised zones and is clearly important to the formation of the deposit although a genetic association has not yet been established.

The local geology and location of the Dalcouth Pit and Summerhill Pit is shown Figure 7. Tin mineralisation is hosted in fine anastomosing quartz-cassiterite (tin oxide) veins and fractures associated with strong chlorite alteration of the host rock. Chlorite alteration presents as strong hematite development within the weathered zone. Quartz veining, rhyolite intrusives and mineralisation are associated with a northwest trending, steeply southwest dipping fracture zone.

The Hodgkinson Formation is described in the Australian Stratigraphic Units Database as mainly pale to dark or greenish grey, fine to medium-grained, medium to thick-bedded, quartz-intermediate arenite. It is rhythmically interbedded with siltstone and mudstone with minor conglomerate and conglomeratic arenite and is sparsely fossiliferous. It is considered to be Devonian to late Silurian.

303000
304000
305000
306000
8056000
8055000
Copper Gully
Males Gully
Mayday Creek
Dh/am
Dalcouth Pit
ML 4349
ML 20547
Summer Hill Pit
Cgcd?
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 100 200 300 400 500
Meters

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Mount Veteran Overview

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GDA94, MGA Zone 55

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Figure 7 - Site Geology

Drawn By: Chris Schlebusch
Requested by: Jacob Arnold
Date: 22/10/2020

Sheet No.
RTPL_ARD_MGT002_MAP_0008_A

- Mining Lease Boundary
- Project Footprint
- Dalcouth Pit
- Summer Hill Pit
- Watercourse
- Dyke or vein containing rhyolite
- Fault accurate
- Devon Microgranite?
- Hodgkinson Formation/am

Data sources:
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Path: S:\Plans\Project_Specific\Ardent\MGT002\RTPL_ARD_MGT002_MAP_0008_A A3L Geology Map.mxd

The Dalcouth mine Pit and Summerhill Pit will be excavated into Hodgkinson Formation strata, where it forms an extensive sequence of marine siliclastic rocks, which are dominated by deep water turbidite sequences, (Rob Lait and Associates, 2013). It includes greywackes and subordinate chert layers, and metabasalts occur locally. It has undergone numerous phases of deformation, having been folded and faulted and the Elizabeth Granite has intruded beneath it.

Rob Lait and Associates (2013) report that, in the vicinity of the proposed Dalcouth pit, the Hodgkinson Formation comprises a metamorphosed shale with a strong, near vertical cleavage and a well-developed slaty cleavage in the turbidite sequences. This cleavage dips to the southwest at between 70° and 90° and has a northwest to southeast strike. Deformation fractures are generally infilled with quartz veins associated with felsic igneous intrusions. There are many cross-cutting faults at a local scale and one major regional north trending fault zone.

Tin mineralisation of the Dalcouth and Summerhill deposits are hosted within the Hodgkinson Formation turbidite sandstones and siltstones in fine anastomosing quartz-cassiterite veins and fractures associated with strong chlorite alteration of the host rock (MGT Minerals, 2018).

Application of acid to some Hodgkinson Formation chip samples collected during drilling for the 2018 monitoring bore installations resulted in slight effervescence, suggesting the presence of carbonate minerals within the rock matrix. Keyser and Lucas (1968) notes that a small proportion of the Hodgkinson Formation turbidites are calcareous.

The stratigraphy of the local area is summarised in Table *7*.

Table 7 Local Stratigraphic Description

Age (Ma)	Group	Formation (code)	Description [1]
Quaternary (0 to 2)	-	Quaternary deposits(Qhh, Qa, Qr)	Alluvium, colluvium, sand, silt and gravel
Unconformity			
Upper Carboniferous (279 to 299)	-	Nanyetta Volcanics (Cyt)	Rhyolitic ignimbrite and lava, volcanic breccia; minor conglomerate(at base), andesite, tuff, tuffaceous sediments
Unconformity			
Carboniferous (318 to 326)	O'Briens Creek Supersuite	Elizabeth Creek Granite (Cgb/33)	Pink and pale grey leucocratic, biotite, adamellite granite, apliteand greisen
Unconformity			
Devonian to Late Silurian (360 to 414)	-	Hodgkinson Formation (Dh/am)	Thin bedded greywacke, sandstone, siltstone, shale and conglomerate

1 Australian Stratigraphic Units Database; http://www.ga.gov.au/data-pubs/data-standards/reference-databases/stratigraphic-units

A geological cross section is shown in Figure *8*, which is taken from the Mount Garnet 1:63,360 Geological Series, Sheet 67, Zone 7 (Yates and Blake, 1970) geological map and runs from east-northeast to west-southwest approximately 1 km north of the Dalcouth deposit.

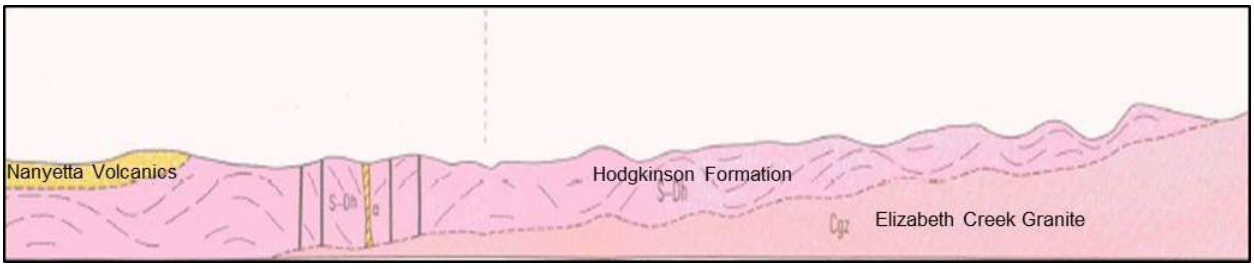


Figure 8 Schematic Geological Cross Section

3.1.4 Site Hydrology and Fluvial Networks

The Project is wholly contained within the upper reaches of the Herbert River Basin and is located around 4km south of the northern catchment boundary. The creeks upstream and surrounding the Project are ephemeral and flow in response to rainfall.

A number of water features surround the Project area which are defined as watercourses, in accordance with the definition of a watercourse specified in the Water Act. These are:

- Males Creek;
- Mayday Creek; and
- Copper Creek.

These drainage features are minor in nature, are ranked as either first or second order drainage features and are classified as non-perennial. This implies that the drainage features do not continually contain water and the stream flow is seasonal in nature and directly following rainfall events.

The Project surface infrastructure is located within the Males Creek catchment, with the mine pit and waste dump adjoining the Copper Creek catchment, as shown in Figure 11.

Environmental values of regional waterways are identified in the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019*. The Project area lies within the Herbert River drainage sub-basin.

The environmental values and water quality objectives for the waters located in this region are detailed in the 'Herbert River Basin Environmental Values and Water Quality Objectives (October 2020)' as prescribed in Schedule 1 of the EPP (Water). The environmental values for the Herbert River (upper western) fresh waters are:

- Aquatic ecosystems;
- Irrigation;
- Farm supply/use;

- Stock water;
- Human consumer;
- Primary recreation;
- Drinking water;
- Industrial use; and
- Cultural and spiritual values.

Surface water quality has been tested in the project area since 2008. The results from sites upstream and downstream of the project infrastructure are summarised here. Table 8 lists the sites and locations. Figure 9 illustrates the location of these monitoring sites.

Table 8 Surface Water Quality Test Sites

Monitoring Site	Monitoring Site Description	Location		Sampling History / Comment
		Easting	Northing	
Reference Sites				
SW10	Upstream Copper Creek	304127	8056133	2 samples in 2022
SW4	Upstream Males Gully	305869	8057008	54 samples; 2013-2018, 2022
SW4a	Upstream Mayday Creek	305630	8055650	8 in 2013-2014
SW11	Upstream Males Gully	305190	8056045	8 in 2021-2022
Compliance Sites				
SW3	Copper Creek	303550	8055710	6 samples in 2013-2022
SW1	Spillway of existing TSF	304105	8055230	73 samples; 2014-2015, 2022
SW8	Males Creek downstream of existing TSF	303898	8055283	140 samples; 2013-2022
SW9	Males Gully boundary compliance point	303366	8055166	97 samples; 2013-2022
SW12	Unnamed watercourse downstream Summerhill Pit	305077	8055840	7 samples; 2021-2022

Note; co-ordinates are MGA, GDA94, zone 55

Water quality test results at the upstream reference sites in Males Gully are summarised in Table 9. These results for the period up to May 2022 are indicative of the water quality upstream of the project areas in Males Gully. Note that SW12 is considered a reference site until mining commences at Summerhill Pit.

Table 9 Summary of Water Quality Test Results, Reference Sites Males Gully

Parameter	Unit	80th percentile of SW 4, 4a 11, 12		Relevant guideline level
		(dissolved)	(total)	(dissolved)
pH	***pH. units***	6.6 – 7.3	NA	6-7.5 [3]
EC	***uS/cm***	166	NA	106 [3]
Turbidity	***NTU***	54.2	NA	5 [3]
Sulfate	***mg/L***	2.0	NA	2 [3]
Fluoride	***mg/L***	0.5		0.11 [3]
Al	***mg/L***	2.42	7.9	0.055 [4]
As	***mg/L***	0.00596	0.0114	0.013 [4]
Cd	***mg/L***	NA	NA	0.0002 [4]
Cr	***mg/L***	NA	0.0042	0.001 [4]
Co	***mg/L***	0.004	0.0013	0.0014 [4]
Cu	***mg/L***	0.15	0.011	0.03 [3]
Pb	***mg/L***	0.0066	0.0037	0.0034 [4]
Mn	***mg/L***	0.036	0.0796	1.9 [4]
Hg	***mg/L***	NA	NA	0.0006 [4]
Ni	***mg/L***	NA	0.0024	0.011 [4]
Se	***mg/L***	NA	NA	0.011 [4]
Ag	***mg/L***	NA	0.0002	0.00005 [4]
Zn	***mg/L***	0.014	0.031	0.02 [3]

[3] Herbert River HRWQO Table 2.1

[4] ANZECC Guidelines 2018; 95% protection

NA = statistical results reflect site results all at or below limit of detection

- = not relevant for this assessment

* F value calculated represents 80th percentile value of 2021/2022 results from SW3,4,4a,10,11,12 + clean water dam 2

for pH, 20th/80th percentile used for lower / upper limit.

Water quality test results at the upstream reference sites in Coppers Gully are summarised in Table 10. These results for the period up to May 2022 are indicative of the water quality upstream of the project areas in Copper Gully. Note that SW3 is considered by MGT an undisturbed site until mining commences at Dalcouth Pit.

Table 10 Summary of Water Quality Test Results, Reference Sites Copper Gully

Parameter	Unit	80th percentile of SW 3, 10		Relevant guideline level
		(dissolved)	(total)	(dissolved)
pH	***pH. units***	6.9 -7.7	NA	6-7.5 [3]
EC	***uS/cm***	73	NA	106 [3]
Turbidity	***NTU***	62	NA	5 [3]
Sulfate	***mg/L***	1.1	NA	2 [3]
Fluoride	***mg/L***	0.7 *	NA	0.11 [3]

Parameter	Unit	80th percentile of SW 3, 10		Relevant guideline level
Al	***mg/L***	2.64	9.4	0.055 [4]
As	***mg/L***	0.008	0.0084	0.013 [4]
Cd	***mg/L***	NA	NA	0.0002 [4]
Cr	***mg/L***	NA	0.0028	0.001 [4]
Co	***mg/L***	NA	0.0008	0.0014 [4]
Cu	***mg/L***	0.008	0.016	0.03 [3]
Pb	***mg/L***	NA	0.0036	0.0034 [4]
Mn	***mg/L***	0.008	0.041	1.9 [4]
Hg	***mg/L***	NA	NA	0.0006 [4]
Ni	***mg/L***	NA	0.0019	0.011 [4]
Se	***mg/L***	NA	NA	0.011 [4]
Ag	***mg/L***	NA	NA	0.00005 [4]
Zn	***mg/L***	NA	0.037	0.02 [3]

[3] Herbert River HRWQO Table 2.1

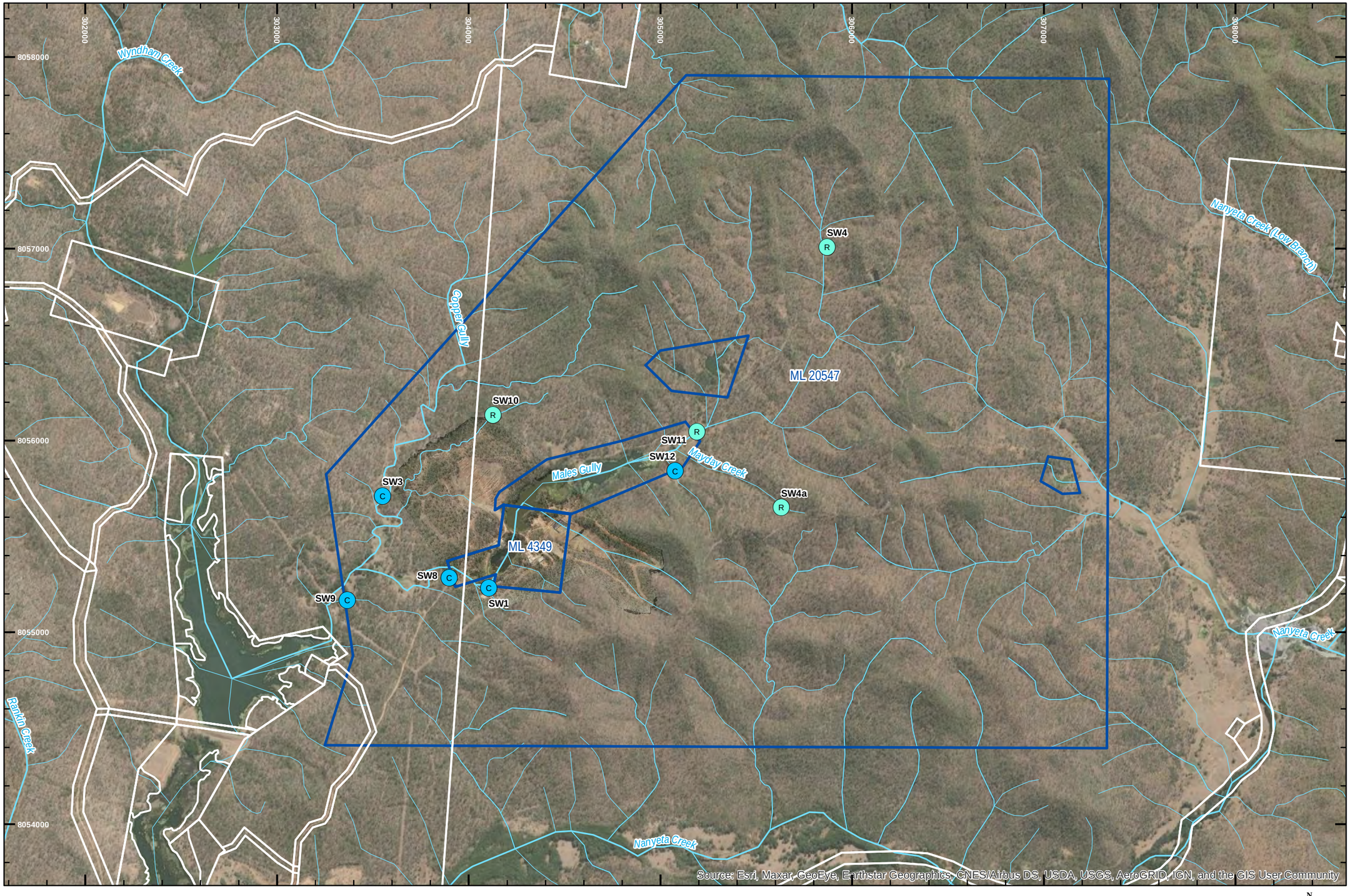
[4] ANZECC Guidelines 2018; 95% protection

NA = statistical results reflect site results all at or below limit of detection

* F value calculated represents 80th percentile value of 2021/2022 results from SW3,4,4a,10,11,12 + clean water dam 2

for pH, 20th/80th percentile used for lower / upper limit

The proposed water supply for the plant (when operating) will come from water stored in three different storage ponds: A clear water pond, a settling pond at the lower end of the new TSF, and the Plant (clear water) pond to the west of the plant. The new TSF will have an under-draining filter system to clean the process water and flow back into the ponds at the lower end of the new TSF where it will return to the process plant pond for re-use in further processing, as shown in Figure 10.



0 200 400 600 800 1,000

Meters

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Mount Veteran Overview

N W E S

GDA94, MGA Zone 55

ARDENT GROUP PTY LTD

Figure 9 - Site EA Surface Water Monitoring Locations

Drawn By:	Chris Schlebusch
Requested by:	Jacob Arnold
Date:	17/06/2021

Sheet No.
RTPL_ARD_MGT003_MAP_0004_A

- Mining Lease Boundary
- Property Boundary
- Watercourse
- C — Surface Water Monitoring Site - Compliance
- R — Surface Water Monitoring Site - Reference

Data sources:
©Qld Department of Resources,
©Geoscience Australia

Path: S:\Plans\Project_Specific\Ardent\MGT003\RTPL_ARD_MGT003_MAP_0004_A A3L Mt Veteran Surface Water Monitoring Sites.mxd

303500
304000
304500
305000
305560
8056000
8055500
8055000
Males Gully
Mayday Creek
Clear Water Dam 1
Clear Water Dam 2
Buffer Pond
New TSF
Old TSF
Copper Gully
Males Gully
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
0 50 100 150 200 250
Meters
N
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S
GDA2020, MGA Zone 55

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Mount Veteran Overview

ARDENT GROUP PTY LTD

Figure 10 - Water Management Infrastructure

Drawn By:	Chris Schlebusch
Requested by:	Richard Davis
Date:	23/08/2022

Sheet No.
RTPL_ARD_MGT001_MAP_0009_C

- Mining Lease Boundary
- Mt Veteran Project Footprint
- Watercourse
- Clean Water Diversion
- Pipeline
- Clear Water Dam
- Pit Water
- Mine Affected Water
- Infrastructure Affected Water
- Environmental Sump
- Plant Pond
- Clear Water Pond
- Settling Pond
- Buffer Pond

Data sources:
©State of Queensland, Department Resources

Path: S:\Plans\Project_Specific\Ardent\MGT001\RTPL_ARD_MGT001_MAP_0009_C A3L Mt Veteran Site Water Management.mxd

The capacity of the ponds on site has been summarised in Table 11.

Table 11 Pond design parameters

Pond	Design Capacity
Process Water Pond (including clear water and settling sections)	22.795 ML
Plant Pond	1.421 ML
Clear Water Dam 1	86ML
Clear Water Dam 2	112ML

Water quality data is not available for all water storage structures on site. The new TSF and process water pond do not yet contain any water. Results from sampling from the clear water dam 1, clear water dam 2 and the Existing TSF is shown in Table 12 .

To get an understanding of the potential water quality within these ponds and new TSF, the water quality from the existing TSF has been used as guidance for the predicted water quality within the process water pond and plant pond.

The clear water dams are currently utilised by the landowner for stock watering. Water quality in the existing TSF is similar to the water quality in clear water dam 2.

Comparing the levels of salinity in the existing TSF to the salinity tolerance for livestock in drinking water, the salinity levels in the Existing TSF are much lower. There are no adverse effects on beef cattle with total dissolved solids (TDS) levels of up to 4000 mg/L. TDS is a measure of all inorganic salts dissolved in water and can be estimated from EC using the following equation:

$$EC\ (\mu S/cm) \times 0.67 = TDS\ (mg/L)$$

Converting the 80th percentile of EC measured in the Existing TSF to TDS results in a TDS level of 181 mg/L which is significantly lower than the recommended salinity levels in livestock drinking water.

In regard to fluoride, the recommended water quality trigger value for livestock drinking water in the ANZECC Water Quality Guidelines is 2mg/L. The 80th percentile fluoride levels in the existing TSF are below 2 mg/L.

Across the dataset of samples taken from the existing TSF, there were no elevated levels of dissolved metals, exceeding the stock water quality guidelines.

There is no stock water quality guideline for pH.

It is noted that the combined volume from the process and plant ponds is approximately 25ML, compared with the volume in the clear water ponds of approximately 200ML.

In summary, water treatment is not considered to be required to achieve the rehabilitation outcomes.

Table 12 Water storage quality analysis

Contaminant	Unit	Stock Water Limit	Clear Water Dam 1 80th Percentile values		Clear Water Dam 2 80th Percentile values		Existing TSF 80th Percentile values	
			(dissolved)	(total)	(dissolved)	(total)	(dissolved)	(total)
pH	pH units	na	6.9 – 7.1	NA	7.0 -7.5	NA	7.48 -7.9	NA
EC	µS/cm	5,970	110	NA	180	NA	270	NA
Turbidity	NTU	N/A	22.6	NA	31	NA	5.3	NA
Sulfate	mg/L	1000	<0.05	NA	<0.5	NA	<0.5	NA
Fluoride	mg/L	2	0.4	NA	0.7	NA	1.1	NA
Aluminium	mg/L	5	0.91	2.0	1.56	2.94	0.062	0.12
Arsenic	mg/L	0.5	0.006	0.0087	0.01	0.0146	0.01	0.012
Cadmium	mg/L	0.01	0.001	0.0052	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	mg/L	1	0.0009	0.0084	0.0009	0.0022	<0.0005	<0.0005
Cobalt	mg/L	1	<0.0005	0.0007	<0.0005	0.0009	<0.0005	<0.0005
Copper	mg/L	1	0.0034	0.0079	0.0045	0.0106	0.0025	0.0037
Lead	mg/L	0.1	0.0011	0.003	0.00084	0.0025	<0.0005	<0.0005
Manganese	mg/L	N/A	0.0154	0.051	0.027	0.1036	0.018	0.138
Mercury (inorganic)	mg/L	0.002	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Nickel	mg/L	1	0.0015	0.0024	0.0007	0.0015	<0.0005	<0.0005
Selenium	mg/L	0.02	<0.001	0.0026	<0.001	0.0018	<0.001	<0.001
Silver	mg/L	N/A	0.00008	<0.00005	0.0002	<0.00005	<0.00005	<0.00005
Zinc	mg/L	20	0.022	0.023	0.014	0.027	0.013	0.016

Note – all metals are dissolved metals. Stock water limits from ANZECC Guidelines, Chapter 9, N/A = no limit specified
Ph range; 20th – 80th percentile

295000
300000
305000
310000
8055000
8050000
Wyndham Creek
Derwent Creek
Copper Gully
Males Gully
Wales Gully
ML 20547
ML 4349
Rankin Creek
Wyndham Dam
Sheepyard Creek
Crooks Dam
Nanyeta Creek
Tummulendah Creek (West Branch)
Tummulendah Creek (East Branch)
Tummulendah Creek
Nanyeta Creek
Five Mile Creek
Butler Gully
Micky Oaks Gully
Ballhooly Gully
Nettle Creek
Glirton Creek
ML 4249
Herbert River, approx. 25km downstream
ML 20541
ML 20034
Limestone Creek
ML 20530
Battle Creek
Dreadnought Gully
John Dhu Creek
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 0.5 1 1.5 2 2.5
Kilometers

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Mount Veteran Overview

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GDA2020, MGA Zone 55

ARDENT GROUP PTY LTD

Figure 11 - Local and Regional Site Drainage

Drawn By:	Chris Schlebusch
Requested by:	Richard Davis
Date:	17/01/2022

Sheet No.
RTPL_ARD_MGT002_MAP_0017_A

- Mining Lease Boundary
- Project Footprint
- Watercourse
- Reservoir

Data sources:
©State of Queensland, Department of Resources

Path: S:\Plans\Project_Specific\Ardent\MGT002\RTPL_ARD_MGT002_MAP_0017_A A3L Surface Water Drainage.mxd

3.1.5 Flooding

Intermittent flooding is a natural feature of the landscape, reflected in the predominance of ephemeral watercourses. Flood modelling was conducted in 2018 and indicated no adverse flood impacts external to the site as a result of the Project. This flood modelling information provided with the 2018 EA amendment was considered sufficient for DES and the Land Court to determine that the landform was stable, resulting in approval of the design in 2020.

The flood impact assessment quantified the flood constraints of the site and provided preliminary design of mitigation features to ensure acceptable flood outcomes in accordance to current best practice and guidelines. Analysis of design storm events were conducted in terms of Annual Exceedance Probability (AEP). The flood model extent is illustrated in Figure 12.

Flood modelling considered the location of domains in relation to potential flood levels. Upstream and downstream effects were considered. Flood levels, including probable maximum flood levels were determined for a range of design storm events (0.1%, 1%, 5%, 10% and 20% AEP (10 minutes to 6 days) and point temporal patterns were simulated over the catchment.

Hydraulic assessments translated hydrologic discharge estimates into flood levels, flow velocities and inundation extents, to determine hazardous flood areas. The hydraulic model results also indicated the predicted flood impacts and identified areas where additional hydraulic controls, such as bunding or diversion drains, may be required.

In accordance with the ARR16 methodology, the predicted peak flood level, depth and velocity grids were extracted from the model for the existing and developed case scenarios, respectively. Results grids were overlaid with contours and pertinent site features and are presented as maps in Appendix 3.

The estimated flood peak in the 1%AEP event (MGT Minerals, 2018), post development is illustrated in Figure 13.

In detail, and of relevance when assessing the suitability of the New TSF landform and the flood model;

a- The height of the 0.1% AEP flood (1 in 1000-year flood) is ~730m above sea level, in Males Gully, downhill from the New TSF embankment
b- The toe of the NEW TSF embankment is at a height of 740m above sea level, in this location.
c- There is no flood scenario, that could be imagined, where the height of water in Males Gully would be a full 10m above the 1 in 1000-year flood event.

For this reason, the design of the New TSF is considered to be unaffected by flood flow in Males Gully.

It should be noted that there will be no remaining structures in the location of the Existing (old) TSF that have the potential to be adversely affected by flooding. The land will be recontoured to match existing, subsoil and topsoil replaced and revegetated. The stability of the area will be the same as undisturbed areas upstream and downstream.

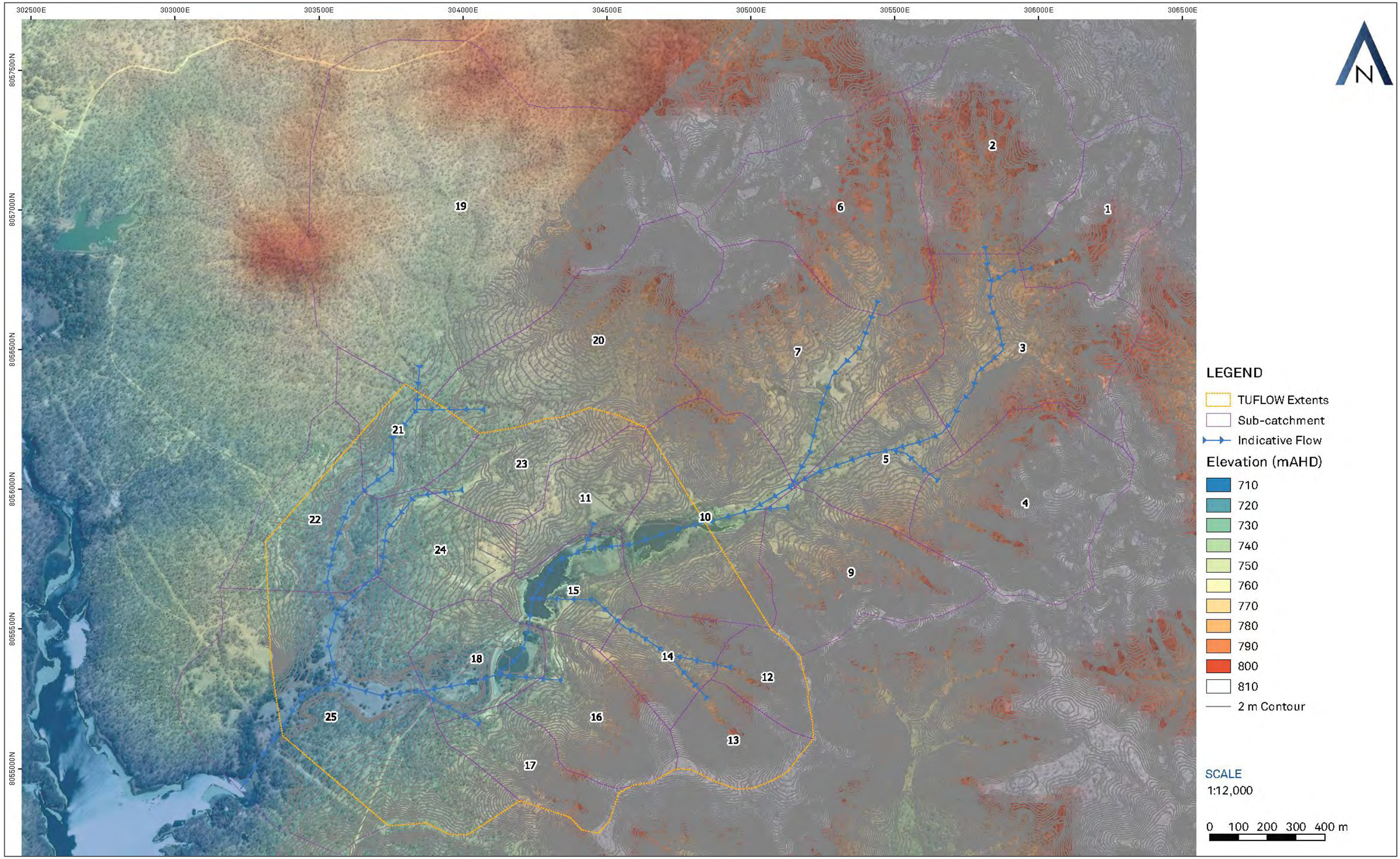
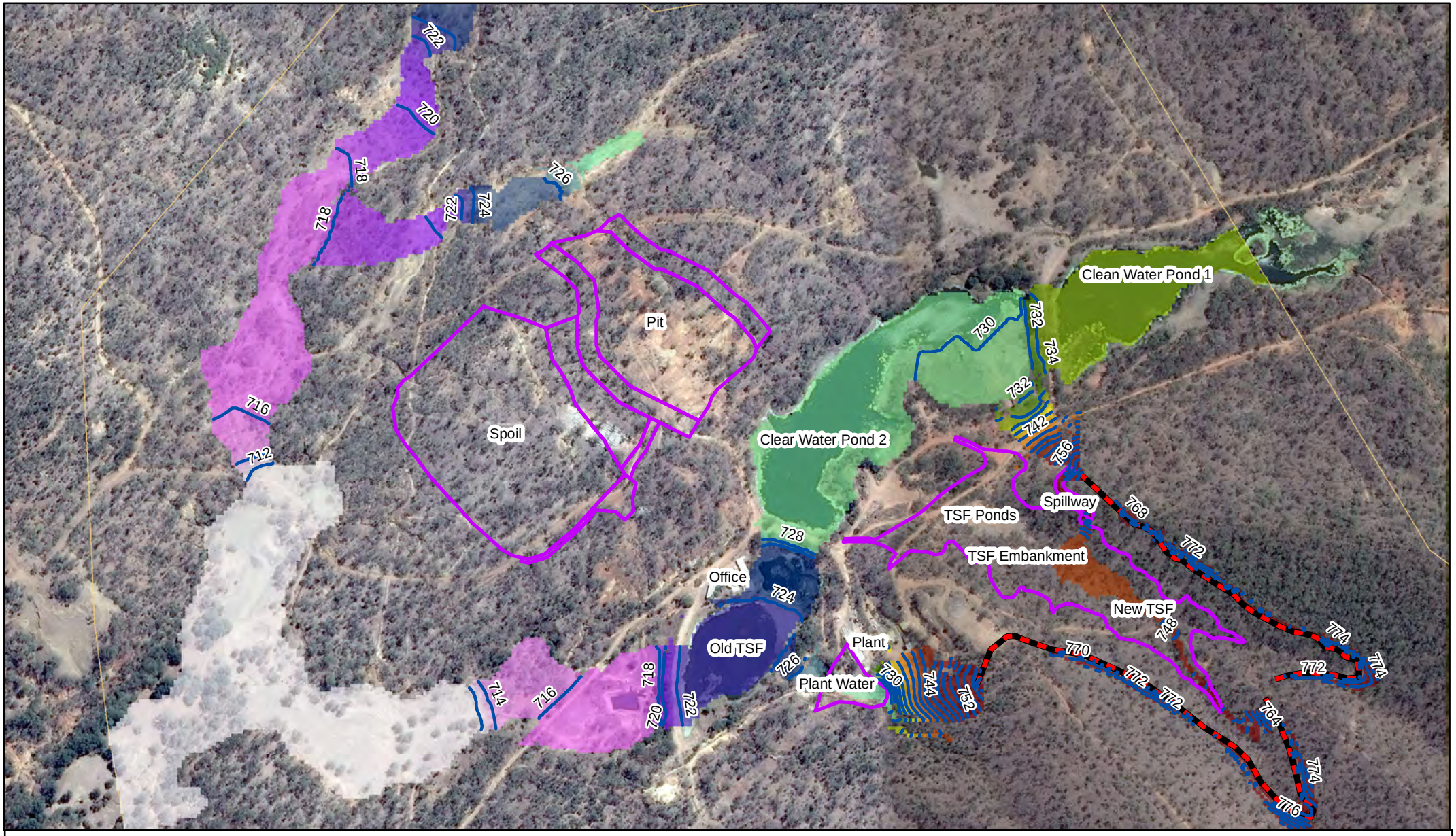


Figure 12 Flood Model Extent



N

0 62.5 125

Metres

Scale @ A4 1:6,700
Date: 05/09/18
Drawn: Stuart B.

Legend

- TUFLOW Extents
- Diversion Channels
- 2m Contour

Peak Flood Level (mAHD)
High : 750
Low : 712

Figure 13

Developed Case Peak Flood Level 1% AEP
Flood Impact Assessment
Dalcouth Tin Mine

DATA SOURCE:

Client: MGT Minerals
Project: BES170407.05

Source; CDM Smith

3.1.6 Groundwater Levels and Properties

A comprehensive assessment of hydrogeology of the project was documented in the report "Groundwater Assessment Report, Ardent Group, 25 January 2022", included as Appendix 4. The hydro stratigraphic units (HSU) of rocks within the local area is summarised in Table 13.

Three HSUs are present. These are the Hodgkinson Formation, Elizabeth Creek Granite and the Quaternary deposits. The Elizabeth Creek Granite is recorded in bore MB4 and MB12 (at depth).

The Hodgkinson Formation can be considered as an aquitard, with low hydraulic conductivity, transmissivity and (likely) storativity values. The Elizabeth Creek Granite is inferred to also behave as an aquitard, based on typical behaviour of granite plutons. The Quaternary deposits likely form a poor to moderate aquifer of variable hydraulic properties, depending upon coarseness of clastic materials and degree of sorting, as well as the degree of anthropogenic reworking.

Table 13 Hydro stratigraphic unit details

HSU	Description	Aquifer / Aquitard
Quaternary Deposits	Reworked clay, gravel, silt and sand. Variable hydraulic properties according to composition.Likely to form a perched aquifer above the underlying Hodgkinson Formation. Reworking by earlier mining operations will likely limit aquifer potential.	Poor Aquifer.
Hodgkinson Formation	Deformed marine siliclastic rocks, dominated by deep water turbidite sequences, including greywackes. Largely composed of metamorphosed shale and quartzites in Dalcouth area with astrongly developed cleavage. Hydraulic properties determined by degree of secondary porosity (fractures, fissures and cleavage partings). Groundwater movement is dependent on interconnection of fracture sets and there is evidence that this is poor, with pockets of groundwater being hydraulically isolated.	Aquitard
Elizabeth Creek Granite	Pink and pale grey leucocratic, biotite, adamellite granite. Essentially undeformed intrusive volcanics, with hydraulic properties likely determined by degree of secondary porosity (fractures, joints). Groundwater movement is inferred to be poor in this formation.	Aquitard

The groundwater environmental values are identified in the *EPP (Water and Wetland Biodiversity)* and QWQG. The environmental values for groundwater are also detailed in the 'Herbert River Basin Environmental Values and Water Quality Objectives (October 2020)'. The environmental values for the Herbert River Basin Groundwaters (Tableland) are:

- Aquatic ecosystems – these occur where groundwater baseflow supports permanent streams and water holes to some extent (e.g. seasonally or permanently). This interaction can occur in tidal and estuarine zones, as well as in freshwater areas;
- Irrigation – where groundwater is used to grow crops and pastures for commercial purposes;
- Farm supply / use – where groundwater is used to provide domestic supply and support

growing of domestic produce;

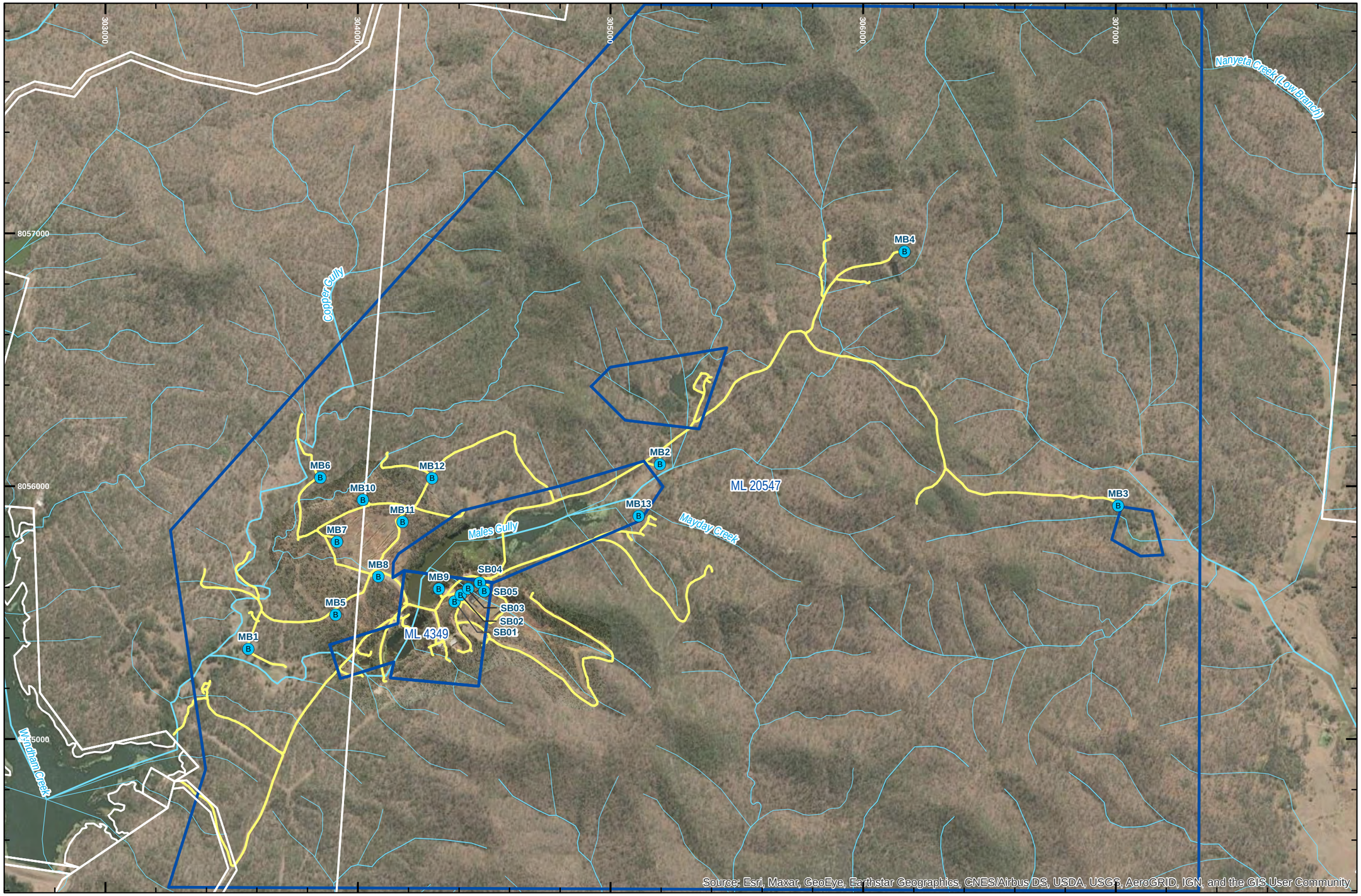
- Stock water – where groundwater is used to provide stock water supplies;
- Drinking water – where groundwater is used for potable water supply;
- Industrial use – where groundwater is used for industrial purposes; and
- Cultural and spiritual – where groundwater supports both indigenous and non-indigenous values, e.g. recreational fishing, heritage, ecology. This interaction can occur in tidal and estuarine zones, as well as in freshwater areas.

The nearest registered bore, outside of the monitoring bores on the mining lease, is over 8km to the south of the site. This reflects the poor groundwater yields from the tight aquifer in the Hodkinson Formation. The quality of the groundwater would generally make it suitable for stock use, except for the concentration of Fluoride which can be greater than the stock water guideline level of 2mg/L. However, as evidenced above, the characteristics of the aquifer mean that extracting groundwater from the aquifer is generally not feasible for this use.

Groundwater bores have been installed in 2009 (MB1 to 3), 2012 (MB4) and 2018 (MB 5 to 12). Groundwater bore MB13 and shallow bores SB01 – SB05 were installed in 2021. The details of these bores are summarised in Table *14*. The bore locations are shown in Figure 14. The lithological logs show the dominant lithology in the project area is comprised of sandstone, siltstone, mudstone and shale; as well as minor rhyolitic extrusives and minor granitic intrusives.

Table 14 Groundwater Monitoring Bore Location and Summary Details

Monitoring Bore	Co-ordinate (MGA94 Zone 55)		Surface RL (m)	Screened Interval RL (m)	Monitoring Frequency
	Easting	Northing			Standing Water Level and Groundwater Quality
Monitoring Bores					
MB1	303,565	8,055,354	707	16 -22	Quarterly
MB2	305,195	8,056,085	742	16 - 22	
MB3	307,009	8,055,921	762	25 - 31	
MB4	306,163	8,056,927	777	40 - 52	
MB5	303,911	8,055,490	729	35 – 48	
MB6	303,850	8,056,032	727	13 – 19	
MB7	303,916	8,055,778	726	18 – 40	
MB8	304,080	8,055,641	740	30 – 42	
MB9	304,319	8,055,592	731	5 – 7	
MB10	304,019	8,055,944	733	23 – 47	
MB11	304,176	8,055,858	756	36 – 48	
MB12	304,292	8,056,030	749	31 – 42	
MB13	305,111	8,055,807	752	25 - 35	
Shallow Groundwater Monitoring Bores					
SB01	304,384	8,055,540	735	4 - 10	Quarterly
SB02	304,408	8,055,568	734	3 - 6	
SB03	304,424	8,055,595	731	4 - 7	
SB04	304,483	8,055,609	734	1.5 - 5	
SB05	304,503	8,055,586	738	2 - 6	



0 200 400 600 800 1,000

Meters

MGT MINERALS PTY LTD

Mount Veteran Overview

N W E S

GDA2020, MGA Zone 55

ARDENT GROUP PTY LTD

Groundwater Monitoring Sites

- Mining Lease Boundary
- Property Boundary
- Watercourse
- Access Track
- Groundwater Monitoring Bore

Figure 14

Sheet No. RTPL_ARD_MGT003_MAP_0005_C

Drawn By: Chris Schlebusch

Requested by: Jacob Arnold

Date: 7/09/2021

Data sources: ©Queensland Department of Resources.

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Table 15 Bore Hydrostratigraphic Units and Sampling Events

Bore	Hydrostratigraphic Unit	Completion Date	Sampling Period	Total Number of Samples (up to end 2022)
MB1	Hodkinson Formation	2009	2013- 2022	44
MB2	Hodkinson Formation	2009	2018-2022	17
MB3	Hodkinson Formation	2009	2018-2022	19
MB4	Hodkinson Formation	2013	2013-2022	41
MB5	Hodkinson Formation	2018	2018-2022	18
MB6	Hodkinson Formation	2018	2020-2022	16
MB7	Hodkinson Formation	2018	2018-2022	17
MB8	Hodkinson Formation	2018	2018-2022	18
MB9	Alluvials	2018	2020-2022	16
MB10	Hodkinson Formation	2018	2018-2022	17
MB11	Hodkinson Formation	2018	2018-2022	17
MB12	Hodkinson Formation	2018	2018-2022	18
MB13	Hodkinson Formation	2021	2021-2022	9
SB01*	Alluvials /Hodkinson Formation	2021	2021-2022	4
SB02*	Alluvials /Hodkinson Formation	2021	2021-2022	3
SB03	Alluvials /Hodkinson Formation	2021	2021-2022	6
SB04*	Alluvials /Hodkinson Formation	2021	2021-2022	4
SB05*	Hodkinson Formation	2021	2021-2022	0

* Instances in 2022 where SB bores were dry

In terms of potential impacts on groundwater quality in the area, the Herberton Region has been subject to tin (and to a lesser extent copper and lead) exploration and mining activity since 1898. Historical disturbance has included the use of mobile plant and dredging to extract tin from surficial soils, sands and gravels in the gullies and adjacent hill slopes, together with shallow costean, pit and adits to access hard rock tin deposits. Surface infrastructure from historical mining includes clean water dams, sand/gravel spoil deposits and a tailings dam constructed in Males Gully.

Recent exploration and mining activity includes exploration drilling (percussion and diamond drilling) and shallow costeans (up to approximately 3m below surface). The majority of groundwater bores have intersected the Hodkinson Formation hydrostatic unit. Assessment of the potential for impact of historical or current mining activities on the Hodkinson Formation hydrostratigraphic unit has concluded that no historical or current site activities are considered to have adverse impacts on groundwater quality or quantity in the Hodkinson Formation.

An assessment of the ionic composition of the groundwater plotting ionic chemistry from the June 2021 sampling indicated:

- All bores cluster within close proximity in the ionic diagrams;
- All waters are bicarbonate rich and vary from Na dominant to Ca dominant;
- MB4 and MB6 plot with slightly elevated Na compared with the other bores;
- MB9 has similar ionic chemistry, but lower EC when compared with the other bores; and

- No evolution of groundwater chemistry across the project area is discernible, perhaps implying that the groundwater from bore to bore is not well connected, but instead reflects the bulk chemistry of the host formation.

On the basis of the ionic chemistry results, it would be reasonable to conclude that the groundwater in all the monitoring bores is from the same hydrostratigraphic unit (i.e. Hodkinson Formation). Based on knowledge of the geology and the relative groundwater pressure head levels, it is interpreted that MB9 intersects groundwater in the upper alluvials hydrostratigraphic unit.

The quality of the groundwater was subject to detailed assessment during an EA amendment in 2022. The result of this assessment was a new table of Groundwater Quality Objectives in the EA, reproduced in Table 16.

Table 16 Groundwater Quality Objectives (taken from Table E4 EPVL00864413)

Monitoring Bores Water Quality Objectives[1]																	
Quality Characteristic	Unit	MB1		MB2		MB3 and MB8		MB4 and MB5		MB6 and MB10		MB7 and MB11		MB12 and MB13		MB9	
		Limit A	Limit B	Limit A	Limit B	Limit A	Limit B	Limit A	Limit B	Limit A	Limit B	Limit A	Limit B	Limit A	Limit B	Limit A	Limit B
pH	pH units	6.9 - 7.9[2]		6.9 - 7.9[2]		6.9 - 7.9[2]		6.9 - 7.9[2]		6.9 - 7.9[2]		6.9 - 7.9[2]		6.9 - 7.9[2]		6.9 - 7.9[2]	
EC	µS/cm	-	997[2]	1380[4]	1400[5]	810[4]	828.5[5]	-	997[2]	1400[4]	1600[5]	-	1200[5]	-	1200[5]	444[4]	511.5[5]
Sulfate	mg/L	8.94[4]	9.72[5]	12[2]	13.45[5]	7.4[4]	8.025[5]	5.82[4]	6.61[5]	45[4]	72[5]	23[4]	25.8[5]	37.0[4]	38.25[5]	1.52[4]	3.77[5]
Aluminium	mg/L	-	0.055[3]	-	0.055[3]	-	0.055[3]	-	0.055[3]	0.064[3]	0.245[5]	-	0.055[3]	-	0.055[3]	0.06[4]	0.075[5]
Arsenic	mg/L	-	0.013[3]	-	0.013[3]	0.013[3]	0.0167[5]	0.0406[4]	0.1051[5]	0.065[4]	0.084[5]	0.0224[4]	0.0355[5]	0.017[4]	0.022[5]	-	0.013[3]
Cadmium	mg/L	0.0005[4]	0.00082[5]	0.0002[3]	0.00036[5]	-	0.0002[3]	0.0003[4]	0.0004[5]	-	0.0002[3]	0.0002[3]	0.00044[5]	0.0002[3]	0.00035[5]	-	0.0002[3]
Chromium	mg/L	-	0.001[3]	-	0.001[3]	-	0.001[3]	-	0.001[3]	-	0.001[3]	-	0.001[3]	-	0.001[3]	-	0.001[3]
Cobalt	mg/L	-	0.001[3]	-	0.002[5]	0.003[3]	0.00625[5]	0.001[3]	0.002[5]	0.006[3]	0.008[5]	-	0.001[3]	-	0.002[5]	-	0.001[3]
Copper	mg/L	-	0.02[2]	-	0.02[2]	-	0.02[2]	-	0.02[2]	-	0.02[2]	-	0.02[2]	-	0.02[2]	-	0.02[2]
Fluoride	mg/L	2.60[4]	2.64[5]	3.70[4]	4.145[5]	3.34[4]	3.685[5]	2.70[4]	3.10[5]	2.70[4]	2.9[5]	3.54[4]	4.04[5]	4.2[4]	4.675[5]	0.40[4]	0.45[5]
Lead	mg/L	-	0.0034[3]	-	0.0034[3]	-	0.0034[3]	-	0.0034[3]	-	0.0034[3]	-	0.0034[3]	-	0.0034[3]	-	0.0034[3]
Manganese	mg/L	-	0.037[3]	0.19[4]	0.20[5]	0.364[4]	0.4525[5]	0.412[4]	0.491[5]	1.1[4]	1.7[5]	0.240[4]	0.440[5]	1.0[4]	1.10[5]	0.248[4]	0.33[5]
Mercury (inorganic)	mg/L	-	0.0006[3]	-	0.0006[3]	-	0.0006[3]	-	0.0006[3]	-	0.0006[3]	-	0.0006[3]	-	0.0006[3]	-	0.0006[3]
Nickel	mg/L	-	0.011[3]	-	0.011[3]	-	0.011[3]	-	0.011[3]	-	0.011[3]	-	0.011[3]	-	0.011[3]	-	0.011[3]
Selenium	mg/L	-	0.011[3]	-	0.011[3]	-	0.011[3]	-	0.011[3]	-	0.011[3]	-	0.011[3]	-	0.011[3]	-	0.011[3]
Silver	mg/L	-	0.00005[3]	-	0.00005[3]	-	0.00005[3]	-	0.00005[3]	-	0.00005[3]	-	0.00005[3]	-	0.00005[3]	-	0.00005[3]
Zinc	mg/L	-	0.054[3]	-	0.054[3]	-	0.054[3]	-	0.054[3]	-	0.054[3]	-	0.054[3]	-	0.054[3]	-	0.054[3]
Other major ions	mg/L	**For interpretive purpose**															

[1] All metals and metalloids must be measured as 'dissolved' (from analysis of a field filtered sample).

[2] 80th percentile (moderate depth) - Table 4.3 Water quality objectives to protect aquatic ecosystem EVs for Groundwater Chemistry Group (refer to Plan WQ1083) – Sodic – 10 Granitic uplands and slopes, Environmental Protection (Water) Policy 2009 Herbert River Basin Environmental Values and Water Quality Objectives.

[3] ANZECC (2000) trigger levels for 95% aquatic ecosystem protection for slightly to moderately disturbed ecosystems.

[4] 80th percentile bore data

[5] 95th percentile bore data

3.1.7 Soil Types, Properties and Productivity

The soils within the Project area are mapped as Rudosols and Tenosols under the Australian Soil Resource Information System (ASRIS) mapping, as shown in Figure 15, as well as Red Kandosols and Brown Kandosols.

Soils across the site have been subject to a more detailed assessment and classification in 2018. Three main soil types were identified, Rudosols, Red Kandosols and Brown Kandosol. Assessment of the sodicity of the topsoil and subsoils across the site was undertaken.

Topsoil thickness is indicated by field classifications of A horizons, which varied by soil type as follows:

- Rudosols, range 0.1 to 0.2m, (SS01, SS07, SS08 and SS09);
- Red Kandosol, 0.2m (SS02); and
- Brown Kandosol, range 0.1 – 0.15m (SS03, SS04, SS05 and SS06).

The median topsoil thickness reported in the 2018 assessment is 0.15 m.

The results indicated that the A and B horizon soils are non-sodic, while deeper A horizons show a tendency towards a sodic soil, especially in the Red Kandosols. The electrical conductivity of soil samples was rated Very Low across the Project area, indicating soil salinity is generally not a limitation for vegetation growth.

The results of the extensive test work are summarised in Table 17.

Table 17 Summary of soil test work

Field soil type	Sample number	Item	Result	Interpretation
Rudosols	SS1,7,8,9	Topsoil thickness	0.1 – 0.2 m	-
		Emmerson Class	3,4	The soil remoulded at the plastic limit disperses in water; to non-dispersive
		Exchangeable Sodium Percentage	0.7 – 5.4	Non-sodic
		Electrical Conductivity dSm^{-1}	0.006 – 0.013	Very low
		pH	5.3 – 5.9	Acidic
		Cation Exchange Capacity meq/100g	1.8 -8.7	Very low to low
		Reactive P (mg/kg)	6 - 8	Marginal P (response to P likely)
		Total Kjeldahl	0.027 –	Very low to low

Field soil type	Sample number	Item	Result	Interpretation
		nitrogen (mg/kg)	0.5	
		Total Organic Carbon %	<0.5 – 1.0	Very low to low
Red Kandosol	SS2	Topsoil thickness	0.2m	-
		Emmerson Class	8	Non-dispersive
		Exchangeable Sodium Percentage	0.7 – 4.3	Non-sodic Deeper samples in C horizon were sodic
		Electrical Conductivity dSm^{-1}	0.009 – 0.01	Very low
		pH	5.4-5.6	Acidic
		Cation Exchange Capacity meq/100g	1.8 -2.7	Very low to low
		Reactive P (mg/kg)	7	Marginal P (response to P likely)
		Total Kjeldahl nitrogen (mg/kg)	0.037	Very low
		Total Organic Carbon %	1.0	Low
Brown Kandosol	SS3,4,5,6	Topsoil thickness	0.1 – 0.15m	-
		Emmerson Class	3,8	Moderate dispersive tendency, to non-dispersive
		Exchangeable Sodium Percentage	0.6 – 5.4	Non-sodic Deeper samples in C horizon were sodic
		Electrical Conductivity dSm^{-1}	0.004 – 0.015	Very low
		pH	5.2 – 5.9	Acidic
		Cation Exchange Capacity meq/100g	1.9 – 14.6	Very low to medium
		Reactive P (mg/kg)	<5 - 10	Marginal P (response to P likely)
		Total Kjeldahl nitrogen (mg/kg)	0.041 - 0.11	Very low to low
		Total Organic Carbon %	0.6 – 1.0	Low

Based on these results, soil erosion susceptibility has been defined, as shown in Table 18.

303750
304000
304250
304500
304750
305000
305250
305500
8056000
8055750
8055500
8055250
ML 20547
ML 4349
0 50 100 150 200 250
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Mount Veteran Overview
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GDA94, MGA Zone 55
ARDENT GROUP PTY LTD
Figure 15 - Dalcouth Project Soils Classification (ASRIS)
Drawn By: Chris Schlebusch
Requested by: Jacob Arnold
Date: 21/10/2020
Sheet No.
RTPL_ARD_MGT002_MAP_0007_A
Mining Lease Boundary
Project Footprint
Summer Hill Pit
Mapped Soil Order (ASRIS)
Kandosols
Rudosols
Tenosols
Data sources:
©Qld Department of Natural Resources, Mines and Energy
©Geoscience Australia
© Commonwealth Scientific and Industrial Research Organisation
Path: S:\Plans\Project_Specific\Ardent\MGT002\RTPL_ARD_MGT002_MAP_0007_A A3L Soils Classification - ASRIS.mxd

Table 18 Soil erosion susceptibility

Soil Order	Sodicity	Emmerson Class	Texture	Landform	Vegetation cover	Erosion Susceptibility
Kandosol	Non-sodic	Class 4	Clay loam	Undulating rises	Variable but mostly cleared	Moderate-High on slopes in high intensity rainfall areas.
Rudosol	Non-sodic	Class 3	Loamy sand	Gently undulating plain	Grazed but not cleared	Low susceptibility due to sandy texture and flat terrain

3.1.8 Land Stability

The Project area is currently used for low-intensity grazing with unimproved pastures across both mining leases.

Historical mining activities are noted in some surrounding hills, comprising of shallow open cuts, costeans and narrow adits. Alluvial tin has been also dredged from local drainage lines historically, and the resulting landform has been modified in the gully areas of the site, including the remnant clean water ponds along Males Gully. There is a water storage, referred to as the Existing TSF, located in Males Gully, generally downstream of the site groundwater bores. Exploration activities have taken place in recent years, restricted to drilling and shallow costeans.

The Project site is considered geologically stable in its current state.

3.1.9 Vegetation Communities and Ecological Data

Vegetation to be disturbed by the development of the project is dominated by Regional Ecosystem (RE) 9.11.10 (Figure 16) and is classed as 'least concern' under the *Vegetation Management Act 1999*. This RE is classified as "of concern" biodiversity status. RE 9.11.10 is described as *Eucalyptus cloeziana*, *Corymbia citriodora subsp. citriodora*, *E. portuensis* and *E. cullenii* mixed woodland on steep dissected hills on highly metalliferous metamorphic rocks.

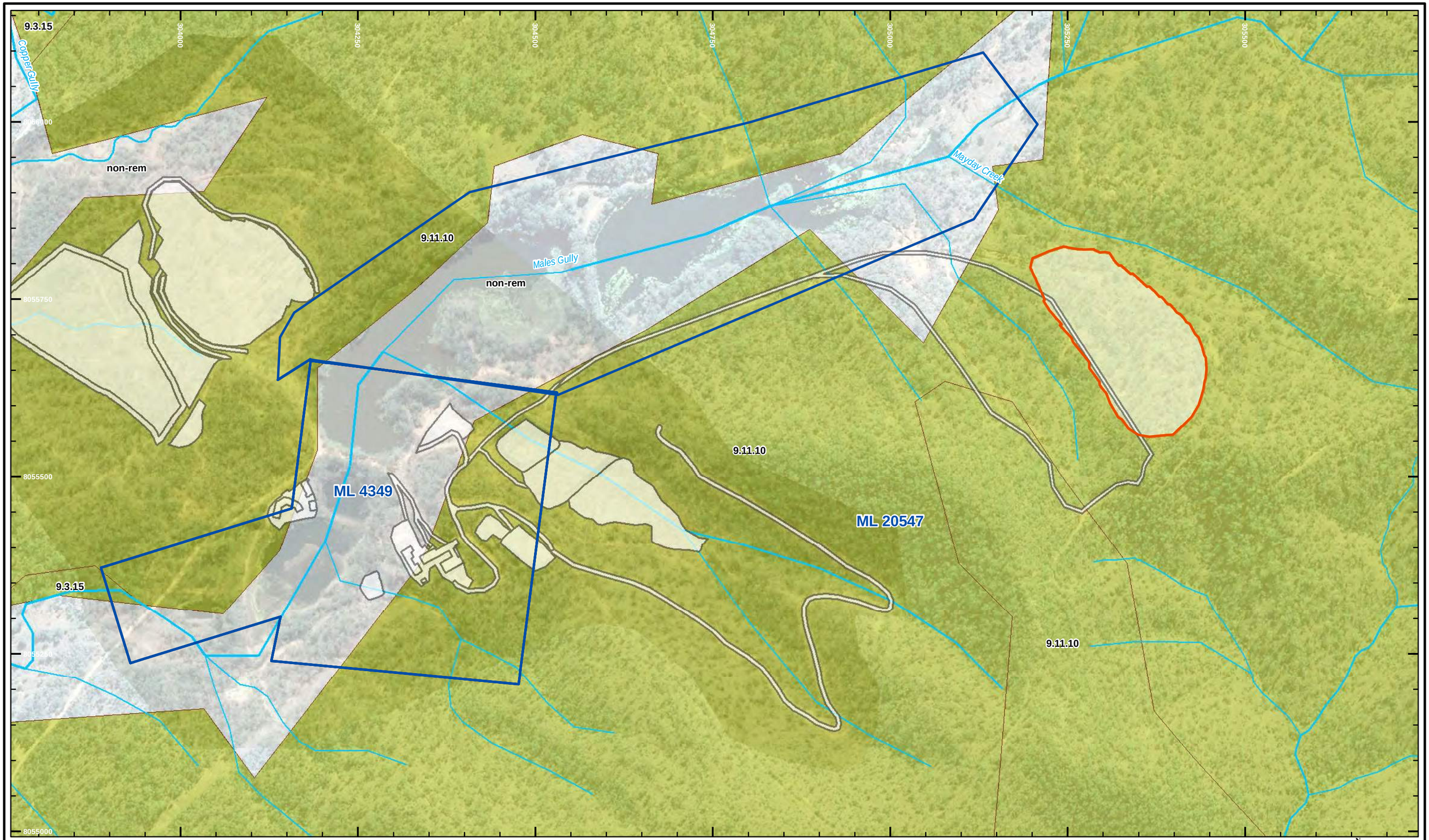
A detailed ecological assessment was completed, in 2014, with further assessment in 2018. The results are summarised in the 2018 EA amendment application (included as Appendix 8).

The assessment of the potential impacts of the project on Matters of National Environmental Significance (MNES), and Matters of State Environmental Significance (MSES) undertaken for the EA amendment application in 2018 determined that there were no significant impacts on MNES or MSES. This assessment

was updated in 2020 when an EA amendment application was approved to include the Summerhill Pit, as shown in Figure 17.

There are no Environmental Sensitive Areas (ESA) mapped on the Project site, as shown in Figure 18.

Three ecological assessments have been undertaken over the Project area in November 2013, March 2014 (both described in a report by Biotropica, April 2014) and January 2018 (reported by CDM Smith, September 2018 in the EA amendment application by MGT 2018) which reported there were no threatened flora species recorded (refer Appendix 8). A *Nature Conservation Act 1992* Protected Plants survey was undertaken in the vicinity of the Summerhill Pit in 2022 (included as Appendix 9) and detected no Protected Plants.



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Meters

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Mount Veteran Overview

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Figure 16 - Regional Ecosystem Mapping (RE V11.0)

- Mining Lease Boundary
- Project Footprint
- Summer Hill Pit
- Watercourse
- Of Concern - Dominant
- Non-remnant, regrowth, disturbed

Drawn By:	Chris Schlebusch
Requested by:	Jacob Arnold
Date:	22/10/2020

Sheet No.
RTPL_ARD_MGT002_MAP_0004_A

Data sources:
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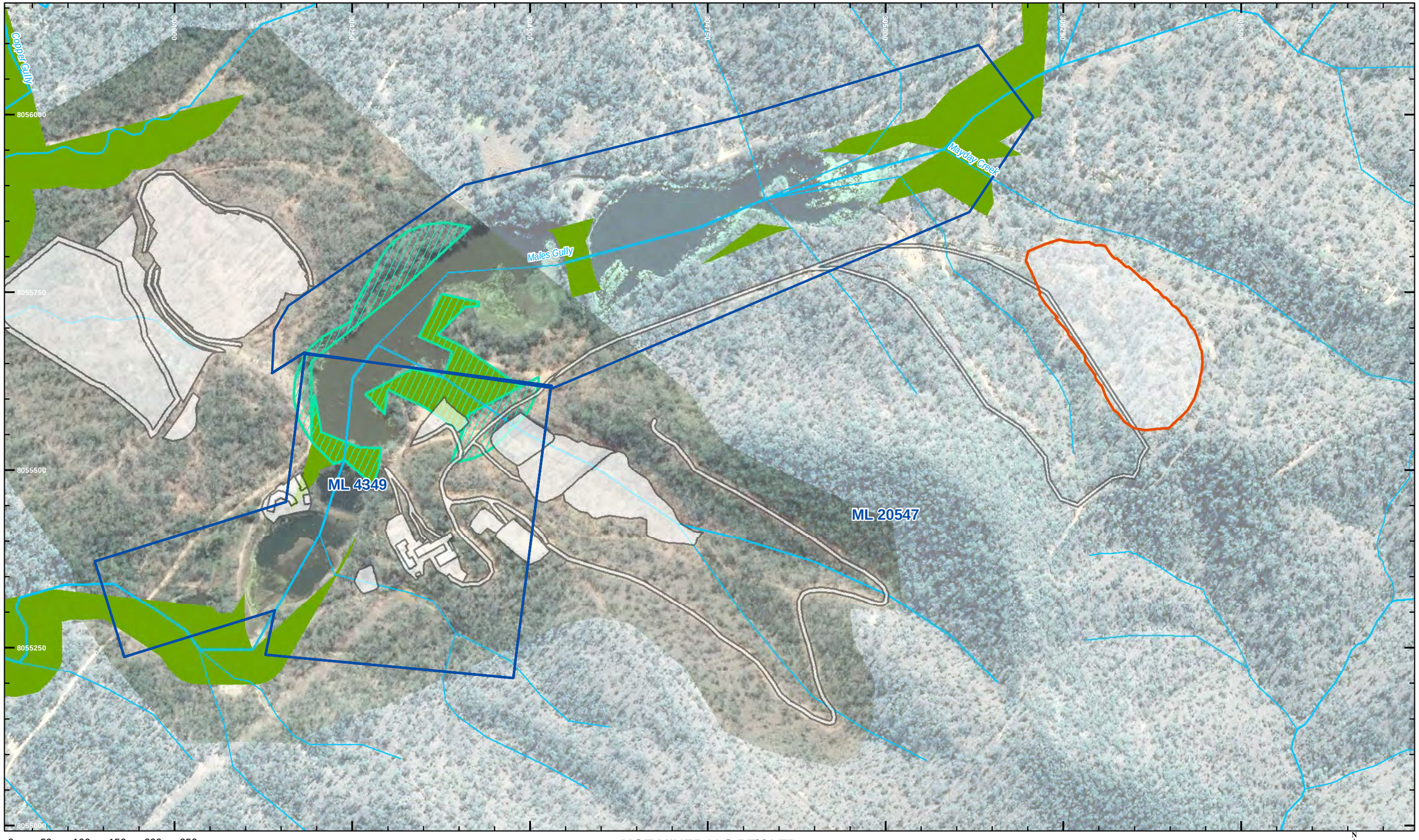

0 50 100 150 200 250

Meters

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Mount Veteran Overview

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Figure 17 - Matters of State Environmental Significance (MSES)

Drawn By:	Chris Schlebusch
Requested by:	Jacob Arnold
Date:	21/10/2020

Sheet No.
RTPL_ARD_MGT002_MAP_0002_A

- Mining Lease Boundary
- Project Footprint
- Summer Hill Pit
- Watercourse
- MSES Regulated Vegetation - 100m from wetland
- MSES Regulated Vegetation - Category R GBR Riverine

Data sources:
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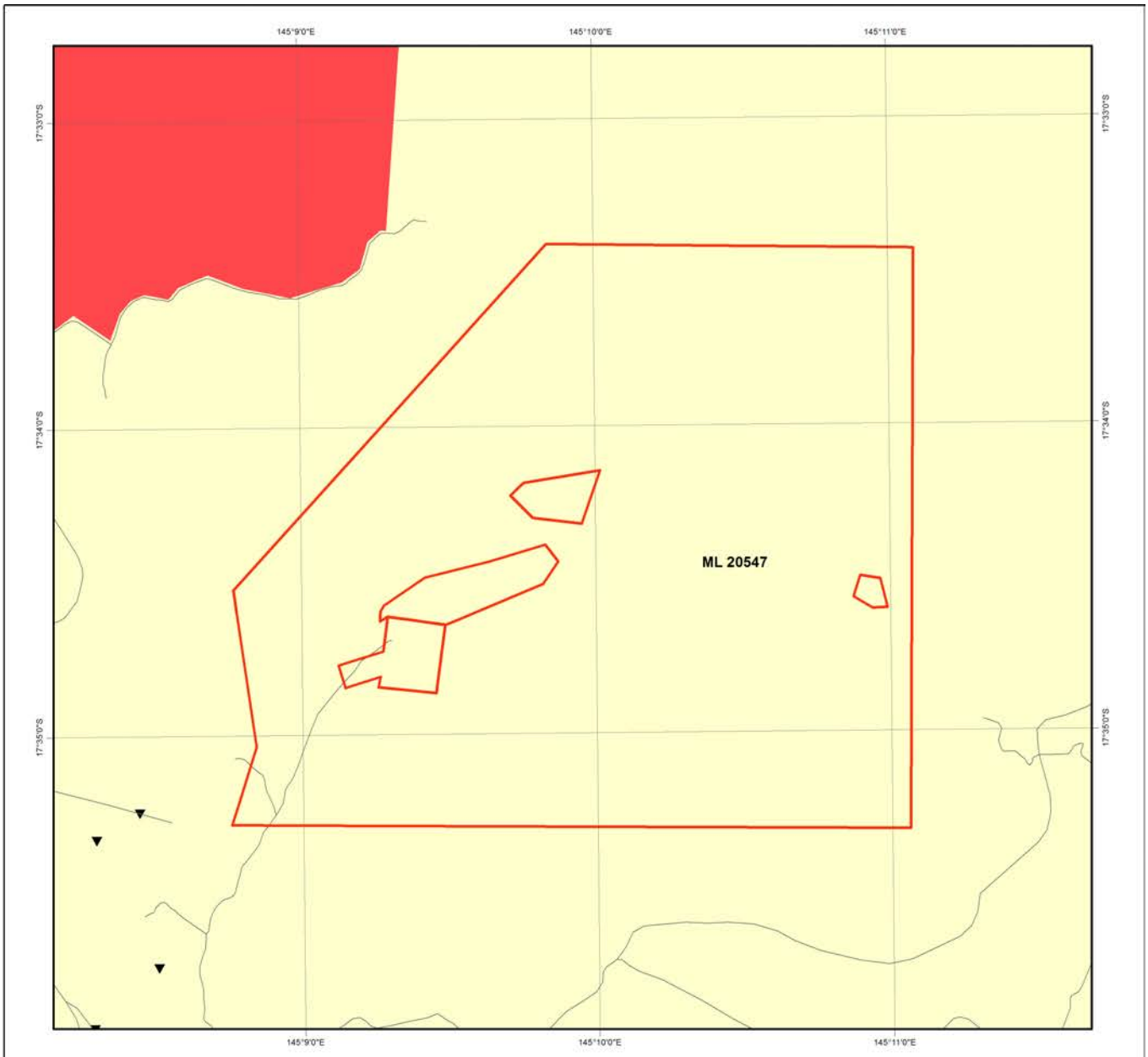


ENVIRONMENTALLY SENSITIVE AREAS - Mining Activities

- Selected Mining Lease (ML)

CATEGORY A
- National Parks
- Conservation Parks
- Forest Reserves
- Special Wildlife Reserve
- Wet Tropics World Heritage Area
- Great Barrier Reef Marine Park Area
- Marine Parks other than General Use Zones

CATEGORY B
- Queensland Heritage Register Places
- Ramsar Sites
- Cultural Heritage Registered Areas and DLA's other than Stanbroke
- Special Forestry Areas
- Seaward Side of Highest Astronomical Tide
- Fish Habitat Areas
- Coordinated Conservation Areas
- Endangered Regional Ecosystems - regrowth and remnant (Biodiversity Status)
- General Use Zones of Marine Parks
- Marine Plants

CATEGORY C
- Nature Refuges
- Resources Reserve
- State Forests
- Timber Reserves
- River Improvement Areas
- Stanbroke DLA
- Coastal Management District
- Dams and Weirs

OTHERS
- Towns
- Roads
- Repealed Wild River Nominated Waterways
- Repealed Wild River Preservation Areas
- Repealed Wild River High Preservation Areas
- Mahogany Glider Habitat
- Directory of Important Wetlands
- Queensland

N

0 330 660 990 1,320 1,650 m

This product is projected into GDA 1994 MGA Zone 55

FIGURE 18 - ESA Map

NOTE TO USER: Themes presented in this map are indicative only. Field survey may be required to verify the 'true' spatial extent and value. Not all environmentally sensitive areas are presented in this map. A user should refer to the particular circumstances relevant to their situation to assess the 'completeness' of themes provided.

The user should note that some boundaries and indicated values are ambient and may change over time (e.g. regional ecosystem boundaries and conservation status, watercourse mapping etc).

The user should be aware that due to multiple overlapping themes/ layers present, some themes/layers may be obscured by others. Ordering in the Legend does not accurately reflect the order by which themes/layers are displayed.

3.1.10 Fauna Presence and Populations

Three ecological assessments have been undertaken over the Project area in November 2013, March 2014 (both described in a report by Biotropica, April 2014) and January 2018 (reported by CDM Smith, September 2018, in the EA amendment application by MGT 2018) (Appendix 8). These assessments reported three threatened fauna species currently listed under the *Environment Protection and Biodiversity Act 1999* (EPBC Act) *or Nature Conservation Act 1992* (NC Act) have been recorded during surveying. These threatened fauna species are:

- Fork–tailed swift (*Apus pacificus*) - Migratory Marine under EPBC Act and Special Least Concern under NC Act;
- Glossy ibis (*Plegadis falcinellus*) - Migratory Marine species under EPBC Act; and
- Greater glider (*Petauroides volans minor*) - Vulnerable under the EPBC Act and NC Act.

One Matter of National Environmental Significance (MNES) was recorded within the Study Area (but not the actual disturbance areas) being the Greater Glider (*Petauroides Volans minor*) which is listed as vulnerable under the EPBC Act. It should be noted that the 'Study Area' refers to the extent of both ML 20547 and ML 4349, totalling an area of approximately 1,181.4ha. While threatened fauna may have been recorded within the area of the mining leases, they may not be present in the approximate area of the Project disturbance area.

The significance of the potential impacts on the Greater Glider was considered during these assessments, and it was concluded that the clearing for the project would not be a significant impact, as defined under the EPBC Act. Despite this, a number of mitigation measures have been proposed including the timing of vegetation clearing, pre-clearing surveys for threatened species, and spotter – catcher engaged to provide support during progressive vegetation clearing.

3.1.11 Pre-mining Land Use

The Project area has been extensively disturbed by historic mining activities dating back to the 1880's and there are a number of identified tin deposits which have previously been worked on a small scale within the Project boundaries, including the Dalcouth pit that was partially mined in the 1940's through to the 1970's.

The mill was constructed in 1980 to treat ore from hard rock deposits located within the area presently covered by ML 20547 but the hard rock mining ceased in the mid 1980's and since that time the mill has only operated intermittently for toll treatment of alluvial concentrates.

No mining has taken place in recent history in the Mining Lease area. The mining areas, waste rock dump and new tailings dam approved by the EA have not been mined, contain no waste rock and no tailings have been deposited.

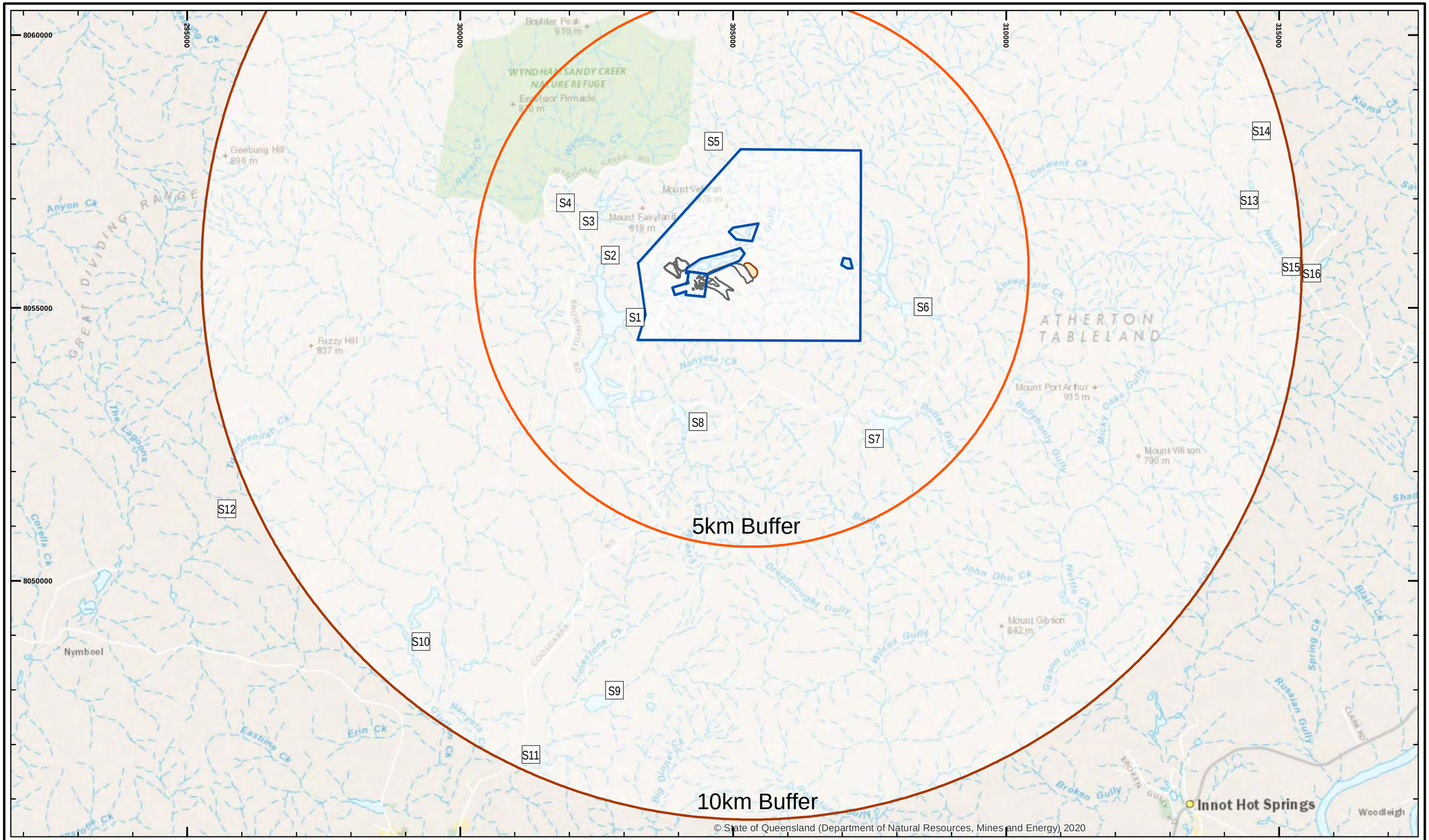
The Project site is surrounded by historical mining and exploration; as well as low intensity grazing.

3.1.12 Landholders

As noted in section 2.3, the Project is located entirely within two parcels of leasehold land. The Project area is currently used for low-intensity grazing. The landholder details are included in Table *2*.

3.1.13 Sensitive Receptors

Sensitive receptors are located at varying distances to the north, east, south and west of the Project. Figure 19 illustrates these locations.



0 0.5 1 1.5 2 2.5
Kilometers

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Mount Veteran Overview

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GDA94, MGA Zone 55

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Figure 19 - Location of Sensitive Receptors

Drawn By: Chris Schlebusch

Requested by: Jacob Arnold

Date: 17/11/2020

Sheet No.
RTPL_ARD_MGT002_MAP_0005_B

- Mining Lease Boundary
- Project Footprint
- Summer Hill Pit
- S1 Sensitive Receptor

Data sources:
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Path: S:\Plans\Project_Specific\Ardent\MGT002\RTPL_ARD_MGT002_MAP_0005_B A3L Sensitive Receptors.mxd

3.2 Design for Closure

As this is a Transitional PRCP, there is no requirement to demonstrate how aspects of the mine site have been designed for closure for existing or approved disturbance (section 3.1, PRC Plan Guideline). The rehabilitation / improvement planning includes detail from when mining activities were first commenced by MGT Minerals up until planned surrender, as described in the mining plan.

3.3 Rehabilitation / Improvement Planning

3.3.1 Progressive Rehabilitation

There is no approved PMLU documented within Environmental Authority EPVL00864413 for ML4349 and ML20547.

Table F1 in the EA, however, specifies mine domains and rehabilitation goals and objectives, with indicators and completion criteria to be specified within 2 years from the commencement of mining. One of the rehabilitation goals is "able to agree a post mining land use". Mining has not yet commenced therefore rehabilitation indicators and completion criteria are not yet required.

The Post Mining Land Use Plan required by condition F2 of the plan has not been completed, as it is required 2 years from commencement of mining (and mining has not yet commenced).

Discussion and justification for the PMLU described in this PRC Plan is included within section 5 of this report.

Table F1 is replicated below in Table 19.

Table 19 Schedule F - Table F1 Rehabilitation Requirements

Mine Domain	Rehabilitation Goals	Rehabilitation Objectives	Indicators	Completion Criteria
Open Cut Pit	Safe	No hazardous materials and structurally sound with limited slopes	TBA	TBA
	Non-polluting	No groundwater contamination or overflow	TBA	TBA
	Stable	Long term geotechnical stability of the low and high walls	TBA	TBA
	Able to sustain an agreed post mining land use	Native vegetation and habitat	TBA	TBA
Waste Rock Dump	Safe to humans and wildlife	Structurally safe with no hazardous materials; and site is safe now and for foreseeable future.	TBA	TBA
	Non-polluting	Contaminants contained onsite; and no release of contaminants to the receiving environment.	TBA	TBA
	Stable	Landform design achieves appropriate erosion rates.	TBA	TBA
	Able to sustain an agreed post mining land use	Native vegetation and habitat.	TBA	TBA

Mine Domain	Rehabilitation Goals	Rehabilitation Objectives	Indicators	Completion Criteria
Mine Infrastructure	Safe to humans and wildlife	Structurally safe with no hazardous materials; and site is safe now and for foreseeable future.	TBA	TBA
	Non-polluting	No residual contaminants that could be released to the receiving environment.	TBA	TBA
	Stable	No erosion and sediment loss.	TBA	TBA
	Able to sustain an agreed post mining land use	Native vegetation and habitat.	TBA	TBA
Water Infrastructure (dams and drains)	Safe to humans and wildlife	Structurally safe with no hazardous materials; and site is safe now and for foreseeable future.	TBA	TBA
	Non-polluting	No residual contaminants that could be released to the receiving environment.	TBA	TBA
	Stable	Landform design achieves appropriate erosion rates.	TBA	TBA
	Able to sustain an agreed post mining land use	Rehabilitate and return to native vegetation and habitat; or water storage where landholder statement for ongoing use has been provided.	TBA	TBA
Haul Road	Safe to humans and wildlife	Structurally safe with no hazardous materials; and safe for the foreseeable future.	TBA	TBA
	Non-polluting	No residual contaminants that could be released to the receiving environment.	TBA	TBA
	Stable	Vegetation Cover to minimise erosion	TBA	TBA
	Able to sustain an agreed post mining land use	Rehabilitate and return to native vegetation and habitat.	TBA	TBA
New TSF	Safe to humans and wildlife	Structurally safe with no hazardous materials; and safe for the foreseeable future.	TBA	TBA
	Non-polluting	Residual contaminants are contained and contaminant release to the receiving environment is prevented.	TBA	TBA
	Stable	Vegetation Cover to minimise erosion	TBA	TBA

Mine Domain	Rehabilitation Goals	Rehabilitation Objectives	Indicators	Completion Criteria
	Able to sustain an agreed post mining land use	Rehabilitate and return to native vegetation and habitat.	TBA	TBA
Existing TSF	Safe to humans and wildlife	Structurally safe with no hazardous materials; and safe for the foreseeable future.	TBA	TBA
	Non-polluting	Residual contaminants are contained and contaminant release to the receiving environment is prevented.	TBA	TBA
	Stable	Vegetation Cover to minimise erosion	TBA	TBA
	Able to sustain an agreed post mining land use	Remove all tailings and place in New TSF, decommission and return to native vegetation and watercourse.	TBA	TBA

To facilitate progressive rehabilitation on site, the mine planning process has aimed to maximise progressive rehabilitation by scheduling the commencement and completion of rehabilitation as soon as practicable after land becomes available.

The staging of mining at Dalcouth Pit is shown in Figure 20 to Figure 23.

The staging of mining at Summerhill Pit is shown in Figure 24.

Stage 1 of the New Tailings Dam is shown in Figure 25.

The excavation of cassiterite from the existing tailings dam has not been illustrated in a figure, as this modest resource will simply be recovered by excavator once the water has been recovered from this dam.

The availability of the Dalcouth Pit for rehabilitation is constrained by the plan to backfill the pit with material from the adjacent waste rock dump. This pit is narrow and deep, and as such it will not be possible to commence this backfilling until mining is completed in the Dalcouth Pit. The availability of the waste rock dump for rehabilitation is also constrained by the plan to push the majority of this rock back into the adjacent pit. The proposed final landform design for Dalcouth Pit and Waste Rock Dump is shown in Figure 26.

The Summerhill Pit will be available for rehabilitation shortly after the short mine life. The proposed final landform design for Summerhill Pit is shown in Figure 27.

The New Tailings Dam will not be available for rehabilitation until the cessation of processing of ore stockpiles following the completion of mining from the Dalcouth and Summerhill pits. The full extent of the tailings dam will be required until this point, as it is a single cell tailings dam. The proposed final landform design for New Tailings Dam is shown in Figure 28 .

The Existing Tailings Dam will be available for rehabilitation shortly after the extraction of the cassiterite from this area. The proposed final landform design for Existing Tailings Dam is shown in Figure 29.

The Process Plant area and related infrastructure will not be available for rehabilitation until mining has completed on all pits, and processing of ore stockpiles has been completed.

The rehabilitation of infrastructure such as the camp, administration buildings and access tracks is not able to commence until the rehabilitation of the pits and tailings dams has been completed, when these infrastructure areas are no longer needed to support progressive rehabilitation.

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Figure 20 - Dalcouth Pit and Dump Stage 1

- Mining Lease Boundary
- Dalcouth Pit
- Dalcouth Pit Floor - 725m
- Dalcouth Dump
- Dalcouth Dump Top - 735m
- Contour (5m)

Drawn By:	Chris Schlebusch
Requested by:	Richard Davis
Date:	17/02/2023

Sheet No.
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Path: S:\Plans\Project_Specific\Ardent\MGT001\PCRP 2023\RTPL_ARD_MGT001_PRCPMAP_0001_A A3L Dalcouth Pit Stage 1.mxd

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Figure 21 - Dalcouth Pit and Dump Stage 2

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Date:	17/02/2023

Sheet No.
RTPL_ARD_MGT001_PRCPMAP_0002_A

- Mining Lease Boundary
- Dalcouth Pit
- Dalcouth Pit Floor - 715m
- Dalcouth Dump
- Dalcouth Dump Top - 747.5m
- Contour (5m)

Data sources:
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Figure 22 - Dalcouth Pit and Dump Stage 3

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Date:	17/02/2023

Sheet No.
RTPL_ARD_MGT001_PRCPMAP_0003_A

- Mining Lease Boundary
- Dalcouth Pit
- Dalcouth Pit Floor - 692m
- Dalcouth Dump
- Dalcouth Dump Top - 762.5m
- Contour (5m)

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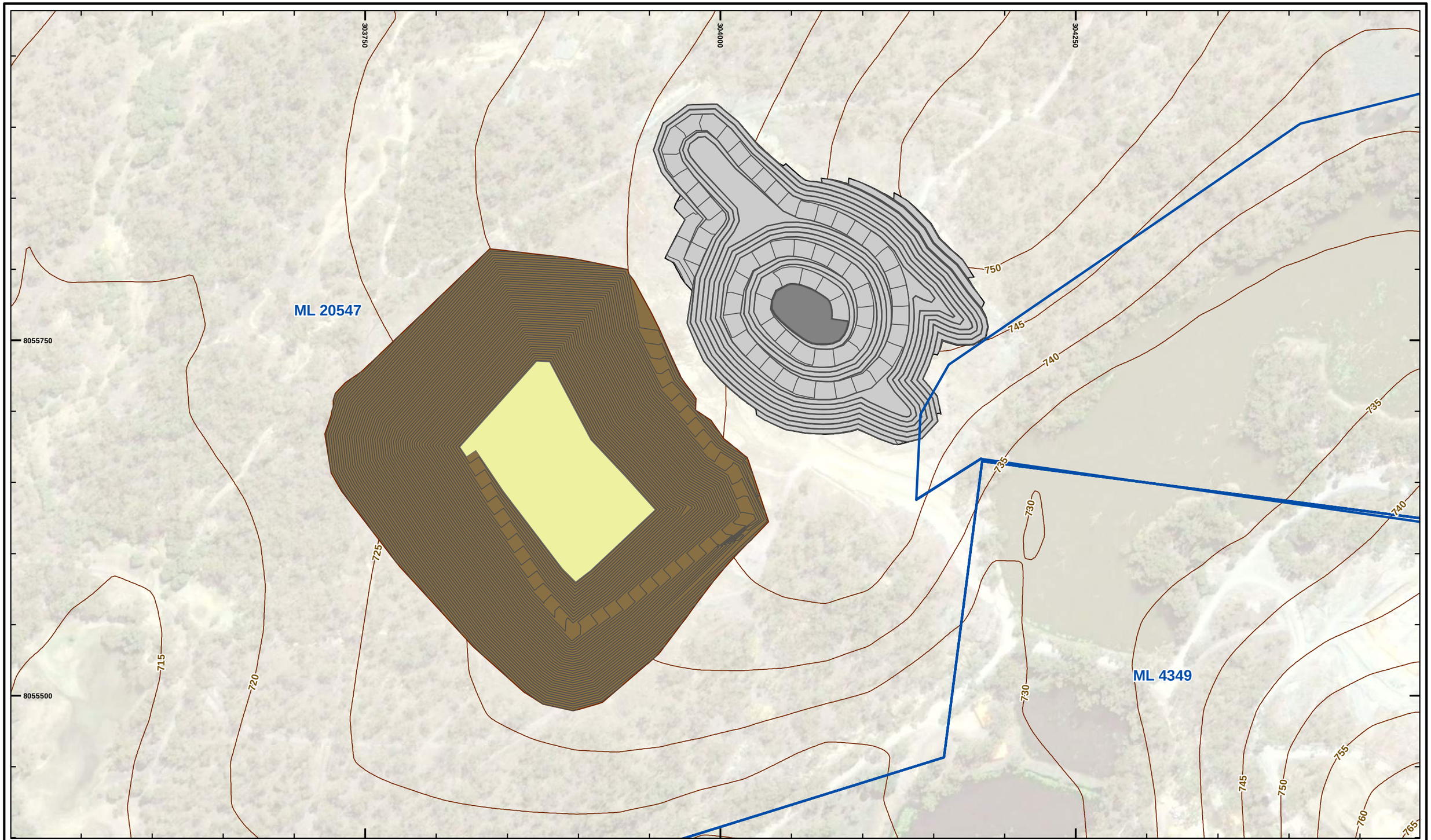

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Figure 23 - Dalcouth Pit and Dump Stage 4

- Mining Lease Boundary
- Contour (5m)
- Dalcouth Pit
- Dalcouth Pit Floor - 660m
- Dalcouth Dump
- Dalcouth Dump Top - 772.5m

Drawn By: Chris Schlebusch

Requested by: Richard Davis

Date: 17/02/2023

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Data sources:
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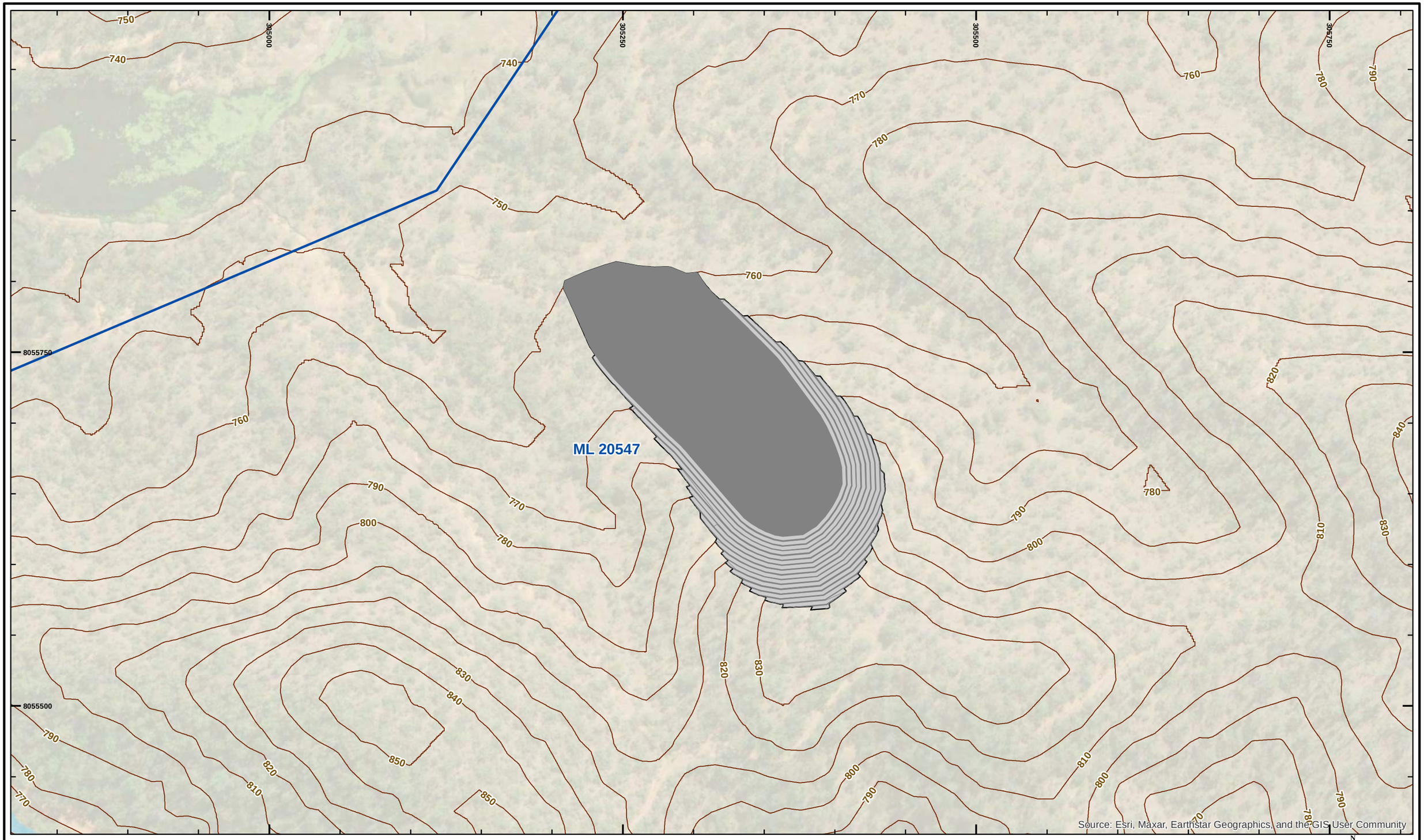

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Figure 24 - Summerhill Pit Stage 1

Drawn By:	Chris Schlebusch
Requested by:	Richard Davis
Date:	17/02/2023

Sheet No.
RTPL_ARD_MGT001_PRCPMAP_0005_A

- Mining Lease Boundary
- Summerhill Pit
- Summerhill Pit Floor - 760m
- Contour (10m)

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Path: S:\Plans\Project_Specific\Ardent\MGT001\PCRP 2023\RTPL_ARD_MGT001_PRCPMAP_0005_A A3L Summerhill Pit Stage 1.mxd

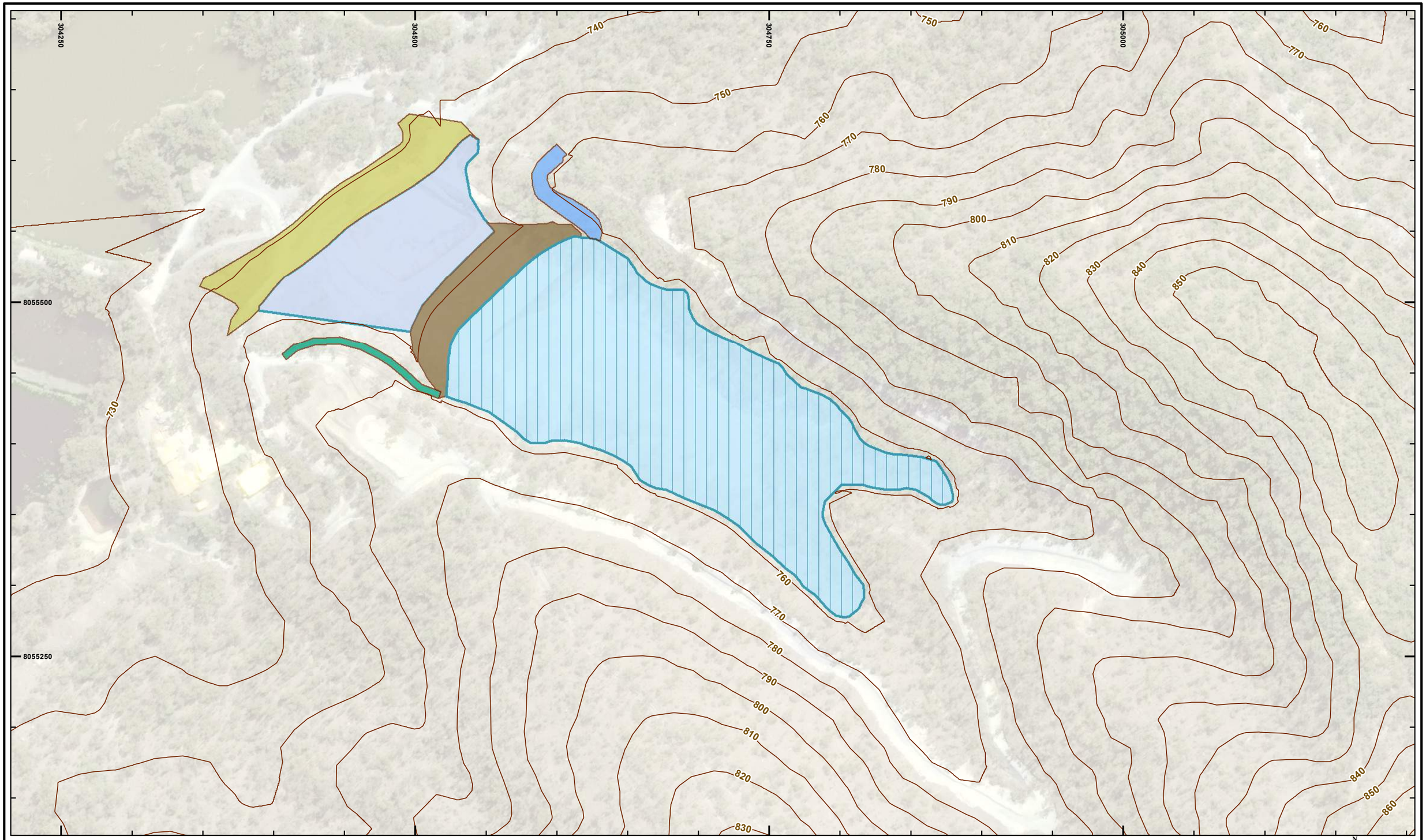

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Figure 25 - New TSF Stage 1

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Date:	12/02/2024

Sheet No.
RTPL_ARD_MGT001_PRCPMAP_0006_C

- Mining Lease Boundary
- TSF Wall
- TSF Level
- New TSF Settling Pond Embankment
- New TSF Settling Pond
- TSF Permanent Spillway
- TSF Post-closure Spillway
- Contour (10m)

Path: S:\Plans\Project_Specific\Ardent\MGT001\PCRP 2023\RTPL_ARD_MGT001_PRCPMAP_0006_C A3L New TSF.mxd

Figure 28 – Final Landform Design Dalcouth Pit and Waste Dump

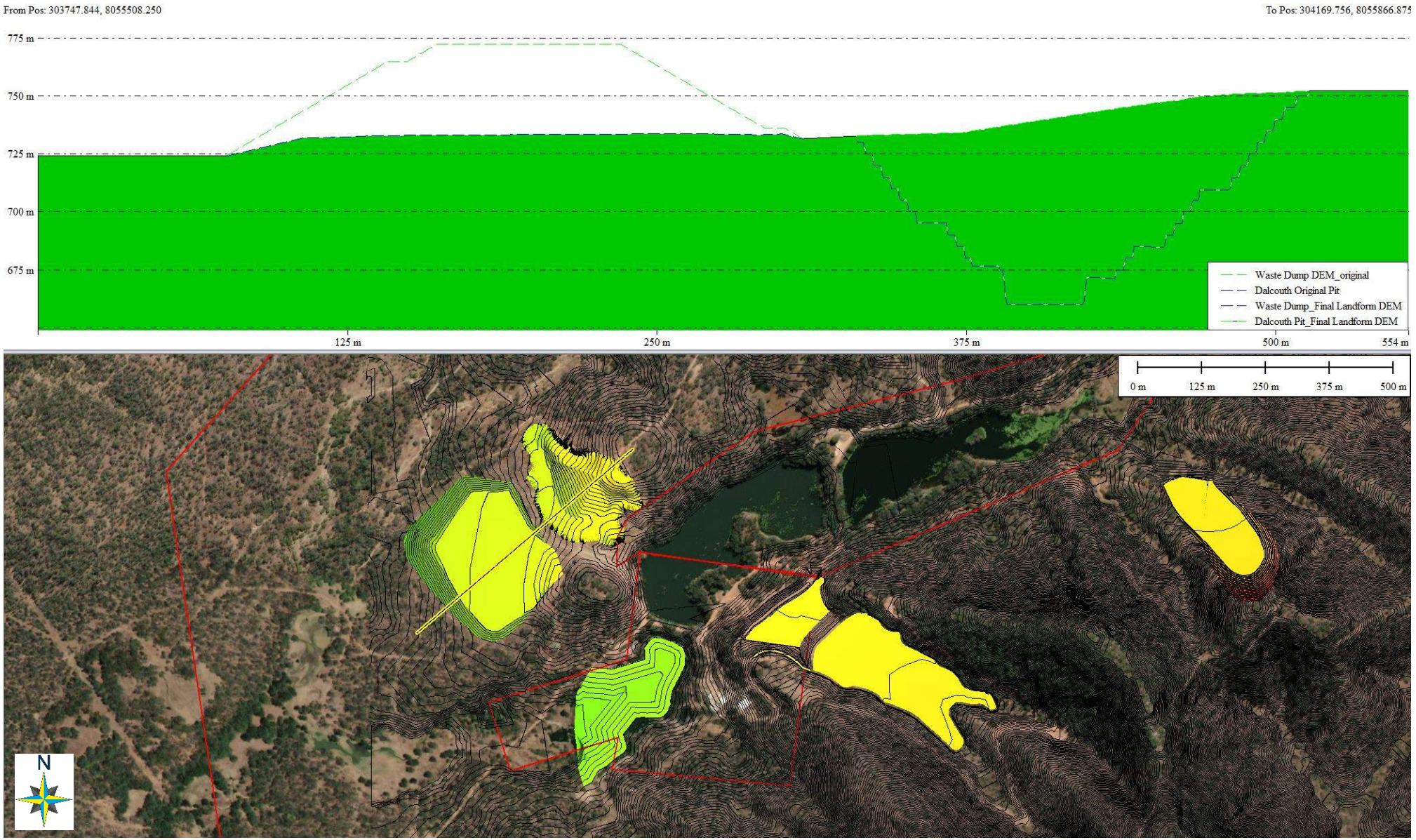


Figure 27 – Final Landform Design Summer Hill Pit

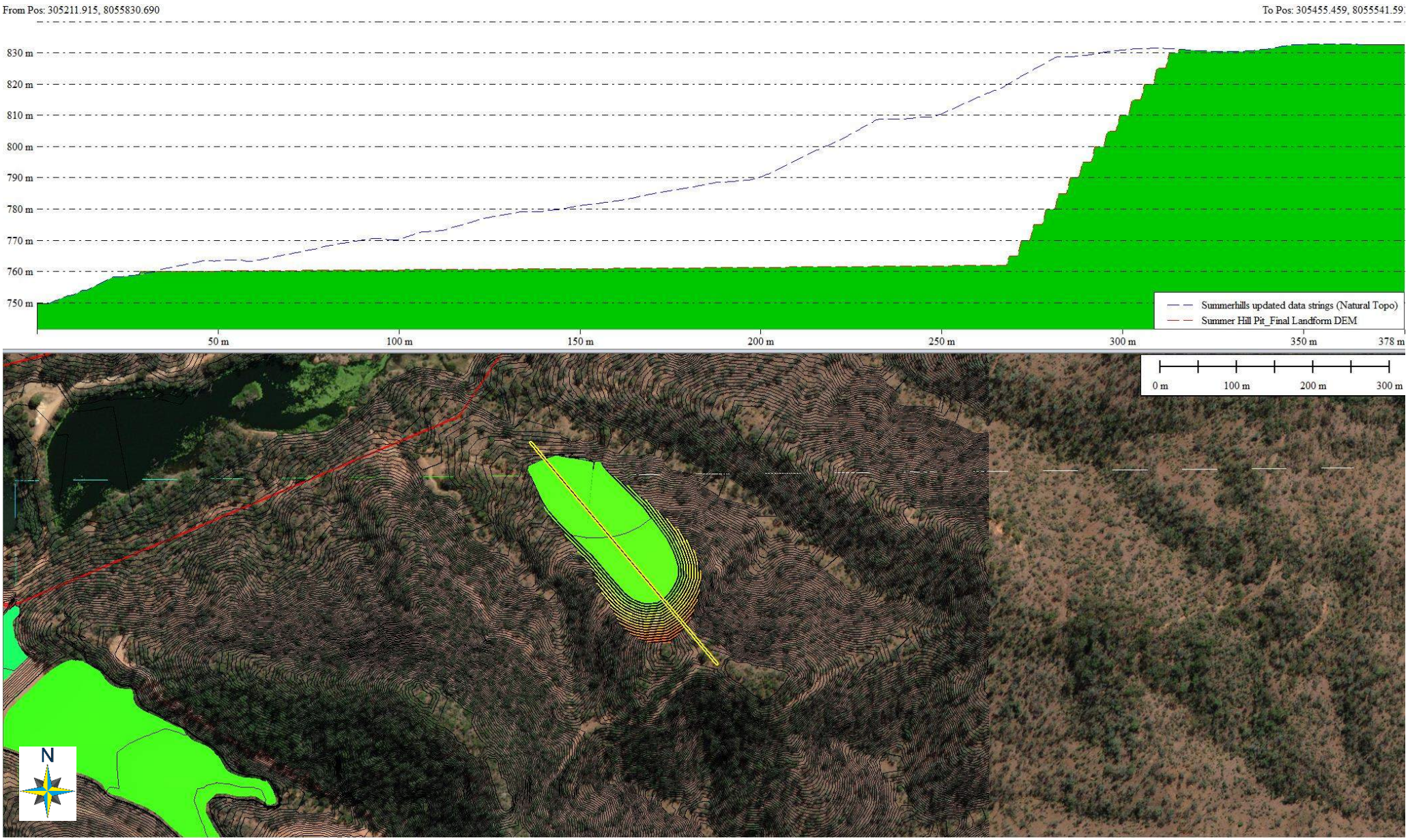


Figure 28 – Final Landform Design Proposed TSF

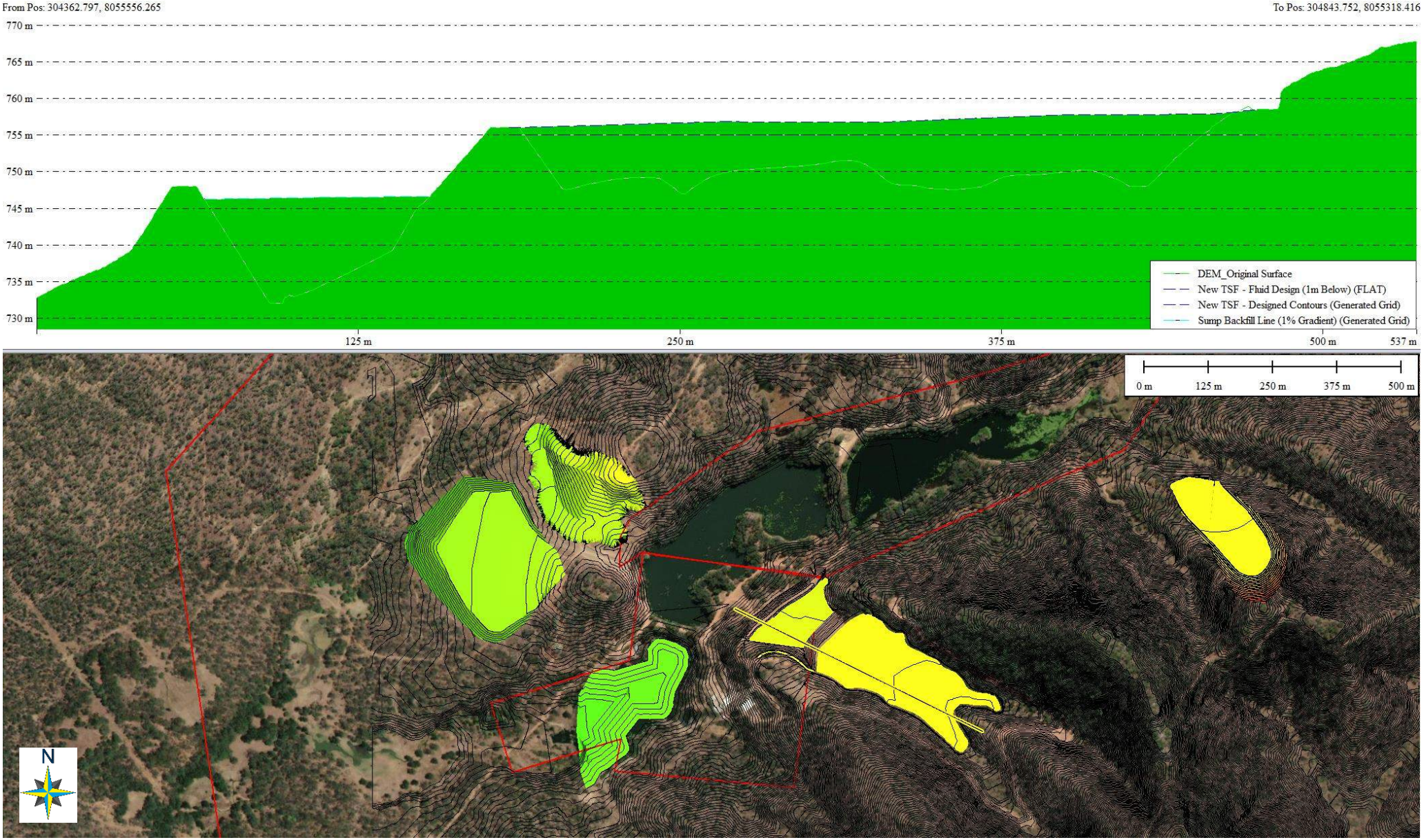
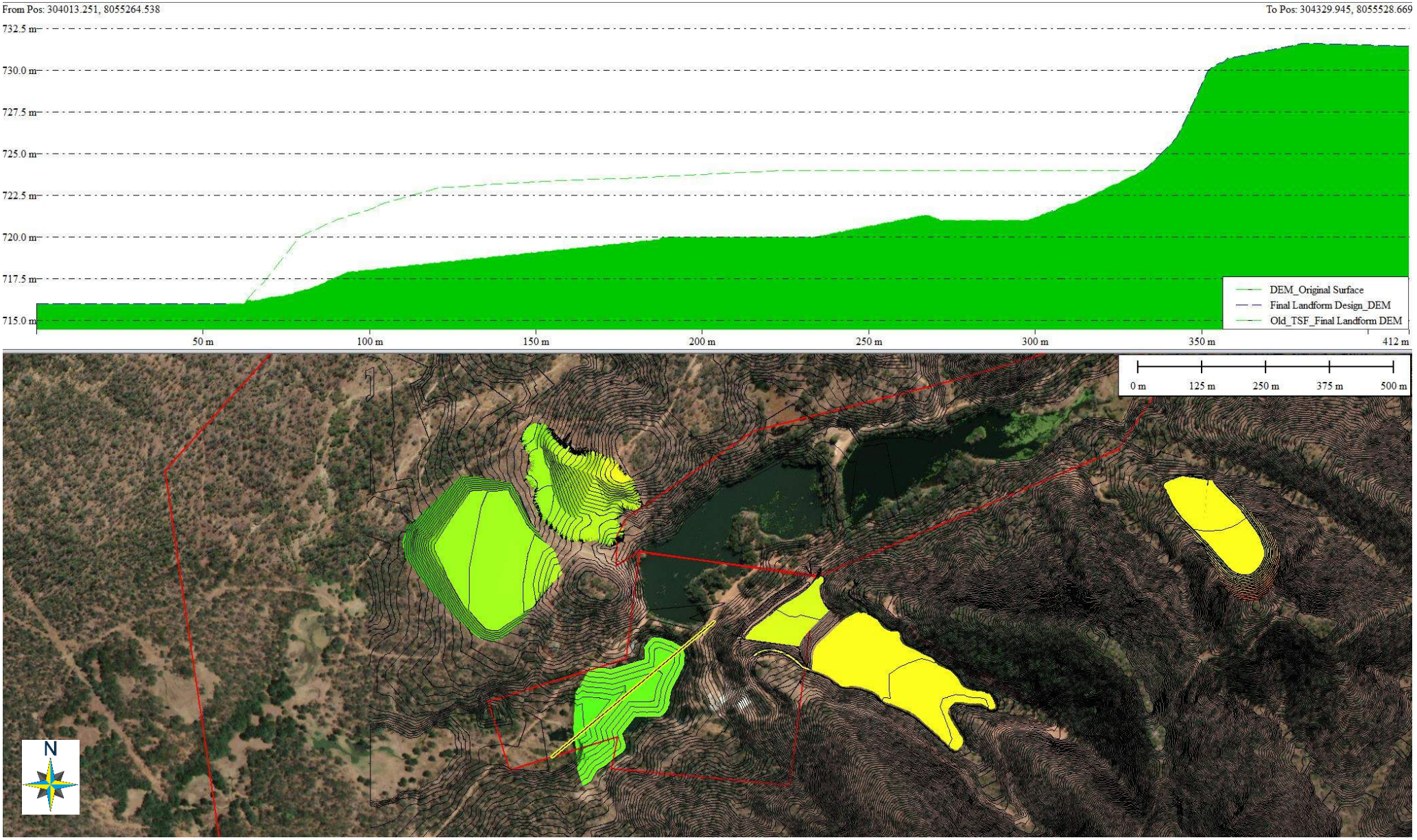


Figure 29 – Final Landform Design Existing TSF



2.6.1 Rehabilitation Areas and Relevant Activities

For the purpose of this PRCP, Rehabilitation Areas and relevant activities have been defined and shown in Table 20. The mining duration is also specified.

Discussion of the availability of rehabilitation areas and the timing of the availability was described in section 3.3.1 above.

It is anticipated that landform development and surface preparation will take around 24 months for the Dalcouth pit, around 24 months for the new TSF (due to time taken for drainage and to establish a stable work area) and 12 months for most other rehabilitation areas.

Revegetation to the extent of achieving the specified rehabilitation criteria is estimated to be completed within 5 – 7 years.

Dates in the PRCP schedule have been selected based on the mine plan as described in this document.

Table 20 Rehabilitation Areas and Relevant Activities

Rehabilitation Area Name	Pit Name / Relevant Activity	Duration of Relevant Activity (Calendar Year)	Size/extent of Relevant Activity (Ha)	Progressive Rehabilitation Possible
RA1	Mining (Dalcouth pit) Waste Rock Dump Mine Work Area Transport Infrastructure	2025 - 2030	10.73	No
RA2	Mining (Summer Hill Pit)	2025 - 2027	3.79	No
RA3	New TSF Diversion Drain Process Water Ponds	2025 - 2031	8.28	No
RA4	ROM Pad Laydown ROM Process Plant Plant Pond	2025 - 2031	0.92	No
RA5	Existing TSF	2025 - 2025	2.09	No
RA6	Office Camp Laydown General	2025 - 2039	0.29	No
RA7	Haul Roads Access Roads	2025 - 2039	1.43	No

(Note; areas rounded to 2 significant figures)

The summary map of the rehabilitation areas is included as Figure 30.

The summary map of the rehabilitation areas is included as Figure 30.

The existing farming access tracks and the Clear Water Dams that are used by the landholder have not been included in the rehabilitation areas, and this is consistent with their treatment in the Estimated Rehabilitation Cost process and past decisions under the *Environmental Protection Act 1994*.

3.3.3 Rehabilitation Undertaken to Date

As required under section 126C(1)(j) of the EP Act, transitional PRCP's must include detail relating to the existing rehabilitation already completed.

No rehabilitation undertaken to date on site has been applied for or approved as progressively certified under the EP Act.

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Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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Figure 32 - Rehabilitation Areas

Drawn By:	Chris Schlebusch
Requested by:	Richard Davis
Date:	12/02/2024

Sheet No.
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Legend

- Mining Lease Boundary
- RA1 - Dalcouth Pit, Waste rock dump, mine work area
- RA2 - Summerhill Pit
- RA3 - New TSF, diversion drain, process water ponds
- RA4 - Process plant, workshop, rom pad, plant pond
- RA5 - Old TSF
- RA6 - Office and Camp
- RA7 - Access roads, laydown areas

Data sources:
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4 Community Consultation

4.1 Details of Consultation in Developing PRCP

4.1.1 Stakeholder Identification

MGT Minerals acquired the mining leases in 2018 and subsequently a series of EA amendments have been approved to develop the Mount Garnet site. Since 2018 the site has essentially been on care and maintenance. Records relating to community consultation in relation to the mining activities and associated rehabilitation requirements prior to 2018 are not available.

As a part of this PRCP process, community consultation was required, and the following primary stakeholders were identified:

- Land owner for ML4349 Simon Garry William Renshaw and Rosemary Anne Burtenshaw
- Land owner for ML20547 Garth Anthony Dunford
- Department of Environment and Science
- Department of Mines
- Tablelands Regional Council
- Local Councilor (Division 2)
- State Member of Parliament (electoral district of Hill)
- Adjacent landholders
- Mt Garnet community.

4.1.2 Community Consultation Register

In order to comply with section 126C(1)(c)(iii) of the EP Act, the rehabilitation planning part of this PRCP must include a community consultation register identifying the consultation undertaken in relation to developing the PRCP. This must include:

- Consultation date(s)
- Identification of each community member
- Description of consultation type
- Information provided to the community
- Issues raised and discussed by the community
- How issues have been considered
- Decisions/outcomes of the engagement
- Commitments made.

The Community Consultation Register is shown in **Table *21***.

Table 21 Community Consultation Register

Date	Community Member / Stakeholder	Type	Information Provided	Issues Raised	How issues were considered	Decisions / Outcomes	Commitments
Ongoing	Directly and indirectly affected landholders	Conversations	Discussions on ongoing care and maintenance activities Identification of concerns	No specific issues or concerns raised relating to rehabilitation or mine closure	Not applicable	Continue engagement with landholders, as required	Continue engagement with landholders as required
18/8/21	Regulatory Body	Meeting with DES related to PMLU	Discussed PMLU	Confirmed PMLU grazing	Reviewed legislative framework to decide on actions required	PRCP to document PMLU as Grazing	Submit PRCP by due date 1 March 2023
Ongoing	Regulatory Bodies	Annual reporting ERC applications EA amendment Applications	Legislated annual reporting requirements ERC calculations and financial assurance requirements EA amendment applications	Discussed ERC calculations and transition from financial assurance framework Discussed rehabilitation plans for site	By Discussion	ERC calculations EA amendment approvals	Under Care and Maintenance. Commit to lodging PRCP by due date.
2018	Regulatory requirement / Community	Public Notification	EA Amendment Application	Water and contaminants Surface Water Management Groundwater contamination	EIS Public Notification Land Court	EIS accepted by Administering Authority EA amendment	Compliance with EA

Date	Community Member / Stakeholder	Type	Information Provided	Issues Raised	How issues were considered	Decisions / Outcomes	Commitments
				Ecologically sustainable Development Rehabilitation and contamination post-closure		granted following decision from Land Court that the EA Conditions, informed by the work undertaken in the EIS, result in sufficient safeguards against the concerns raised. Concerns relating to rehabilitation were in relation to not wanting mining or grazing in the region and have therefore been discounted from consideration.	

Date	Community Member / Stakeholder	Type	Information Provided	Issues Raised	How issues were considered	Decisions / Outcomes	Commitments
2018	Regulatory Body	Transfer of EA and Mining Lease	Transfer application	No specific issues or concerns raised relating to rehabilitation or mine closure	No specific issues raised	No specific decision or outcomes	NA

4.2 Rehabilitation Community Consultation Plan

In order to comply with section 126C(1)(c)(iv) of the EP Act, the rehabilitation planning part of this PRCP must include a community consultation plan detailing how ongoing consultation will be carried out in relation to the rehabilitation to be carried out under the PRCP.

The objectives for community consultation, method of community engagement, frequency, information to be released and consideration of feedback and comments are included, as required, and documented in the Community Consultation Plan.

Information will include the final landform design implementation and rate, primarily with the key government stakeholders. Progress toward milestone criteria will be shared. Any issues arising will be managed through a process of: regular communication; feedback and follow-up on issues raised; and close out of issues raised with the stakeholder.

As the Project progresses with the rehabilitation activities for the site, a series of engagement phases will be initiated with the primary stakeholders for the project, as required. The objective of this engagement will be to inform the stakeholders of the near future and long-term activities on the site to gauge their level of interest and to identify any local experience and knowledge relevant to the rehabilitation methodology.

Table *22* outlines the consultation program for this PRCP.

Table 22 Community Consultation Plan for PRCP

Objective	Engagement Type	Proposed consultation frequency	Released information
Inform primary stakeholders	Letter to present information on the project and timeframes for activities	As required basis	Dependent on contact
Landholders	One on One Discussions	As required basis	Dependent on contact
Maintain contact with key state government stakeholders to maintain understanding of project developments	Regulatory authority information	Annual	Phone call to delegates on project status
Inform wider community	Media release News on website	In the event of significant milestones that may have interest to the local region	Maps and summary information to the community

Objective	Engagement Type	Proposed consultation frequency	Released information
Fulfil reporting obligations under PRCP	Statutory reporting	Annual	Compile and present annual report to DES
Ensure Local Government is informed of any proposed changes to Post Mining Land Use or schedule	Phone call and meeting relevant Planning Department	As required basis	Phone and discussions at meetings, maps
Ensure Local Councilor and State Member of Parliament is informed of any changes proposed to Post Mining Land Use or schedule	Phone call and follow up meeting with relevant Councilor / MP	As required basis	Phone and discussions at meetings, maps
Ensure project is understood (no mis-information)	Ad hoc contact and one on one meetings with Regulatory Agencies, Community Groups and local MP	As required basis	Dependent on contact

Feedback and comments received from the Community Consultation will be considered in the following way;

1. Feedback will be summarised and key themes identified.
2. Feedback will be reviewed by management and key site personnel.
3. Assessment on how the feedback can be used to improve the relevant outcomes or site management, considering the relevant business needs, approval conditions and legislative requirements.
4. Decision by management on the implementation
5. Response provided to the stakeholder, using appropriate communication channels.

5 Post-Mining Land Use

5.1 Overview

The Post Mining Land Use for ML4349 and ML20547 is outlined in Table 23 below, and illustrated in Figure 31.

In accordance with section 126C(1)(j) of the EP Act, the PMLU of grazing was considered to be the most appropriate PMLU option, for the following reasons:

- The mining lease will return to grazing, which will integrate with existing surrounding land use and pre-mining land use in line with the requirements of the current landholders.
- Grazing is the current land use of areas within the mining lease which are not disturbed by mining.
- Grazing will be established to match surrounding areas and include revegetation of native and pasture grasses, and open woodland native trees.
- Grazing PMLU will provide a beneficial environmental outcome of ongoing environmental management; as well as economic and social benefits via employment opportunities to the region via ongoing operation of cattle grazing property.
- Land rehabilitated to a PMLU of grazing will be safe and structurally stable; sustainable; and non-polluting causing no environmental harm.

This PMLU of grazing was previously described in the EA amendment applications by MGT in 2018 and 2020. This proposed use was deemed acceptable by DES at the time of assessment of the applications.

For clarity - a small area of land will remain as Infrastructure to include existing telecommunications and power infrastructure assets owned by external parties (Telstra and Ergon). These assets currently support the community by provision of vital communication coverage. Removal of these items would likely cause significant community concern by the removal of a vital communication link.

Table 23 Post Mining Land Use

Post Mining Land Use	Area (Ha)	Comment
Grazing	27.67	Site Disturbance Footprint
Grazing	1151.78	Undisturbed Footprint in mining lease
Infrastructure	2.49	Powerline and communication tower, owned by third parties

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ML 20547

ML 4349

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Figure 33 - Post Mining Land Use

Legend

- Mining Lease Boundary
- PMLU - Grazing (undisturbed)
- PMLU - Grazing

Sheet No. RTPL_ARD_MGT001_PRCPMAP_0011_C

Drawn By: Chris Schlebusch

Requested by: Richard Davis

Date: 12/02/2024

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5.2 Consistency of PMLU and Community Outcomes

EPVL00864413 for ML4349 and ML20547 does not specify a land outcome. Table F1, however, includes rehabilitation objectives as "native vegetation and habitat" with the overall rehabilitation goal as "able to sustain an agreed post mining land use".

The proposed PMLU of grazing was considered by the Land Court of Queensland in 2020 in the objection hearing for the amendment of the Environmental Authority. The expert evidence by Mr N Tucker considered the proposed PMLU of grazing as appropriate and presiding member PG Stilgoe OAM accepted this statement.

The PMLU of grazing is considered consistent with the outcomes of the community consultation undertaken to date as grazing is the current land use; and there were no queries or issues raised by adjacent landholders or other members of the local community in relation to continuing these grazing activities.

A small area of land will remain as a PMLU of "Infrastructure" to include existing telecommunications and power infrastructure assets owned by external parties (Telstra and Ergon). These assets currently support the community by provision of vital communication coverage. Removal of these items would likely cause significant community concern by the removal of a vital communication link. It is considered that the retention of this infrastructure would have broad community support.

5.3 Consistency of PMLU and Planned Government Land Outcomes

The current Tablelands Regional Council (TRC) Planning Scheme identifies the entirety of ML4349 and ML20547 as located in the "Rural, broad hectare zone" (Figure 32).

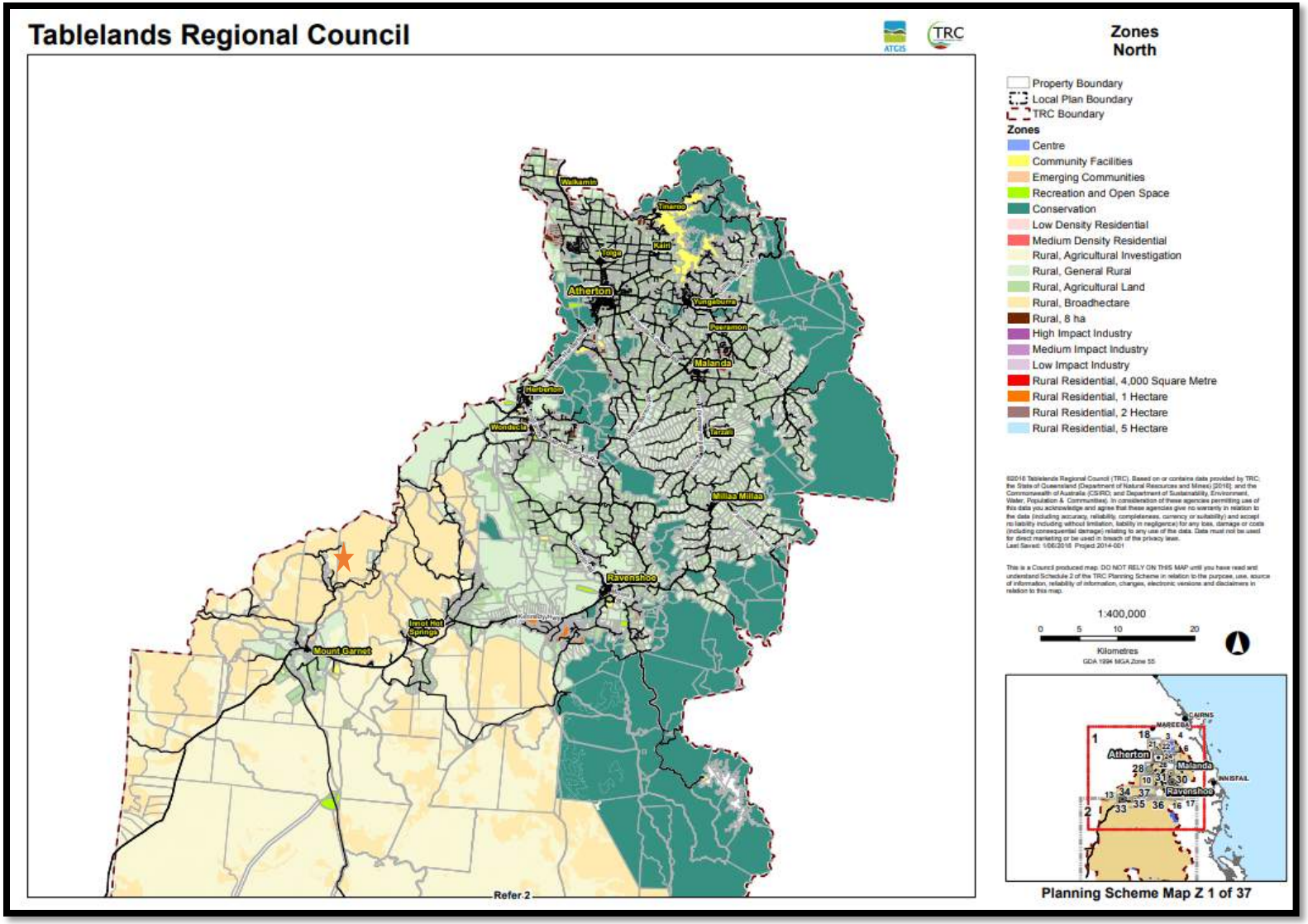


Figure 32 Tablelands Council Planning Scheme Zoning

(MGT location indicated by orange star)

Under the TRC Planning Scheme, the purpose of the Rural Zone is to recognise the importance of primary production to the economy of the region and to maintain and strengthen the range of primary industries which contribute to the rural economy. In particular, the "broad hectare precinct" broadly encompasses the southern, western and northern parts of the region where **grazing** on very large rural holdings is the dominant rural activity (TRC, 2016).

Therefore, the proposed PMLU of grazing is in line with the current TRC Planning Scheme.

There are no regulatory constraints for the proposed post-mining land use "grazing". Furthermore, this PMLU is consistent with:

- Community consultation (as per s126C(1)(d) EP Act, outlined above.
- Landholder requirements, which is also consistent with pre-mining land use and surrounding land use.
- There are no physical constraints such as slope or geological limitations to the proposed PMLU. This is evidenced by the fact that grazing is currently and historically been successfully undertaken in the Project area. Furthermore, no voids will remain hence not causing potential impact to grazing activities.
- There are no chemical characteristics that will generate constraints as there will be no residual contamination arising from the mining activities including from tailings or other waste disposal.
- Environmental benefits by reinstating vegetation and habitat features in keeping with the surrounding land use.
- Economic benefits relative to the rehabilitation costs, as well as ongoing economic and social benefits for the landowner and community due to employment in the region.
- Best practice rehabilitation methods including backfilling any voids created from mining.
- Retention of any infrastructure to support the grazing enterprise including fences, tracks and water features where written agreement with the landholder has been obtained.

There are limited other PMLU options due to the location of the site, the terrain and the TRC Planning Scheme Zone. The only potential option would be to return the site to a native ecosystem; however this is inconsistent with the TRC Planning Scheme Zone and the requirements of the land owners. However, PMLU Grazing does include the revegetation of native ecosystems in addition to pasture grasses, including open woodland tree species which will provide habitat for native fauna.

At the completion of rehabilitation, the site will be geotechnically and geochemically stable, safe and non-polluting.

A small area of land will remain as a PMLU of "Infrastructure" to include existing telecommunications and power infrastructure assets owned by external parties (Telstra and Ergon). These assets currently support the community by provision of vital communication coverage. Removal of these items would likely cause significant community concern by the removal of a vital communication link. It is considered that the retention of this infrastructure would have broad Local Government and State Government support.

6 Non-Use Management Areas

A non-use management area (NUMA) is an area of land that cannot be rehabilitated to a stable condition after all the relevant activities for the PRCP carried out on the land have ended (s112 EP Act).

There are no non-use management areas proposed as it is planned for the entire area to be rehabilitated to a stable condition once the relevant activities carried out on the land have ended.

7 Rehabilitation Management Methodology

7.1 Overview

The proposed rehabilitation strategy for the mine (when operational) will involve a progressive rehabilitation program. Suitable soil resources for use in rehabilitation will be stripped from areas where construction and mining operations will occur. In addition, following clearing, topsoil will be collected where available and either used directly for rehabilitation purposes or placed into clearly marked topsoil stockpiles. The same applies for sub-soil stockpiles. These stockpiles will then be progressively replaced onto the post-mining rehabilitation landform in the form of the pit rim bund wall or safety berm around the pit. Adequate controls (including sediment fence and appropriate cover) will be in place to manage the erosion risk of the stockpiles or bund itself. An inventory of available soils will be maintained to ensure adequate materials are available for planned rehabilitation activities.

The main features of the progressive rehabilitation process are:

- Constructing a stable landform for all disturbed areas;
- Test sub-soils for sodicity and apply ameliorants in accordance with AQP recommendations before spreading across reshaped areas;
- Test topsoil and apply ameliorants in accordance with AQP recommendations before spreading across reshaped areas;
- Contour ripping immediately after topsoil placement to control erosion;
- Revegetation with an appropriate seed mix prior to the wet season; and
- Management of rainfall and runoff from the rehabilitated landform in sediment dams.

The Dalcouth open cut pit and Summerhill open cut pit will be developed in parallel. Topsoil and subsoil to be stripped and separately stockpiled for future use. Progressive rehabilitation, including reshaping, topsoiling and seeding will be undertaken through the operational period.

The mine pit void will be shaped to be made safe and stable, appropriate sub-soil to be added, topsoiled and seeded. In parallel, any mine infrastructure that is no longer required will be decommissioned and dismantled for removal from site with the individual locations rehabilitated accordingly. Dams and access roads will remain for future beneficial use or decommissioned. The new TSF will be capped, whilst the existing TSF will be deconstructed and returned to a chain of ponds system. Rehabilitated areas will be monitored and if necessary reworked to achieve the required completion criteria.
The aim of progressive rehabilitation is to minimise the amount of land disturbed at any one time. Progressive rehabilitation will also include the rehabilitation of any areas disturbed during construction that are not required for ongoing operations. Topsoils and subsoils will be stored around the pit perimeter and will act as a bund wall or safety-berm to the pit in line with industry best practice to prevent the deterioration of soil quality.

7.2 Rehabilitation Objectives

The EP Act requires that mine rehabilitation by conducted for land disturbed by mining activities to ensure that:

- The land is safe and structurally stable;
- There is no environmental harm being caused by anything on or in the land; and
- The land can sustain a post-mining land use.

The Project area is currently used for low-intensity grazing. MGT Minerals intends to manage its operations and conduct decommissioning and rehabilitation activities to ensure that the land disturbed is returned to land suitable for pasture and to enable low-intensity grazing to continue. Hence, the PMLU nominated is **Grazing**.

7.3 Rehabilitation Milestones and Criteria

Key rehabilitation considerations include:

- Engineering for stability and intense rainfall events in site stormwater controls.
- Seeding and vegetation cover to be in place prior to the wet season to reduce erosion risk and increase success of vegetation establishment. Rehabilitation program must consider wet and dry season and ensure erosion control techniques are applicable.
- Selection of species will include those that are most resilient to climate change.
- Drainage diversions will be permanently established to a stable, vegetated and self-sustaining channel to ensure continued protection of downstream water quality values.

The extensive areas surrounding the proposed mining disturbance areas enable the establishment of a number of analogue sites, to compare key metrics / milestone criteria for demonstrating achievement of the relevant milestone. Suitable analogue sites will be defined at the appropriate time for monitoring.

The following schedule (Table 24) outlines rehabilitation milestones and criteria and are applicable to any of the disturbance areas and numbered in sequence of application and expected achievement. Milestones are to be:

- Outcome based
- Flexible to changing circumstances
- Include metrics
- Be reviewed
- Measurement to demonstrate achievement of milestone.

Table 24 Rehabilitation Milestones and Criteria

Milestone Reference	Applicable Rehabilitation Area	Rehabilitation Milestone	Milestone Criteria
RM1	RA1, RA2, RA3, RA4, RA5, RA6, RA7	Infrastructure Decommissioning and Removal	1. All services, e.g. water, electricity, gas, are disconnected and terminated 2. All pipelines associated with the mining activity are removed 3. All buildings are demolished and removed 4. All road materials (concrete, bitumen, gravel) removed where not to be retained 5. All fencing removed, where not be retained as part of the PMLU 6. All machinery and equipment removed

Milestone Reference	Applicable Rehabilitation Area	Rehabilitation Milestone	Milestone Criteria
			7. All non-required surface water drainage infrastructure removed 8. . All waste removed and disposed of in accordance with Environmental Authority (EA) EPVL00864413
RM2		Remediation of Contaminated Land	1. A preliminary comminated land investigation is undertaken and a report is prepared by an Appropriately Qualified Person (AQP)1. 2. All hazardous and contaminated materials have been assessed and identified by an AQP, and disposed of lawfully 3. A contaminated land investigation document has been prepared by an AQP containing a site suitability statement confirming that land is not contaminated and is suitable for the proposed PMLU.
RM3	RA1, RA2, RA3, RA4, RA5, RA6, RA7	Landform Development and reshaping / reprofiling	1. Dalcouth Pit backfilled to at least pre-mining ground surface and consistent with pre-mining contours averaging 12% and self-draining 2. Waste rock dump cover installed (Min. 1m thickness of compacted rock) to minimise erosion and reduce rainfall infiltration 3. Upper surface of waste rock dump to be free draining slope of 1% 4. Dalcouth Pit backfill and waste rock dump side batters constructed to 5% slopes, where applicable 5. Geotechnical assessment of Summerhill Pit undertaken by AQP to ensure proposed design is safe and stable for the grazing PMLU 6. Batter slopes at Summerhill Pit achieve an overall slope angle of no greater than 48 degrees in weathered rock, 57 degrees in fresh rock 7. Floor of Summerhill Pit achieve design slope of no more than 1% 8. New TSF capped installed (Min 0.2m trafficability layer, min 0.2m low permeability layer, min 0.4m capillary

Milestone Reference	Applicable Rehabilitation Area	Rehabilitation Milestone	Milestone Criteria
			break) to provide geotechnical stability and reduce rainfall infiltration 9. New TSF Upper surface is free draining towards spillway (approx. 2 degrees slope) 10. Existing TSF embankment removed 11. Re-established approximate pre-disturbance contours in the Existing TSF valley area (slope approximately 10% to 30%) 12. All major earthworks completed 13. Drainage structures to be designed by AQP to meet criteria required at the time of construction 14. All erosion and sediment control systems have been installed 15. Final landform surveyed by an AQP as per the construction designs and assessed as geotechnically stable 16. Drainage rates from the cover system into the new TSF are <1x10-8 m/s 17. New TSF cover system has been constructed according to design and certified by AQP
RM4	RA1, RA2, RA3, RA4, RA5, RA6, RA7	Surface Preparation	1. Spread adequate sub-soil material over shaped surfaces - minimum 22.5cm 2. Spread adequate topsoil material over shaped surfaces - average 15cm 3. An assessment of the placed growth media health and suitability completed by an AQP to confirm soil is suitable for target vegetation establishment 4. Any fertilisers/ameliorants recommended as a result of the soil assessment have been applied at the rate recommended by the AQP 5. Perform ripping and/or surface contouring to minimise soil loss and encourage rain infiltration and vegetation uptake
RM5	RA1, RA2, RA3, RA4, RA5, RA6, RA7	Revegetation (Grazing)	1. Revegetation strategy reviewed by AQP and Revegetation Plan prepared, including selection of appropriate analogue and monitoring sites, if recommended

Milestone Reference	Applicable Rehabilitation Area	Rehabilitation Milestone	Milestone Criteria
			2. Seeding has been completed with recommended seeding mix shown at Table 1 at a rate of 1kg/ha for canopy species and up to 7kg/ha for grass/shrub species, or as amended by the AQP at RM5-1 3. Timing of seeding to align with wet weather to coincide with elevated levels of soil moisture 4. Stock exclusion fencing installed around all areas that have been seeded
RM6	RA1, RA2, RA3, RA4, RA5, RA6, RA7	Achievement of Surface Requirements (Grazing)	1. Measured indices at rehabilitated sites for Grazing within a 50x5m plot: a) At least three of the tree and shrub species, and three of the ground cover species listed in Table 1 are present; b) ≥70% of target species have germinated c) Percentage ground cover ≥ 50% of that recorded at analogue sites as nominated in RM1-1; and d) Weed density no more than 10% greater than the percentage cover at analogue sites. 2. Landform certified as geotechnically stable, i.e having achieved a safety factor greater than 1.5 3. Drainage meets design criteria as per RM3-13 4. No signs of active erosion meeting classification of Severe, i.e. erosion features that would prevent reinstatement of the grazing PMLU
RM7	RA1, RA2, RA3, RA4, RA5, RA6, RA7	Achieved PMLU to Stable Condition(Grazing)	1. Measured indices at rehabilitated sites for Grazing within a 50x5m plot: 2. ≥70% of the productivity (carrying capacity measured as pasture biomass) of that recorded at analogue sitesas nominated in RM5-1; 3. Percentage ground cover ≥ 50% of that recorded at analogue sites; and

Milestone Reference	Applicable Rehabilitation Area	Rehabilitation Milestone	Milestone Criteria
			4. Weed density no more than 10% greater than the percentage cover at analogue sites. 5. Land suitability class of ≤3, based on the latest version of the 'Guidelines for Agricultural Land Evaluation in Queensland' as assessed by an AQP. 6. Maintenance requirements for rehabilitated land is no greater than that required for the land prior to its disturbance. 7. Erosion assessment of final landform: No evidence of erosion classified as Moderate and Severe2; drainage follows intended and appropriate drainage paths 8. Average sediment erosion rate of less than 5 t/ha/y has been achieved 9. Sediment and erosion control structures removed after disturbed areas are classed as stable 10. Stock exclusion fencing removed from around revegetation areas 11. Surface water quality monitored monthly during flow at, but not limited to, downstream locations specified in Table 1 must not exceed the limits in Table 2, for a minimum of 2 consecutive years. 12. If the surface water quality exceeds criteria 8 above, the applicable reference site must be compared to the downstream site result; and quality measured at a downstream site must be equal to or less than the quality measured at the applicable reference site. 13. For a minimum of 2 consecutive years groundwater must be monitored quarterly at, but not limited to, compliance bores specified in Table 3, for all quality characteristics listed in Table 4.

Milestone Reference	Applicable Rehabilitation Area	Rehabilitation Milestone	Milestone Criteria
			14. Groundwater quality results must not exceed the limits in Table 4, for three consecutive results.
RM8	RA1, RA2, RA3, RA4, RA5, RA6, RA7	Achieved PMLU (Infrastructure)	1. Final landform survey confirms no structures or equipment remain other than those documented in a landholder agreement. 2. No erosion classification of Severe or Extreme. 3. Landform shows suitable slope gradients e.g. <20% except to connect with surrounding natural topography. 4. Hazard and Safety Assessment completed by an AQP demonstrating hazards in rehabilitation areas are consistent with the nature and severity of hazards typical of neighboring equivalent land use. Identified residual hazards are low risk with no significant increase in risk expected over time.

8 General Rehabilitation Practices

8.1 Hydrogeology

A comprehensive assessment of hydrogeology of the project was documented in the report "Groundwater Assessment Report, Ardent Group, 25 January 2022", included as Appendix43. The baseline hydrogeology information was summarised in section 3.1.6. This section contains further detail relevant to rehabilitation planning.

Hydro-stratigraphic units (HSUs) are zones within a hydrogeological system that have similar hydrogeological properties with respect to their influence on groundwater flow.

Three HSUs are present. These are the Hodgkinson Formation, Elizabeth Creek Granite and the Quaternary deposits. The Elizabeth Creek Granite is recorded in bore MB4 and MB12 (at depth).

The Hodgkinson Formation can be considered as an aquitard, with low hydraulic conductivity, transmissivity and (likely) storativity values. The Elizabeth Creek Granite is inferred to also behave as an aquitard, based on typical behaviour of granite plutons. The Quaternary deposits likely form a poor to moderate aquifer of variable hydraulic properties, depending upon coarseness of clastic materials and degree of sorting, as well as the degree of anthropogenic reworking. The HSUs are summarised in **Table 13.**

8.1.1 Hydrogeological Properties

Slug test work was undertaken on selected bores in 2018. This data was used to derive estimates of hydraulic conductivity (K) of the screened intervals. These results are summarised in **Table 25**.

Table 25 Slug Test Analysis Results

Hydro Stratigraphic Unit	Monitoring Bore	Hydraulic conductivity (m/day)
Alluvials	MB9	20
Hodkinson Formation	MB5	0.4
	MB6	0.006
	MB7	1.2
	MB8	0.06
	MB10	0.05
	MB11	0.009

There was no test work conducted in the Elizabeth Creek Granite.

The Quaternary deposits consist of reworked clay, gravel, silt and sand, and overlie the Hodgkinson Formation in the valley bottom at the Project. Groundwater is present in these deposits and is likely to be predominantly recharged during stream flows. Aquifer testing indicates the sediments are highly permeable.

Aquifer testing indicates the Hodgkinson Formation has low hydraulic conductivity **Table 25** and correspondingly is expected to have low storage values and low primary (effective) porosity, due to both its greywacke and turbidite origins and the metamorphism that it has undergone. Hydraulic conductivity of the rocks comprising this formation will be dominated by secondary porosity fractures and fissures where these occur and remain open. Groundwater movement through the Hodgkinson Formation will depend largely on the interconnection of fracture sets and there is evidence that this is poor, with pockets of groundwater being hydraulically isolated, based on observations during reverse circulation drilling carried out by MGT in the Project area where water levels in adjacent bores are very different.

Additional testwork was undertaken by Golder in mid 2021 in the vicinity of the proposed tailings dam, including packer testing of shallow weathered Hodkinson Formation (Geotechnical Investigation and Groundwater Monitoring Bore Installation, Mt Veteran Tin Mine, 27 August 2021, Golder). The Hydraulic testing consisted of constant head and falling head tests, with testwork conducted in the open section of at least 1m of Hodkinson Formation at the base of a 5 to 9m deep HQ diamond drill hole.

The constant-head test data measured in the temporary shallow bores was analysed using the following equation developed by the United States Bureau of Reclamation (Reynolds, 2013):

$$\text{KUSBR} = \frac{Q_s}{C_u aH}, \text{ where } C_u = 2\pi \left(\frac{L}{a}\right) \left[\frac{2 - (L|H)}{\sinh^{-1}(L|a) - (L|H)}\right]$$

Where:
KUSBR – Saturated hydraulic conductivity (m/s)
Qs – Steady state flow out from the test section (m3/s)
Cu – Quasi-empirical “conductivity coefficient” (-)
a – effective radius of the water discharge zone (m)
H – Steady state head from base of the hole (m)
L – Length of test interval (m)

Data obtained from each FHT was analysed using the KGS model and Barker Black method for a single-well test in an unconfined aquifer. The test data was analysed using AQTESOLV Version 4.50.

A summary of the CHT and FHT results is included in **Table 26** below.

Table 26 Constant Head Test and Falling Head Test Results

Bore ID	Test interval (m below ground level)	Tested Formation	Test Method	Analysis Method	Estimated K (m/s)
GB01	7.4 to 8.4	Arenite	Falling Head Test	KGS Model	3.7×10^{-9}
				Barker Black	3.1×10^{-9}
GB02	7.7 to 8.70	Arenite	Constant Head Test	Ahreans & Barlow	1.5×10^{-8}
			Falling Head Test	KGS Model	1.5×10^{-8}
				Barker Black	1.2×10^{-8}
GB03	5.50 to 6.50	Arenite	Constant Head Test	Ahreans & Barlow	1.1×10^{-8}
			Falling Head Test	KGS Model	3.1×10^{-8}
				Barker Black	2.6×10^{-8}
GB04	6.15 to 7.15	Arenite	Constant Head Test	Ahreans & Barlow	3.0×10^{-8}
			Falling Head Test	KGS Model	8.5×10^{-8}
				Barker Black	8.5×10^{-8}

The results of this testwork indicate very low hydraulic conductivity in the shallow Hodkinson Formation.

Recharge to the Hodkinson Formation will be primarily via diffuse infiltration of rainfall and also from leakage from the Quaternary deposits that overlie it where they are present in local valleys. The low overall hydraulic conductivity of the unit likely restricts recharge rates and most recharge probably occurs in areas where the fracture and fissure systems are developed, outcrop or sub-crop, and remain open and extend to depth. The maximum recharge potential will occur where fracture and fissure sets are open and are exposed to flowing watercourses (e.g. Males Creek) during the wet season.

A summary of the anticipated ranges in hydraulic properties for the project area is included in **Table 27**.

Table 27 Expected Range in Hydraulic Property Values

Hydro Stratigraphic Unit	General Description	K (m/s) [1]	Sy (-/-) [2] [3]	ne (-/-) [2] [4]
Quaternary sediments	Sand, silt and gravel (poorly sorted, assume bulk hydraulic properties related to fine-medium sand)	2.3×10^{-4}	$8x10^{0}$ to $2.5x10^{1}$	$3x10^{-1}$ to $5x10^{-1}$
Hodgkinson Formation	Greywacke, sandstone, siltstone, shale and conglomerate (assume bulk hydraulic properties related to shale and sandstone)	5.8×10^{-8} to 1.1×10^{-5}	$5x10^{-1}$ to $1.5x10^{1}$	$5x10^{-3}$ to $1x10^{-1}$

Notes:
1. Hydraulic conductivity
2. Source: Domenico and Schwartz (1990), and Driscoll (1986)
3. Specific yield
4. Effective porosity

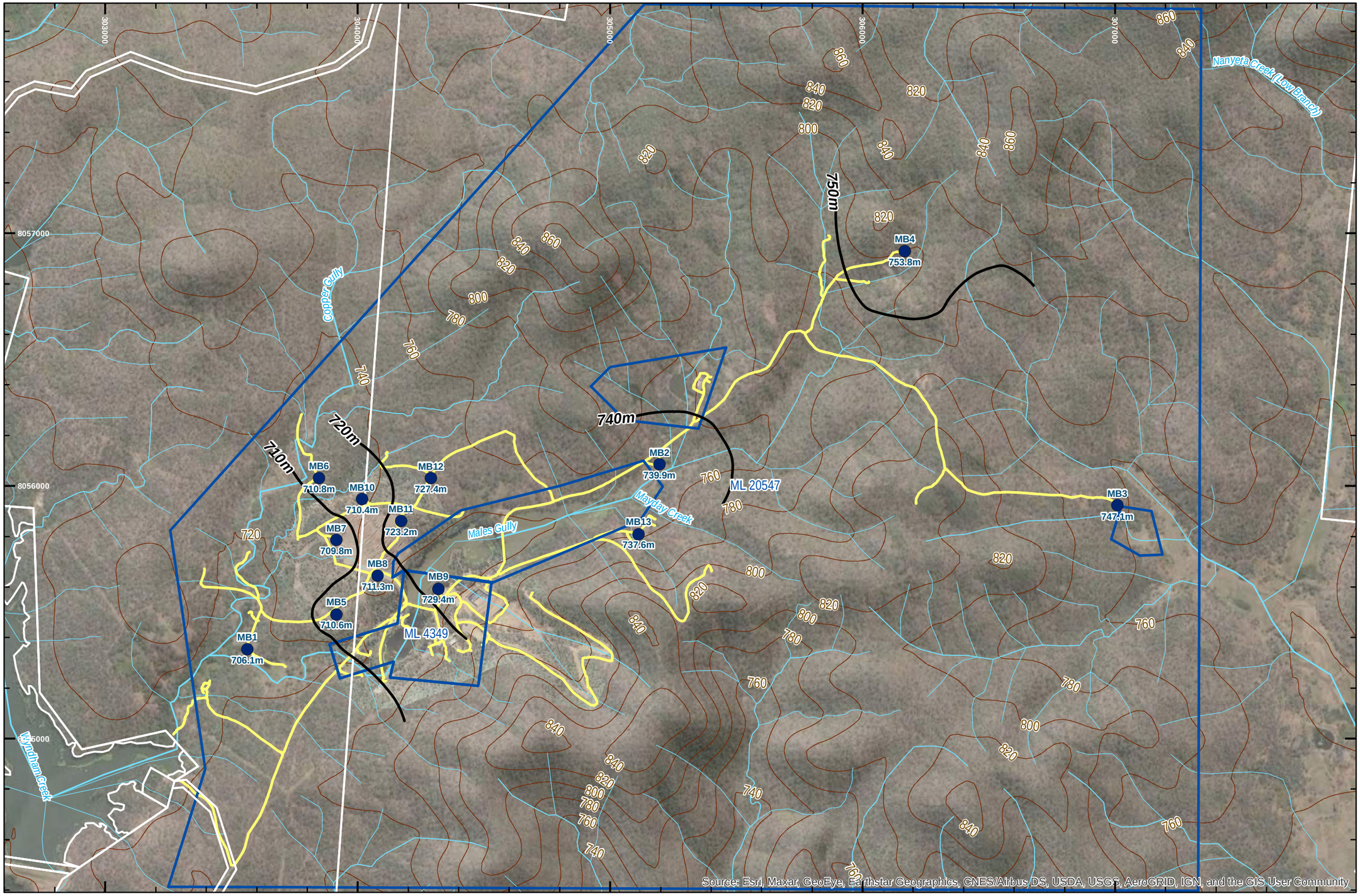
It is reported that historical groundwater level data indicates little variation over time, with a slight increase in water level following wet seasons. Groundwater level head data has been plotted on Figure 33 and from this map the following can be inferred;

1. The overall hydraulic gradient in the Hodkinson Formation is from north east to south west in the local project area.
2. Groundwater pressure level in MB9 in the alluvial gravels is above the pressure level in the Hodgkinson Formation.
3. Groundwater level in MB9 is approximately equal to the water level in the adjacent pond inferring a direct connection.
4. Standing water levels in the ponds in Males Gully are above the pressure level in the Hodkinson Formation.
5. If there was a hydraulic connection between the Alluvial Gravels and the Hodkinson Formation, then the Hodkinson Formation would be receiving recharge from the pond water/alluvial gravels.
6. Pressure levels in the Hodkinson Formation are below the local surface elevation, such that no groundwater dependent ecosystems reliant on the Hodkinson Formation are likely to be present in the local project area.

8.1.2 Hydrochemistry and Groundwater Quality

Discussion of the hydrochemistry of the groundwater is included in section 3.1.6.

The quality of the groundwater was subject to detailed assessment during an EA amendment in 2022. The result of this assessment was a new table of Groundwater Quality Objectives in the EA, reproduced in **Table 16**. .



0 200 400 600 800 1,000

Meters

MGT MINERALS PTY LTD

Mount Veteran Overview

N W E S

GDA2020, MGA Zone 55

Figure 33 - Groundwater Levels Contour Map

Drawn By: Chris Schlebusch

Requested by: Richard Davis

Date: 25/01/2022

Sheet No.

RTPL_ARD_MGT003_MAP_0007_B

- Mining Lease Boundary
- Property Boundary
- Watercourse
- Access Track
- Elevation Contour
- Groundwater Monitoring Bore (with SWL, December 2021)
- Standing Water Level Contour

Data sources:
Elevation = SRTM from QDR DEM, Webservice 2021-07015
©Queensland Department of Resources

Path: S:\Plans\Project_Specific\Ardent\MGT003\RTPL_ARD_MGT003_MAP_0007_B A3L Mt Veteran Ground Water Levels.mxd

8.1.3 Uses of Groundwater

The nearest registered bore, outside of the monitoring bores on the mining lease, is over 8km to the south of the site. This reflects the poor groundwater yields from the tight aquifer in the Hodkinson Formation. The quality of the groundwater, would generally make it suitable for stock use, except for the concentration of Fluoride can be greater than the stock water guideline level of 2mg/L. However, as evidenced above, the characteristics of the aquifer mean that extracting groundwater from the aquifer is generally not feasible for this use.

8.1.4 Conceptual Groundwater Model

A conceptual Hydrogeological Model for the project area has been prepared and is documented in Appendix 4.

Groundwater recharge is anticipated to occur mainly during the wet season as infiltration in outcropping areas, and during stream flow events. Evapotranspiration from the soil horizon and unsaturated zone will take place all year, with this rate exceeding the rainfall rate for most months of an average year. Rainfall runoff results in ephemeral flow in streams, although the ponded water bodes in Males Creek are maintained year-round.

It is concluded that there are two main hydrostratigraphic units present in the project area, the Hodkinson Formation and Alluvial deposits.

Groundwater flow in the Hodgkinson Formation is predominantly from the higher north-eastern areas to the lower south western area of the project. Groundwater movement will be slow, relying on secondary porosity, and thus poor connectivity across the site. Groundwater levels in the Hodkinson Formation are anticipated to be lower than the overlying Alluvial Aquifer. If there is a connection between these two hydrostratigraphic units, then the Alluvial Aquifer may add a component of recharge to the Hodkinson Formation.

Groundwater levels in the Alluvial aquifer are anticipated to reflect water level in adjacent ponds. Groundwater levels in the Alluvial aquifer will generally follow the local ground level contours (i.e. flow downhill) although this may be locally disrupted where gravel and sand thickness is affected by past (historical) alluvial mining activities.

Groundwater may be hosted in the Alluvial deposits coincident with creeks, in areas away from the ponded areas. This groundwater would be in response to recharge of Alluvial sands and gravels during times of ephemeral creek flow. It is anticipated that there is poor connection in this aquifer along drainage lines. This is because observations in creek lines of exposed basement rock formations is relatively common.

Flow (or recharge) between the Alluvial aquifer and underlying Hodkinson Formation is expected to be minimal due to the significantly lower hydraulic conductivity present in the Hodkinson Formation.

While there have been historical mining activities noted in the district, no activities by the current mining lease holders is anticipated to have had a material impact on the groundwater quality or levels on site.

The Hydrostratigraphic Units are summarised in **Table 28** and illustrated in **Figure 34.**

Table 28 Hydrostratigraphic Unit Summary

Hydrostratigraphic Unit	Age	Description	Recharge Mechanisms	Discharge Mechanisms	Hydraulic Conductivity	Aquifer classification
Alluvial/Alluvium	Quaternary	Alluvium, colluvium, sand, silt and gravel	• direct rainfall • stream flow	limited discharge into underlying formations, evaporation	2 x 10^{-4} m/s (a)	poor Aquifer
Hodkinson Formation	Devonian to Late Silurian	Thin bedded metamorphosed rock including meta-greywacke, meta-sandstone, meta-siltstone, meta-shale and meta-conglomerate.	• direct rainfall • stream flow, where formation is exposed in base of streams	no discharge to surface (i.e. GDE), groundwater flows down groundwater gradient generally to west	8 x 10^{-7} m/s (a) 8.5 x 10^{-8} to 3.1 x 10^{-9} m/s (b)	Aquitard

Note (a) from MGT Minerals, EA Amendment Application Supporting Report, 2018, (b) from unpublished report Geotechnical Investigation and Groundwater Monitoring Bore Installation, Golder, August 2021

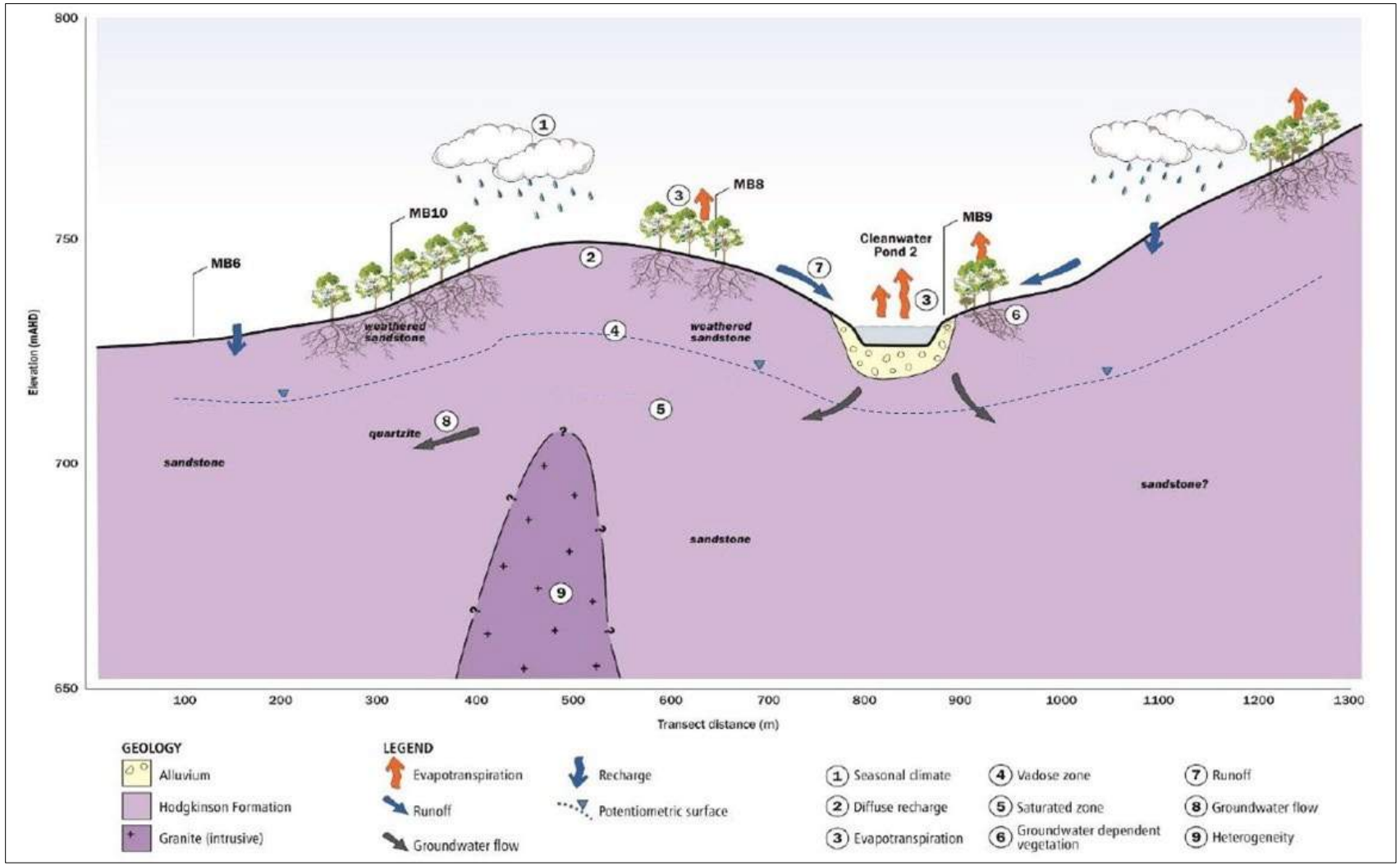


Figure 34 Conceptual Groundwater Model

8.1.5 Mining Impacts on Groundwater

The effects of mining on Groundwater have been described in detail in the documents provided for the 2018 EA amendment (Dalcouth Pit), the 2020 EA amendment (Summerhill Pit), the 2021 EA Amendments (Tailings Dam) and the 2022 EA amendment (Groundwater).

Mining of the Dalcouth pit will result in local dewatering of the Hodgkinson Formation strata immediately around the pit. Dewatering will be through pumping from pit base sumps and drains if inflows are substantial enough, otherwise evaporation may be sufficient to manage inflows.

The low hydraulic conductivity of the Hodgkinson Formation, together with its observed poorly developed hydraulic connectivity means that anticipated dewatering volumes will be low, and it is likely that the cone of depression caused by the pit dewatering will be closely restricted to the area surrounding the pit. This will mean that the pit dewatering should have little impact on the groundwater quantity and quality hosted within the Hodgkinson Formation as a whole.

The pit will be backfilled at the cessation of mining to a level above the water table. The backfilled pit void will have enhanced hydraulic conductivity and storativity values compared to the surrounding Hodgkinson Formation strata. It may therefore very locally enhance available groundwater volumes in this restricted area. The waste rock used to backfill the pit was originally sourced from the pit. Therefore, the bulk geology is the same and so the waste rock should not impact on groundwater quality in this location.

The waste rock storage has the potential to create groundwater mounding beneath it, during operation. However, this effect will only be temporary as it will be used to backfill the pit when mining has ceased, leaving a much-reduced waste rock storage area. Discussion of waste rock quality in section 8.5 indicates that there should be minimal impact on groundwater quality from this waste rock.

The mining of the Summerhill pit is anticipated to have little to no impact on groundwater in the region of the pit, as the mining level will not reach the measured groundwater level in this locality.

Seepage to groundwater from the Tailings Dam is anticipated to have minimal impacts on groundwater quantity and quality in this location. The tailings dam embankment and floor will be lined, and shallow seepage detection bores have been installed immediately downslope of the embankment. The tight Hodkinson Formation rocks beneath the tailings dam area are expected to restrict infiltration. Discussion of tailings waste quality in section 8.5 indicates that there should be minimal impact on groundwater quality from the tailings.

8.2 Flooding

Flood plain modelling is not required as there are no voids located within a flood plain being rehabilitated.

As shown in Figure 13 the flood risk profile is low.

Rehabilitated areas will be re-contoured to achieve a safe and stable landform. Permanent surface water diversions will be incorporated into the final landform to ensure that clean surface waters are

directed into the surrounding drainage lines. The stockpiled overburden may be re-used to assist in achieving the final landform.

8.3 Soil and Capping Material Assessment

The results from the testing of soil materials on site has been detailed in section 3.1.7.

The results of testing of weathered overburden is detailed below in section 8.5.

During the development of extraction areas in areas that have been undisturbed, all topsoil/subsoil will be selectively lifted and stored for later use in the rehabilitation stage of the project. At this stage, additional test work can be undertaken of the stockpiled materials to confirm their suitability for use in rehabilitation.

When mining is complete at Dalcouth Pit, the waste rock will be used to backfill the pit to the final desired landform specifications to ensure that is safe and stable. Subsoil and topsoil will be replaced on the profiled landform in the reverse order to which it was stripped; that is the subsoil is placed on top of any returned overburden and the topsoil on top of the subsoil at an appropriate thickness.

Before the topsoil is spread, the profiled landform will be scarified parallel to the contour to a nominal depth of 50 to 100mm to break up any hard setting surfaces and prevent lamination of the topsoil and profiled landform.

Where required, contour banks will be progressively installed to minimise rill erosion and direct water off the profiled landform to either a stable surface or dedicated stabilised drainage paths or flumes constructed on the final landform. The heights and depths of these contour banks will be determined through ongoing landform design. At the finalisation of this process a pre-vegetation landform will have been constructed. Finalised landforms will be sown with a cover crop and grass species to provide erosion protection before the native species become established.

8.4 Soil Management

8.4.1 Topsoil

Topsoil stockpiles were not retained for the historical disturbance areas on the mining lease. Topsoil has not been stripped from the area disturbed in the Dalcouth area. Topsoil and subsoil have been retained adjacent to the exploration trenches.

The topsoil requirements for the plant pond and process pond are calculated at a combined 716m^3 (combined area of 0.478 ha x 0.15m topsoil thickness). There exists on site a stockpile area of growth media adjacent to Clean Water Dam 2 that has been partially revegetated, indicating its viability to sustain vegetation. This stockpile covers an area of approximately 1,400m^2 and is 1.5m high, giving a total of approximately 2,100m^3 of growth media. This growth media stockpile can thus be used for rehabilitation.

The topsoil / growth media requirement for the existing TSF is estimated at 3,075m^3 (2.09ha x 0.15m). The TSF embankment is already well vegetated and so will not require topsoil addition. This topsoil can be partially sourced from the growth media stockpile 1 area, for a total of 1,384m^3. The balance

of the topsoil (1,691m^3) can be obtained from the additional growth media locations located on site. These stockpile areas support pasture growth and so demonstrate their viability as a growth media. Collectively these stockpile areas total an area of over 15,000m^2, and with backfill thickness conservatively estimated at 0.2m, this totals over 3,000m^3 of growth media available. Thus, there is enough growth media on site to satisfy the requirement for the existing TSF rehabilitation.

Additional growth media requirements will be obtained by pre-stripping topsoil and subsoil in advance of mine development (i.e. for the Waste Rock Dump, Summerhill Pit and TSF).

A summary of the available topsoil onsite is detailed in Table 29, and the topsoil required for rehabilitation is outlined in Table 30.

Table 29 Existing topsoil stockpile volumes

Topsoil Stockpile	Volume (m^3)
1	2,100
2-5	3,000
TOTAL	**5,100**

Table 30 Topsoil rehabilitation requirements

Area	Volume (m^3)
Plant pond and process pond	716
Existing TSF	3,075
TOTAL	**3,791**

Topsoil and subsoils will be stripped, handled and stored to prevent excessive soil deterioration. An inventory of available soils will be maintained to ensure adequate materials are available for planned rehabilitation activities.

Prior to stripping, all vegetation would be progressively cleared to the minimum extent required for the impending future works. Supervisors and earthmoving plant operators will be trained to visually identify the topsoil layers to ensure that stripping operations are conducted in accordance with stripping plans and in situ soil conditions. Care will be taken to ensure soil moisture conditions are appropriate for stripping and stockpiling.

Material that has been stockpiled for reuse will be protected from excessive disturbance or traffic and stockpiled away from drainage lines. Drainage will be constructed to manage or divert surface water flows around stockpiles and maintained to ensure proper functioning. Topsoil stockpiles will be formed in low mounds with a height up to three metres and subsoil stockpiles up to six metres. Long-term stockpiles (present for greater than six months) will be deep ripped and provided with a vegetative cover to maintain the soil heath, maintain biological activity and minimise erosion potential. Stockpiled material will be constructed with batters or gradients of 1:4 wherever possible. Appropriate sediment controls will be installed to prevent soil loss. Weed and pests will be monitored and controlled as required.

Prior to re-spreading, weed growth will be scalped from the top of the stockpiles, if required, to minimise the transport of weeds into rehabilitated areas. Any stockpiles that have evidence of any

weed growth will be treated prior to the use in rehabilitation. Movement and handling from stockpiles to be conducted to minimise structural degradation such as compaction. Selective placement will occur so that more erodible soils will be placed on flatter areas as opposed to steeper slopes to minimise erosion potential. Respreading of soil will be conducted in even layers at a thickness appropriate for the intended final land use. Contour ripping will occur to encourage soil keying, water infiltration and minimise runoff.

Reseeding and revegetation will occur as soon possible after respreading to establish vegetation cover. Slope drainage control will be installed to limit slope lengths and runoff velocities; and collection drains and catch dams will collect runoff and remove suspended sediment.

Topsoil and spoil material will be tested prior to being used for rehabilitation. The results from soil testing will determine if any ameliorates are required to be added to topsoil and spoil material to achieve sustainable rehabilitation. The use of soil ameliorants is designed to prevent surface crusting, increase moisture and organic content, and buffer surface temperatures to improve germination. Vegetation which has been stockpiled as a result of clearing activities will be mulched on site and this will also be incorporated into the rehabilitation activities.

8.4.2 Sub-soil

Material that has been stockpiled for reuse will be protected from excessive disturbance or traffic and stockpiled away from any drainage lines. Drainage will be constructed to manage or divert surface water flows around stockpiles and maintained to ensure proper functioning.

In the event long-term stockpiles are required (present for greater than six months) they will be deep ripped and provided with a vegetative cover to maintain the soil heath, maintain biological activity and minimise erosion potential. Stockpiled material will be constructed with batters or gradients of 1:4 wherever possible. Appropriate sediment controls will be installed to prevent soil loss; and weeds and pests will be monitored and controlled as required. These stockpiles may be temporarily located within active pit areas.

8.4.3 Site Soil Assessment

As outlined in the sections above, there is sufficient growth media / soil stockpiles on site to address the rehabilitation of the existing TSF and Plant Pond/Process Pond. Prior to the disturbance of the major mining features (Waste Rock Dump, Dalcouth Pit, Summerhill Pit, New TSF) topsoil and subsoil will be pre-stripped and stockpiled. Thus, there will be sufficient topsoil and growth media stockpiled for the later rehabilitation of these features. It is expected that no material will be imported on to site.

8.5 Waste Characterisation

8.5.1 Dalcouth Pit

A total of 37 samples of material (18 ore and 19 waste rock (including one unknown)) from the Dalcouth pit area were tested for geochemical parameters. A summary of the assessment of acid generation potential is provided in Table *31* for Waste Rock and Table *32* for Ore.

Table 31 Summary of Geochemical Results from Dalcouth Waste Rock

Analyte Description	Units	Minimum	Maximum	Standard Deviation	Mean	Sample Count
Aged EC 1:2	µS/cm	23	820	196.59	210.21	19
pH Paste	pH Units	5.7	9.5	1.24	-	19
Total Sulphur	% w/w	<0.005	0.045	0.01	0.01	19
SHCl	% w/w	<0.005	0.023	0.01	0.01	19
Total Oxidisable Sulfur	% w/w	<0.005	0.026	0.01	0.01	19
Acid Neutralisation Capacity	% CaCo3	<0.05	4.7	1.16	1.02	19
Acid Neutralisation Capacity	kg H_2SO_4/tonne	<0.5	2.5	0.60	1.20	19
NAPP[1]	kg H_2SO_4/tonne	<0.5	<2	NA	NA	19
NAPP inc ANC[1]	kg H_2SO_4/tonne	-2	<2	1.12	0.47	19
NAG pH	pH Units	4.6	9	1.48	-	15
pHOX	pH Units	4.5	8.4	1.36	-	19
Net Acid Generation pH7	kg H_2SO_4/tonne	0.6	1	0.11	0.95	19

[1]NAPP – there were no NAPP results above the limit of reporting however some samples contained acid neutralising capacity. For these samples half reporting limit (<LOR) was assumed for NAPP to calculate the mean and standard deviation (for NAPP inc ANC)

The results show that waste rock samples are generally close to neutral (pH results for paste ranged from slightly acidic to 5.7 to basic 9.5 pH units) and contain relatively little to no sulfur (Total S (%) ranged from <0.005 to 0.045) or oxidisable sulfur (Total oxidisable S (%) ranged from <0.005 to 0.026).

These waste rocks are not anticipated to be an acid mine drainage risk.

Table 32 Summary of Geochemical Results for Dalcouth Ore

Analyte Description	Units	Minimum	Maximum	Standard Deviation	Mean	Sample Count
Aged EC 1:2	µS/cm	30	400	110.49	161.61	18
pH Paste	pH Units	6	9.5	0.93	-	18
Total Sulphur	% w/w	<0.005	0.4	0.11	0.05	18
SHCl	% w/w	<0.005	0.06	0.01	0.01	18
Total Oxidisable Sulfur	% w/w	<0.005	0.35	0.09	0.04	18
Acid Neutralisation Capacity	% CaCo3	<0.1	2.5	0.68	0.83	18
Acid Neutralisation Capacity	kg H_2SO_4/tonne	<0.5	12	3.18	2.35	18
NAPP[1]	kg H_2SO_4/tonne	<0.5	<2	NA	NA	18
NAPP inc ANC[1]	kg H_2SO_4/tonne	-5	<2	1.46	0.52	18
NAG pH	pH Units	4.1	8.8	1.19	-	15
pHOX	pH Units	4.4	8	1.22	-	18
Net Acid Generation pH7	kg H_2SO_4/tonne	0.5	1	0.15	0.94	18

[1]NAPP – there were no NAPP results above the limit of reporting however some samples contained acid neutralising capacity. For these samples half reporting limit (<LOR) was assumed for NAPP to calculate the mean and standard deviation (for NAPP inc ANC)

The ore samples contained slightly more sulfur (Total S (%) ranged from <0.005 to 0.4) or oxidisable sulfur (Total oxidisable S (%) ranged from <0.005 to 0.35) and had a similar pH range to waste rock samples. In general, the acid neutralisation capacity for all samples (including waste rock and ore) was greater than the net acid generation potential; there were no NAPP results above the limit of reporting (LOR); however, some samples contained acid neutralising capacity.

Based on standard classification systems for the assessment of the potential for acid mine drainage from these samples, ore and waste rock materials are generally non-acid forming (NAF). Two samples were classifiable as potentially acid forming (PAF) with low capacity to generate acidity, and six samples were classifiable as uncertain (UC). This result is summarised in Table 33.

Table 33 Summary of Geochemical Classification of Dalcouth Ore and Waste Rock Samples

	Potentially acid forming	Potentially acid forming Low Capacity	Non-acid forming	Acid Consuming	Uncertain
Number of Samples	0	2	29	0	6
% of Samples	0%	5%	78%	0%	16%

The ore and waste geochemical samples were classified as oxidised, fresh or mixed dependent upon the zone from which the samples were collected, with results summarised in **Table *34***.

Table 34 Summary of Dalcouth Geochemical Classification and Rock Weathering Zone

Zone	Potentially Acid Forming	Non-acid Forming	Uncertain	Total
Oxide	0	10	0	10
Mixed	0	9	1	10
Fresh	1	3	5	9
Zone unknown	1	7	0	8

To provide a conservative assessment of the potential for acid/saline/neutral mine drainage, both oxide waste and ore acid mine drainage test results have been summarised in Table 35. As shown by the geochemical test work, the material is non-acid forming as all samples have total sulfur below the laboratory detection levels. Therefore, by definition, there can be no acid mine drainage from these samples and consequently, it is anticipated that the waste rock, tailings and exposed walls in the pit will be non-acid forming.

Overall, the acid generation potential, based on the samples analysed to date, is considered to be low. Only two of the samples analysed were classifiable as PAF (low capacity). The bulk of the materials disturbed by the project are from the oxidised zone with the least potential to generate acidity. Over time some materials will be placed into the TSF with potential to generate acidity, however the results would suggest that the volume of these materials is likely to be low. Although the bulk of the materials tested were also not acid consuming the acid neutralising capacity was generally greater than the acid generation capacity.

It is anticipated that the tailings will behave similar to the ore, that is be overall non-acid forming. This is generally consistent with historical assessment of tailings samples (24 discrete samples) at the existing tailings storage facility (TSF), which reported NAGpH results to be generally neutral to slightly basic (variation from 6.9 to 7.5pH units).

Table 35 Dalcouth Oxide Waste and Ore AMD Test Results

Analyte Description	Units	702012	702013	702014	702015	702019	702021	702016	702017	702018	702020
Sample Description		Waste	Waste	Waste	Waste	Waste	Waste	Ore	Ore	Ore	Ore
Type of Sample		Oxide	Oxide	Oxide	Oxide	Oxide	Oxide	Oxide	Oxide	Oxide	Oxide
Aged EC 1:2 #	µS/cm	430	80	820	440	190	370	390	190	230	100
pH Paste # pH	Units	7.7	6.5	5.7	7.2	7.2	6.7	6	7	7	7.9
Total Sulphur # %	w/w	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
SHCl # %	w/w	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total Oxidisable Sulfur, %	w/w	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acid Neutralisation Capacity ANCBT%	$CaCO_3$	0.56	<0.05	0.75	0.37	0.69	0.75	0.06	0.12	0.74	0.67
Acid Neutralisation Capacity kg	H_2SO_4/tonne	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
NAGP # kg	H_2SO_4/tonne	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
NAPP inc ANC # kg	H_2SO_4/tonne	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
pH_{ox}	Units	6.3	6.3	5.9	8.4	7	7.2	6.4	6.9	7.9	7.4
Net Acid Generation pH7	H_2SO_4/tonne	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2

The analysis of leachate testing of the samples in included as Table 36. Note that this leachate testing was TCLP leaching, with an acidic leach fluid. Actual site conditions are expected to be subject to neutral leaching (i.e. rainfall), hence the results in this table are an overestimation of the likely leach fluid quality.

In terms of saline mine drainage, the aged EC 1:2 results range from 80 µS/cm to 820 µS/cm (average 300 µS/cm). These results span the very low to medium salinity range, with the average falling within the "low" range as reported in the "*Technical Guidelines for Environmental Management of Exploration and Mining in Qld"* (Department of Minerals and Energy 1995).

In terms of neutral mine drainage, the TCLP leach results indicate that some samples marginally exceed the EA water quality objective for arsenic, cadmium, cobalt. The levels of manganese and zinc exceed the water quality objective for most of the samples tested. It should be noted that the test results represent a worst-case scenario, under acidic pH conditions. For example, at the expected pH condition (circum neutral), zinc is only sparingly soluble.

Table 36 Dalcouth Oxide Waste and Ore TCLP Leach Analysis Results

Analyte Description	Units	*EA WQ Objective*	702012	702013	702014	702015	702019	702021	702016	702017	702018	702020
Sample Description			Waste	Waste	Waste	Waste	Waste	Waste	Ore	Ore	Ore	Ore
Type of Sample			Oxide	Oxide	Oxide	Oxide	Oxide	Oxide	Oxide	Oxide	Oxide	Oxide
Arsenic - Dissolved	mg/L	*0.013*	0.016	0.003	0.001	0.01	0.02	0.016	<0.001	0.005	0.003	0.005
Cadmium - Dissolved	mg/L	*0.0002*	<0.002	0.003	<0.002	0.003	0.004	<0.002	<0.002	0.002	<0.002	<0.002
Cobalt - Dissolved	mg/L	*0.002*	0.01	<0.01	<0.01	0.01	0.01	0.01	0.01	<0.01	<0.01	<0.01
Chromium - Dissolved	mg/L	*0.001*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper - Dissolved	mg/L	*0.03*	<0.01	0.03	<0.01	<0.01	0.01	<0.01	0.02	<0.01	0.04	<0.01
Mercury - Dissolved	mg/L	*0.0006*	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Manganese - Dissolved	mg/L	*0.02*	0.12	1.5	0.11	1.1	1	0.85	0.54	0.57	0.48	1
Molybdenum - Dissolved	mg/L	*na*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel - Dissolved	mg/L	*0.011*	<0.01	0.01	0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01
Lead - Dissolved	mg/L	*0.0034*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Antimony - Dissolved	mg/L	*na*	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc - Dissolved	mg/L	*0.02*	0.02	0.11	0.04	0.09	0.45	0.17	0.11	0.1	0.11	0.01

Shaded cell exceeds chosen comparison level

8.5.2 Summerhill Pit

The waste rock extracted from the Summerhill Pit will be oxide material only. A total of 15 rock samples have been tested from drill samples in the Summerhill Pit area. These samples were tested for typical acid mine drainage characteristics, as well as whole rock chemistry and leachate chemistry. These results are discussed below.

These rock samples included samples classified as ore and as waste. The waste rock extracted from the Summerhill Pit will be oxide material only. The details are included below.

Table 37 Summerhill Acid Mine Drainage Test Samples Register

Drill hole no.	Easting (m)	Northing (m)	Elevation (m AHD)	Sample No.	Rock Type
SH03	305,401.63	8,055,641.50	811.307	598001	Ore
SH03	305,401.63	8,055,641.50	768.785	598002	Ore
SH03	305,401.62	8,055,641.46	748.785	598003	Ore
SH14	305,346.05	8,055,561.29	817.898	598004	Ore
SH14	305,360.74	8,055,576.56	794.898	598005	Waste
SH14	305,379.69	8,055,597.16	762.898	598006	waste
SH23	305,410.28	8,055,662.86	763.691	598007	Waste
SH23	305,405.76	8,055,660.39	779.691	598008	waste
SH23	305,382.94	8,055,647.54	804.691	598009	Ore
SH12	305,371.28	8,055,557.12	830.974	598010	Waste
SH12	305,377.09	8,055,561.46	823.974	598011	Ore
SH12	305,383.91	8,055,566.50	815.974	598012	Ore
SH08	305,408.50	8,055,646.84	811.58	598013	Waste
SH08	305,411.70	8,055,652.06	805.58	598014	Waste
SH08	305,418.22	8,055,662.46	794.58	598015	Waste

The basic parameters including pH, Conductivity and acid-base accounting for ore are included in Table 38. From these results it is observed;

- pH is circum-neutral
- Electrical conductivity maximum result is 0.08 mS/cm which would be regarded as low salinity rock
- Maximum percent total sulfur is 0.069%, with a resulting maximum potential acidity of 2 kg H_2SO_4/t (i.e. very low potential to generate acid)
- Much of the total S is present as sulfate-S, which is non-acid generating
- Maximum Total Oxidisable Sulfur is 0.008 % which is very low, which equates to a potential acidity of 0.24 kg H_2SO_4/t (i.e. very low potential to generate acid)
- Most acid neutralising potential is below the lower level of detection, with two samples recording positive acid neutralising potential
- There were no samples with a positive Net Acid Producing Potential

Therefore, in accordance with the ARD Test Handbook (AMIRA International, 2002) this waste rock would be considered NON Acid Producing, circum-neutral and of low potential salinity.

To confirm the results from the static testing, a single stage Net Acid Generation (NAG) test was undertaken on the samples. The results for the ore samples are included in **Table 39.** From these results it is observed;

NAG pH ranges from 7.1 to 7.9

NAG to pH 4.5 and to pH7 are all below the lower limit of detection.

Thus, the NAG results confirmed the initial acid-base accounting results, that all the ore samples tested would be regarded as Non Acid Forming (NAF).

Table 38 Acid-Base Accounting – Summerhill Ore Samples

Sample #	Analyte	pH	Conductivity 1:2	Sulfur	Sulfur - HCl	Total Oxidisable Sulfur	Max Potential Acidity	Acid Neutralising Capacity	Net Acid Producing Potential	AMD Classification
	Units	pH units	mS/cm	%	%	%	kgH_2SO_4/t	kgH_2SO_4/t	kgH_2SO_4/t	
	LLD	*0.1*	*0.01*	*0.005*	*0.005*		*2*	*2*	*2*	
598001		5.8	0.03	0.021	0.017	0.004	<2	<2	<2	NAF
598002		6.8	0.04	0.011	0.010	0.001	<2	<2	<2	NAF
598003		6.7	0.04	0.069	0.066	0.003	2	6	<2	NAF
598004		5.8	0.05	0.005	<0.005	0.005	<2	<2	<2	NAF
598009		6.8	0.04	0.008	0.006	0.002	<2	<2	<2	NAF
598011		7.3	0.08	<0.005	<0.005	<0.005	<2	<2	<2	NAF
598012		6.1	0.04	0.019	0.017	0.002	<2	<2	<2	NAF
	max	***7.3***	***0.08***	***0.069***	***0.066***	***0.008***	***2.0***	***6.0***	**<2**	-
	min	***5.8***	***0.03***	***0.005***	***0.006***	**0.001**	***<2.0***	***<2.0***	**<2**	-
	mean	***6.5***	***0.05***	***0.022***	***0.023***	***0.003***	***na***	***na***	**na**	-

LLD= lower limit of detection

Table 39 Single Stage NAG Test Results – Summerhill Ore Samples

Sample No.	Analyte	pHox (23B)	Net Acid Generation to pH 4.5	Net Acid Generation to pH 7.0	AMD Classification
	Units	pH Units	kgH_2SO_4/t	kgH_2SO_4/t	
	LLD	*0.1*	*2*	*2*	
598001		6.1	<2	<2	NAF
598002		7.9	<2	<2	NAF
598003		6.3	<2	<2	NAF
598004		6.8	<2	<2	NAF
598009		7	<2	<2	NAF
598011		7.9	<2	<2	NAF
598012		7.1	<2	<2	NAF

The basic parameters including pH, Conductivity and acid-base accounting for waste rock are included in **Table 40**. From these results it is observed;

- pH is circum-neutral
- Electrical conductivity maximum result is 0.28 mS/cm which would be regarded as low salinity rock
- Maximum percent total sulfur (S) is 0.044%, with a resulting maximum potential acidity of 2kg H_2SO_4/t (i.e. very low potential to generate acid)
- Much of the total S is present as sulfate-S, which is non-acid generating
- Maximum Total Oxidisable Sulfur is 0.008 % which is very low, which equates to a potential acidity of 0.24kg H_2SO_4/t (i.e. very low potential to generate acid)
- Most acid neutralising potential is below the lower level of detection, with two samples recording positive acid neutralising potential
- There were no samples with a positive Net Acid Producing Potential

Therefore, in accordance with the ARD Test Handbook (AMIRA International, 2002) this waste rock would be considered NON Acid Producing, circum-neutral and of low potential salinity.

To confirm the results from the static testing, a single stage NAG test was undertaken on the samples. The results for the ore samples are included in **Table 41.** From these results it is observed;

NAG pH ranges from 5.1 to 7.5

NAG to pH 4.5 and to pH7 are all below the lower limit of detection.

Thus, the NAG results confirmed the initial acid-base accounting results, that all the waste samples tested would be regarded as Non Acid Forming.

Table 40 Acid-Base Accounting – Summerhill Waste Samples

Sample #	Analyte	pH	Conductivity 1:2	Sulfur	Sulfur - HCl	Total Oxidisable Sulfur	Max Potential Acidity	Acid Neutralising Capacity	Net Acid Producing Potential	AMD Classification
	Units	pH units	mS/cm	%	%	%	kgH_2SO_4/t	kgH_2SO_4/t	kgH_2SO_4/t	
	LLD	*0.1*	*0.01*	*0.005*	*0.005*		*2*	*2*	*2*	
598005		6.8	0.02	<0.005	<0.005	<0.005	<2	<2	<2	NAF
598006		7.2	0.03	<0.005	<0.005	<0.005	<2	11	<2	NAF
598007		7.1	0.03	0.014	0.012	0.002	<2	<2	<2	NAF
598008		6.3	0.07	0.044	0.044	0.000	<2	<2	<2	NAF
598010		6.6	0.28	<0.005	<0.005	<0.005	<2	<2	<2	NAF
598013		6.9	0.08	<0.005	<0.005	<0.005	<2	2	<2	NAF
598014		6.8	0.07	0.021	0.019	0.002	<2	<2	<2	NAF
598015		6.3	0.09	0.040	0.032	0.008	<2	<2	<2	NAF
	max	***7.2***	***0.28***	***0.044***	***0.044***	***0.008***	***<2.0***	***11.0***	**<2**	-
	min	***6.3***	***0.02***	***0.014***	***0.012***	**<0.005**	***<2.0***	***2.0***	**<2**	-
	mean	***6.8***	***0.08***	***0.03***	***0.027***	***0.003***	***na***	***6.5***	**na**	-

LLD= lower limit of detection

Table 41 Single Stage NAG Test Results – Summerhill Waste Samples

Sample No.	Analyte	pHox (23B)	Net Acid Generation to pH 4.5	Net Acid Generation to pH 7.0	AMD Classification
	Units	pH Units	kgH_2SO_4/t	kgH_2SO_4/t	
	LLD	*0.1*	*2*	*2*	
598005		6.5	<2	<2	NAF
598006		7.4	<2	<2	NAF
598007		6.8	<2	<2	NAF
598008		5.1	<2	<2	NAF
598010		7.4	<2	<2	NAF
598013		7.5	<2	<2	NAF
598014		6.4	<2	<2	NAF
598015		6.3	<2	<2	NAF

Assessment of whole rock chemistry and leachate chemistry has been undertaken. The leachate fluid used was the toxicity characteristic leaching procedure (TCLP) leach, with a final pH circa 5.0 pH units. This leach fluid is likely to be more acidic than prevailing conditions, and so provides a conservative assessment.

Comparison of the whole rock chemistry results for ore samples (**Table 42**) with the *National Environment Protection (Assessment of Site Contamination Measure 1999* (ASC NEPM), concentration levels for the most conservative "residential – A" health-based investigation levels indicates that ALL concentrations are below the investigation level, apart from arsenic. As outlined in the ASC NEPM, these trigger levels are not "limits", but triggers for additional investigation. This elevated arsenic will either report to the concentrate product and be shipped from site or may report to the tailings.

The leachate chemistry from a weak acid leach (TCLP) of the ore was undertaken. Comparison of these results with the Environmental Authority surface water triggers has been undertaken (**Table 43**).

From the leach test results, it can be seen that only one sample exceeded the arsenic surface water trigger. The remainder of the leach test results indicated that there were exceedances of the surface water quality limits for one sample for chromium, some samples for nickel, and most samples for copper, zinc, cobalt and manganese. It must be remembered that the leachate testing used involved an acidic leach fluid, which give a "worst case" scenario. The leachate test results may provide some indicators to the chemistry of the supernatant water in the tailings dam. The tailings dam is designed to reclaim this water and recirculated it in the processing plant circuit.

The ore chemistry results are consistent with that previously reported for the Dalcouth Pit.

Table 42 Total Metals Analysis Results – Summerhill Ore Samples

Sample No.	Analyte	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	Co	Mo	Mn	Sb
	Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
	LLD	5	0.1	1	1	0.02	1	1	1	1	2	1	2
598001		3300	0.400	37	420	0.040	10	5	55	7	3	610	3
598002		22	<0.1	11	930	<0.02	10	2	78	3	<2	920	<2
598003		960	<0.1	20	620	0.060	<1	4	19	<1	<2	99	4
598004		570	0.600	50	640	0.040	30	3	230	6	3	1500	<2
598009		17	0.500	59	100	<0.02	37	1	180	12	36	1100	<2
598011		97	0.500	63	780	<0.02	34	4	290	17	4	1300	<2
598012		130	0.100	50	400	<0.02	8	1	23	2	2	570	<2
	max	***3300***	***0.600***	***63***	***930***	***0.060***	***37***	***5***	***290***	***17***	***36***	***1500***	***4***
	min	***17***	***0.100***	***11***	***19***	***0.040***	***8***	***1***	***19***	***2***	***2***	***99***	***2***
	mean	***728***	***0.420***	***41***	***556***	***0.047***	***22***	***3***	***125***	***8***	***10***	***817***	***4***
NEPM Health Investigation Levels (1)		*100* [1] *3000* [2]	*20*	*100*	*6000*	*40*	*400*	*300*	*7400*	*100*	*na*	*3800*	*na*

1. National Environment Protection Measure 1999 (as amended) Health Investigation Levels for “residential A”
2. NEPM Health Investigation Level for “commercial / industrial”.

Table 43 Leachate (Dissolved) Metals Analysis Results – Summerhill Ore Samples

Sample #	Analyte	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	Co	Mo	Mn	Sb
	LLD	0.001	0.002	0.01	0.01	0.0002	0.01	0.01	0.01	0.01	0.01	0.01	0.001
598001		0.007	<0.002	0.02	0.07	<0.0002	0.03	<0.01	0.04	0.01	<0.01	3.7	<0.001
598002		<0.001	<0.002	<0.01	1.1	<0.0002	<0.01	<0.01	0.03	0.01	<0.01	2.4	<0.001
598003		0.085	<0.002	<0.01	1	<0.0002	<0.01	<0.01	0.02	<0.01	<0.01	0.5	<0.001
598004		<0.001	<0.002	<0.01	0.09	<0.0002	0.06	<0.01	0.26	<0.01	<0.01	2.3	<0.001
598009		<0.001	<0.002	<0.01	<0.01	<0.0002	0.01	<0.01	0.05	0.02	<0.01	3.2	<0.001
598011		0.004	<0.002	<0.01	0.27	<0.0002	0.05	<0.01	0.11	0.04	<0.01	1.9	<0.001
598012		<0.001	<0.002	<0.01	0.26	<0.0002	0.02	<0.01	0.03	<0.01	<0.01	1.8	<0.001
	max	***0.085***	<0.002	***0.02***	***1.1***	<0.0002	***0.06***	<0.01	***0.26***	***0.04***	<0.01	***3.7***	<0.001
	min	***0.004***	<0.002	<0.01	***0.07***	<0.0002	***0.01***	<0.01	***0.02***	***0.01***	<0.01	***0.5***	<0.001
	mean	***0.032***	-	-	***0.47***	-	***0.03***	-	***0.07***	***0.02***	-	***2.26***	-
EA Water Quality Objective		*0.013*[4]	*0.0002*[4]	*0.001*[4]	*0.03*[3]	*0.0006*[4]	*0.011*[4]	*0.0034*[4]	*0.02*[3]	*0.002*[5]	*na*	*0.02*[5]	*na*

All units mg/L

[2]Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy (2011)

[3]Environmental Protection (Water) Policy 2009 Herbert River Basin Environmental Values and Water Quality Objectives.

[4]ANZECC (2000) trigger levels for 95% aquatic ecosystem protection for slightly to moderately disturbed ecosystems.

Comparison of the whole rock chemistry results for waste rock samples (**Table 44**) with the ASC NEPM concentration levels for the most conservative "residential – A" health-based investigation levels indicates that ALL concentrations are below the investigation level, apart from arsenic. As outlined in the ASC NEPM, these trigger levels are not "limits", but triggers for additional investigation.

The most likely future use of the site following rehabilitation, is for low stock density pastoral operations. As such, the arsenic above the residential-A trigger level is not considered to be a limit on this future use. Following on from this, we need consider potential for impact of metals that leach from these waste rocks, and the potential for ecological impacts.

The leachate chemistry from a weak acid leach (TCLP) of the waste was undertaken. Comparison of these results with the Environmental Authority surface water triggers has been undertaken (**Table 45)**.

From the leach test results, it can be seen that no samples exceeded the arsenic surface water trigger. The remainder of the leach test results indicated that there were exceedances of the surface water quality limits for two samples for chromium, three samples for nickel, and most samples for copper, zinc, cobalt and manganese. It must be remembered that the leachate testing used involved an acidic leach fluid, which give a "worst case" scenario. The use of the NAF waste rock from Summerhill in the tailing dam embankment will enable any potential leachate to be captured and managed by the mine water management system.

The waste chemistry results are consistent with that previously reported for the Dalcouth Pit.

Table 44 Total Metals Analysis Results – Summerhill Waste Samples

Sample No.	Analyte	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	Co	Mo	Mn	Sb
	Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
	LLD	5	0.1	1	1	0.02	1	1	1	1	2	1	2
598005		500	<0.1	49	230	<0.02	21	2	73	5	4	970	<2
598006		42	<0.1	53	30	<0.02	26	12	110	10	2	830	<2
598007		230	0.200	38	780	<0.02	22	10	130	5	4	720	<2
598008		38	<0.1	31	390	<0.02	<1	5	8	<1	10	70	<2
598010		86	0.200	56	210	<0.02	20	3	55	11	4	920	<2
598013		38	0.300	41	19	0.030	20	<1	130	6	3	1000	<2
598014		180	<0.1	50	370	<0.02	17	2	78	3	5	650	2
598015		28	<0.1	52	700	<0.02	9	1	71	2	2	1000	<2
	max	***500***	***0.300***	***56***	***780***	***0.030***	***26***	***12***	***130***	***11***	***10***	***0500***	***2***
	min	***28***	***<0.1***	***31***	***19***	***<0.02***	***<1***	***<1***	***8***	***2***	***2***	***70***	***<2***
	mean	***143***	***-***	***46***	***341***	***-***	***19***	***5***	***82***	***6***	***4***	***770***	***-***
NEPM Health Investigation Levels (1)		*100* [1] *3000* [2]	*20*	*100*	*6000*	*40*	*400*	*300*	*7400*	*100*	*na*	*3800*	*na*

1. National Environment Protection Measure 1999 (as amended) Health Investigation Levels for “residential A”
2. NEPM Health Investigation Level for “commercial / industrial”.

Table 45 Leachate (Dissolved) Metals Analysis Results – Summerhill Waste Samples

Sample #	Analyte	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	Co	Mo	Mn	Sb
	LLD	0.001	0.002	0.01	0.01	0.0002	0.01	0.01	0.01	0.01	0.01	0.01	0.001
598005		<0.001	<0.002	0.02	0.06	<0.0002	0.01	<0.01	0.04	0.01	<0.01	3.3	<0.001
598006		<0.001	<0.002	0.01	<0.01	<0.0002	0.01	<0.01	0.02	0.01	<0.01	2.6	<0.001
598007		0.003	<0.002	<0.01	0.45	<0.0002	<0.01	<0.01	0.06	0.01	<0.01	1.4	<0.001
598008		<0.001	<0.002	<0.01	0.02	<0.0002	<0.01	<0.01	<0.01	<0.01	<0.01	0.12	<0.001
598010		<0.001	<0.002	<0.01	0.19	<0.0002	0.02	<0.01	0.07	0.06	<0.01	1.8	<0.001
598013		<0.001	<0.002	<0.01	<0.01	<0.0002	0.02	<0.01	0.02	<0.01	<0.01	0.68	<0.001
598014		<0.001	<0.002	<0.01	0.04	<0.0002	<0.01	<0.01	0.02	<0.01	<0.01	2.7	<0.001
598015		<0.001	<0.002	<0.01	0.11	<0.0002	0.04	<0.01	0.04	<0.01	<0.01	0.74	<0.001
	max	*0.003*	<0.002	*0.02*	*0.45*	<0.0002	*0.04*	<0.01	*0.07*	*0.06*	<0.01	*3.7*	<0.001
	min	<0.001	<0.002	*0.01*	*0.02*	<0.0002	*0.01*	<0.01	*0.02*	*0.01*	<0.01	*0.12*	<0.001
	mean	-	-	-	*0.145*	-	*0.02*	-	*0.04*	*0.02*	-	*1.67*	-
EA Water Quality Objective		*0.013*[4]	*0.0002*[4]	*0.001*[4]	*0.03*[3]	*0.0006*[4]	*0.011*[4]	*0.0034*[4]	*0.02*[3]	*0.002*[5]	*na*	*0.02*	*na*

All units mg/L

[2]Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy (2011)

[3]Environmental Protection (Water) Policy 2019 Herbert River Basin Environmental Values and Water Quality Objectives.

[4]ANZECC (2000) trigger levels for 95% aquatic ecosystem protection for slightly to moderately disturbed ecosystems.

8.6 Landform Design

The following general factors were considered when determining the appropriate design parameters for the final landform:

- Geological factors and geotechnical stability of the materials
- Surface water runoff
- Site specific boundaries (property and mining lease boundaries)
- Final land use.

The Landform Design Plan (Ausrocks, 2023) in Appendix 5 contains specific details on the landform design, maps and 3D design drawings.

The specific design parameters for the final landform in key mine domains are outlined below;

Dalcouth (backfilled) Pit and WRD final landform;

- Pit backfill to at least pre-mining ground surface and consistent with pre-mining contours averaging 12% and self-draining
- Upper surface of waste rock dump to be free draining slope of 1%
- Side batters to be constructed to 5% slopes
- Surface water flow controls, drainage and drop structures to be included at detailed design stage.

Summerhill Pit final landform;

- Bench height 5m
- Batter angle (Bench face angle) ; 37 degrees in weathered/transitional rock, 80 degrees in fresh rock
- Operational Ramp width 15m
- Overall slope angle 48 degrees in weathered rock, 57 degrees in fresh rock.
- Pit floor slope 1% and self-draining.

An assessment of geotechnical stability has been completed by AMC (2021) and is included in Appendix 6.

New TSF final landform;

- Spillway maintained in place post rehabilitation
- External Embankment batter angle 1V:2.5H
- Upper surface to be free draining towards spillways (approx. 1 degrees slope)
- Embankment surface water flow controls, drainage and drop structures on to be included at detailed design stage
- Rocky mulch to be applied to external embankment to enhance resistance to erosion
- Lower embankment remains for longer term access to Summerhill area (for rehabilitation)

The area of the new TSF, reflects the Stage 1 area approved in the EA.

A Slope stability analysis on the design embankment and tailings dam is described in the Golder design report (November 2021) included as Appendix 7.

Existing TSF final landform

- Removal of embankment (re-use of materials as growth media)
- Re-establishment of approximate pre-disturbance contours in the valley area (slope approximately 10% to 30%)
- Surface to be free draining
- Series of connected pools and channels to be re-created in valley floor, with an average gradient of approximately 2%
- Existing well vegetated slopes to remain undisturbed (especially in the western area).

There is no record of the pre-disturbance land surface in the area of the existing TSF, so the final rehabilitation slope will be a best match with the surrounding and downstream areas. The details of the construction method and QA/QC that will apply will be specified by an RPEQ at the appropriate time.

The existing undisturbed landform is characterised by significantly sloped areas, commonly up to 45 degrees, as shown in Figure 35. This land currently supports low density grazing activity, with cattle observed to traverse the hills and ridgelines of the landscape. The final landforms proposed for the waste rock dump, Dalcouth Pit, new TSF, TSF settling pond and the floor of Summerhill Pit are predominantly flat, with slope generally below 15 degrees.

The inner TSF embankment, outer TSF embankment and Summerhill pit wall are areas of complex slope that may be less desirable for cattle grazing, however these areas combined represent approximately 7.8% of the total proposed site footprint. Furthermore, the final design of the TSF embankments may be able to be revised to incorporate additional waste rock material, such that these slopes can be reduced further.

The Summerhill Pit benches are nominally designed at a width of 2.5 metres and are daylighted to the ground surface level, meaning they are accessible and able to be traversed by cattle. The hardy stock present on the property are accustomed to the existing steep conditions and the proposed final landform will not pose an impediment to their grazing activities once rehabilitated. It is considered that the final landform proposed is compatible with the nominated grazing PMLU.

The final landform designs are consistent with similar examples in mine, quarry and civil development in northern Queensland and therefore trials are not considered necessary at this stage to verify the predicted success of the proposed landforms. The relatively short duration of mining means that there would unlikely to be useful data gathered from trials, before the final landforms and rehabilitation takes place.

304000
304500
305000
8056000
8055500
Dalcouth Pit
Dalcouth WRD
Clear Water Dam 1
Clear Water Dam 2
Summerhill Pit
ML 20547
TSF Permanent Spillway
TSF Settling Pond
TSF Embankment
TSF Settling Pond Embankment
TSF Post-closure Spillway
New TSF
ML 4349
Summerhill Pit
Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
0 50 100 150 200 250
Meters
N
W E
S
GDA2020, MGA Zone 55

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Mount Veteran Progressive Rehabilitation and Closure Plan

ARDENT GROUP PTY LTD

Figure 35 - Final Landform: Slope

Legend

- Mining Lease Boundary
- Males Gully
- Clean Water Dam
- Rehabilitated Mining Area

Slope (degrees)

- 0 - 10
- 11 - 15
- 16 - 20
- 21 - 25
- 26 - 45
- 46 - 90

Sheet No. RTPL_ARD_MGT001_PRCPMAP_0013_A

Drawn By: Chris Schlebusch
Requested by: Richard Davis
Date: 15/02/2024

Data sources:
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Path: S:\Plans\Project_Specific\Ardent\MGT001\PCRP 2023\RTPL_ARD_MGT001_PRCPMAP_0013_A A3L PRCP Final Landform - Slope.mxd

8.7 Cover design

The assessment of waste rock detailed in this report (section 8.5) has demonstrated that there is low potential for acid or neutral mine drainage to be generated from the waste rock, or exposed faces at the Summerhill Pit, or the tailings in the New Tailings Dam.

The Existing TSF will be scoured of historic tailing materials in the initial stages of mining and as such will not require encapsulation or cover to complete rehabilitation of this infrastructure.

Therefore, it is only proposed to install a designed cover at the Waste Rock Dump (including the area backfilled over Dalcouth Pit) and the New Tailings Dam with the following objectives;

- Be geotechnically stable
- Minimise erosion (water and wind)
- Reduce rainfall infiltration
- Provide a capillary break (TSF only)
- Provide a medium to support vegetation regeneration and PMLU
- Enhance surface water runoff quality.

The details of the design for the cover over the Waste Rock Dump (WRD) is detailed in Table 46. The details of the design for the cover over the New Tailings Dam is detailed in Table 47.

Table 46 Waste Rock Dump Cover Design

Description	Thickness	Comment	Objective
Growth media/topsoil	0.15m (minimum)	Sourced from topsoil stockpile	Minimise erosion (water and wind) Provide a medium to support vegetation regeneration and PMLU Enhance surface water runoff quality.
Sub-soil	0.225m (minimum)	Sourced from sub-soil stockpile	Provide a medium to support vegetation regeneration and PMLU
Compacted Rock	1m	Final 1m of WRD to be compacted in situ during placement	Reduce rainfall infiltration. Geotechnical stability
Top of waste rock	N/A	Undisturbed WRD	N/A

Table 47 New Tailings Dam Cover Design

Description	Thickness	Comment	Objective
Growth media/topsoil	0.15m (minimum)	Sourced from topsoil stockpile	Minimise erosion (water and wind) Provide a medium to support vegetation regeneration and PMLU Enhance surface water runoff quality.
Sub-soil	0.225m (minimum)	Sourced from sub-soil stockpile	Provide a medium to support vegetation regeneration and PMLU
Capillary Break	Minimum 0.4m	Loose dumped rock	Provide capillary break
Low Permeability Layer	Minimum 0.2m	Compacted clayey subsoils	Reduce rainfall infiltration
Trafficability Layer	Minimum 0.2m	Rock placed in dried tailings to enhance stability for later works. Amount of rock required will depend on final drained tailings shear strength (may not be required at all)	Geotechnical stability
Top of tailings	N/A	Undisturbed tailings	N/A

The volumes of growth media and sub-soil will be selectively removed from the footprint of the pits, waste rock dump and tailings dam before construction. Therefore, there will be a balance of topsoil, and growth media stockpiled for rehabilitation purposes. Furthermore, the clayey subsoil removed from the pit locations will provide ample material for a low permeability layer to be installed over the New TSF. The results of soil surveys in the project area, and topsoil thickness has been detailed in section 3.1.7.

The waste rock removed and stockpiled from Dalcouth Pit and Summerhill Pit will be located in the Waste Rock Dump. The removed volume will expand with the bulking (expansion) factor conservatively estimated at 1.5. There will therefore be an excess of waste rock available after the backfilling of Dalcouth Pit, and this waste rock will be available for the trafficability layer in the cover on the New TSF.

The backfill of the TSF settling pond will take place after any residual sediment is removed and placed back into the tailings dam. Rock will then be placed into the pond to create a free draining surface (to the north), then covered by subsoil and topsoil as per the cover design in Table 47.

The details of the construction method and QA/QC that will apply will be specified by an RPEQ at the appropriate time.

The final cover designs are consistent with similar examples in mine sites in northern Queensland and therefore trials are not considered necessary at this stage to verify the predicted success of the proposed cover system. The relatively short duration of mining means that there would be unlikely to be useful data gathered from cover system trials, before the final landforms, capping and rehabilitation takes place.

Prior to soil movement, any stockpiles that have evidence of any weed growth will be treated prior to the use in rehabilitation. Movement and handling from stockpiles to be conducted to minimise structural degradation such as compaction.

The soil will be ripped if compacted, otherwise will have the surface roughened and then seeded. Contour ripping may be conducted on sloped areas to encourage soil keying, water infiltration and minimise runoff.

Mulch, jute netting or other temporary soil covers may be used in selected areas during the revegetation program to reduce the risk of heavy rain eroding the seed bed soil. In addition, slope drainage control features may be used to minimize erosion, together with catch dams to collect runoff and remove suspended solids.

Logs and rocks retained for fauna habitat will be moved into rehabilitated areas at the final stage of surface preparation.

Vegetation which has been stockpiled as a result of clearing activities may be mulched on site and this will also be incorporated into the rehabilitation activities.

8.8 Water Management

8.8.1 Overview

The transport of sediment has the potential to impact the environmental values of both waters and land and is dependent on the scale and location of the activity, its proximity to sensitive receiving environments and the site ESC response.

Erosion and sediment transport risk exists throughout the lifecycle of mining activities, including earthworks and reducing through operational project phases to decommissioning; as disturbances are increasingly stabilised and progressively rehabilitated. Accordingly, ESC measures differ during different phases of the project and are dependent on generally consistent seasonal patterns. Ground disturbing activities beyond mining should be planned to occur during the dry season to limit the potential for erosion and sedimentation.

While waste rock assessments (section 8.5) has indicated low risk of acid or metalliferous mine drainage, the cover designs nevertheless incorporate elements to reduce infiltration of incident rainfall and subsequent seepage. Shallow seepage detection bores are installed downslope of the new TSF which will enable early detection of potential seepage, and guide management (or interception) of this seepage, if required.

Limited dewatering of the Dalcouth Pit is anticipated (as described in section 8.1), if any water is stored from dewatering it will be used in dust control on trafficked areas.

8.8.2 Drainage Control

There is a range of potential drainage controls that will be used in site-specific mitigation methods depending on site-specific characteristics. These potential drainage controls include the following:

- diversion of up-slope stormwater runoff around disturbed areas including stockpiles, New TSF and waste storage areas;
- installation of lateral catch drains or flow diversion banks to minimise rill erosion along steep continuous slopes (i.e. >10%) especially associated with linear infrastructure construction (i.e. pipelines, roads/tracks and powerlines);
- placement of velocity control structures such as rock check dams to reduce the flow velocity in channels; and/or
- lining of channel with scour resistant materials including erosion control matting or rock lining; and use of energy dissipation structures at the outlets of banks, drains and chutes.

8.8.3 Erosion and Sediment Control

The following are a range of potential ESC that will be used in site-specific ESC plans depending on site-specific characteristics. These potential ESC include the following:

- Prioritising drainage and erosion control measures, rather than allowing erosion to occur and trying to trap the resulting sediment;
- Spreading mulch or retained native vegetation over disturbed areas as soon as practicable after construction to reduce splash impact erosion and to stabilise disturbed landforms;
- Use of erosion blankets (i.e. jute and coir matting or geosynthetics) as an alternative to mulching in drainage channels or areas of strong winds or overland flow;
- Use of sediment traps (i.e. sheet flow and field inlet sediment traps) and sediment basins;
- Amelioration of problem soils (i.e. gypsum treatment of sodic soils);
- Use of 'ripping' or similar techniques on finished soil surfaces to encourage revegetation where required;
- Use of binding polymers; and/or
- Programming and scheduling of works to suit climatic conditions.

8.8.4 Erosion and Sediment Control Plans

ESCPs must be implemented and are to consider potential for environmental impacts within the documents. These should include:

- Pit dewatering considerations for water storage and quality of water from this source;
- Management of rainwater from cleared areas;
- Installation of permanent drainage structures including diversion drains, culverts and flow control e.g. rock checks;
- Propagation of native matting grasses and vegetation on batters and in drains, if required; and/or
- Stabilisation of batters.

8.8.5 Rehabilitation Erosion and Sediment Controls

Achieving and maintaining groundcover is key to reducing erosion risk and provides the best protection against downstream sedimentation. Progressive stabilisation and rehabilitation of disturbed areas will be undertaken to reduce erosion and sediment risk. Stabilisation / rehabilitation will be undertaken to achieve the rehabilitation objectives of the approved Progressive Rehabilitation and Closure Plan.

Typical post-mine use rehabilitation strategies aimed at long term ESC include:

- Reprofiling disturbed areas to be consistent with pre-mining topography;

- Reshaping disturbed areas into stable landforms;
- Permanent stabilisation of any remaining batters/roads;
- Spreading of stockpiled topsoil and revegetation of disturbed areas with indigenous plant species contiguous with the surrounding landscape;
- Installation of permanent infrastructure e.g. rock checks, whoa boys and drainage to slow water flow rates without requiring ongoing maintenance or inspection.

8.8.6 Water Management Infrastructure

The status of Clean Water Dams 1 and 2 was discussed in section 2.4. It is planned that these dams will be retained for continued future use for stock and as habitat and a water source for native fauna. This is consistent with the PMLU of grazing. It is expected that all other water infrastructure (for example process water pond) will be removed and rehabilitated (as described in the approved ERC application). This includes water pipelines associated with the mining activity.

Clean water diversions will remain around the tailings storage facilities to protect these areas during revegetation works, as shown in Figure 36.

If any other water infrastructure is to be retained onsite this will occur following written agreement of the underlying landholder.

8.8.7 Water Quality Monitoring

All erosion and sediment controls will be maintained in a functioning condition until individual areas have been certified as rehabilitated. Where controls are observed to be not functioning correctly, the controls are restored to meet the required standard.

Sediment control structures, e.g. sediment basins, rock check dams, sediment fences, drainage controls etc will be inspected for capacity and structural integrity on a monthly basis and/or following rainfall events ≥ 20 mm/day.

These inspections shall be documented on a site inspection form and photographed for evidence of condition. Water from sediment control structures may be tested for pH, EC and total suspended solids (TSS), assess the effectiveness of the sediment control structures.

Actions shall be raised from each inspection should maintenance or repair be required, with the action assigned formally to an appropriate person in the management structure and an appropriate and realistic timeframe assigned for rectification of the ESC measure.

Surface Water quality monitoring, as required by the conditions of the EA will continue until final ML surrender. The water quality objectives and compliance limits conditioned in the EA are more stringent than the corresponding stock watering guidelines, which would be applicable to the PMLU, and as such these have been selected for use in ongoing monitoring.

303500
304000
304500
305000
305500
8056000
8055500
8055000
Males Gully
Mayday Creek
Clear Water Dam 1
Clear Water Dam 2
Copper Gully
ML 20547
Males Gully
ML 4349
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

0 50 100 150 200 250
m

MGT MINERALS PTY LTD
Mount Veteran Overview

N
W E
S
GDA2020, MGA Zone 55

ARDENT GROUP PTY LTD

Figure 36 - Water Management Infrastructure - Retained

Drawn By:	Chris Schlebusch
Requested by:	Joanne Salmon
Date:	16/02/2024

Sheet No.
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- Mining Lease Boundary
- Watercourse
- Clean Water Diversion
- Clear Water Dam
- Rehabilitated Area

Data sources:
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8.9 Revegetation Method

8.9.1 Species Selection

Revegetation activities will typically commence at the completion of land forming, such as, reshaping, topsoiling and drainage works. The timing of these works will be scheduled to enable a preferred seasonal sowing of native vegetation seed. Where surfaces have been prepared, the nominated revegetation specification for native tree, shrub and grass species, will be sown using seed stock or planted depending on the species and slope gradients.

Rehabilitation will utilise locally relevant tree and shrub species at a density and richness consistent with the surrounding native vegetation and habitat. Plant selection will be based on the following criteria:

- The species will support the proposed PMLU
- The species will successfully establish on the available growth medium;
- The species will bind the soil; and
- The species diversity will result in a variety of structure and food and habitat resources.

The revegetation objective is to achieve the PMLU of grazing, consistent with the surrounding undisturbed areas (i.e. grazing in native woodland).

There were no specific conservation significant species identified that need a specific revegetation plan. There are no specific fauna habitat requirements identified, over and above the re-establishment of the proposed PMLU.

Native flora used for rehabilitation will ideally be endemic and will be established through a combination of direct seeding or planting of tube stock from local propagules. Seed will be collected from site where possible and treated if necessary, to ensure it is adapted to environmental conditions in the area. Tree and shrub establishment onsite will be dominated by the direct seeding method.

Vegetation communities located within or along watercourses/drainage lines provide important habitat for fauna, and seasonal creeks and drainage lines provide habitat for plants that are not found elsewhere within the site. The presence of *Lophostemon grandiflorus* and *L. suaveolens* indicate that these areas are seasonally inundated (RE9.3.15). These species may be introduced into the rehabilitaiton species list where water persists in the reformed land.

An initial tree and shrub mix that will be used for rehabilitation is provided in Table 48 and is based on the current suite of flora species found in the Project area.

Table 48 Rehabilitation Species List

Scientific Name	Common Name
Tree	
Corymbia citriodora	Lemon-scented gum
Corymbia clarksoniana	Clarkson's bloodwood
Corymbia dallachiana	Dallachy's gum
Eucalyptus cloeziana	Gympie messmate
Eucalyptus crebra	Narrow-leaf ironbark
Eucalyptus portuensis	Mahogany

Eucalyptus atrata	Herberton Ironbark
Eucalyptus cullenii	Cullens Ironbark
Ficus opposite	Sandpaper fig
Maytenus cunninghamii	Yellowberry bush
Shrub	
Acacia calyculata	-
Acacia decora	Showy wattle
Acacia holosericea	-
Acacia simsii	Sim's wattle
Acacia disparrima	Hickory wattle
Forb	
Dianella nervosa	Flax lily
Lomandra filiformis	Wattle mat-rush
Lomandra multiflora	Many-flowered mat-rush
Grass	
Setaria surgens	Pidgeon grass
Themenda triandra	Kangaroo Grass
Alleteropsis semialata	Cockatoo Grass

The seed density application rate for the canopy species is anticipated to be up to 1kg/ha and for the grass / shrub species, up to 7kg/ha. Ideally, seeding should be undertaken when the soil is moist, in the early wet season.

A combination of native and introduced pasture species will be used to ensure the establishment of a groundcover and reduce the likelihood of erosion. Legumes may also be selected to assist in the supply of bio-available nitrogen to the soil.

If local species do not provide adequate cover, it may be necessary to use a cover crop to protect the soil. Should this be required, the crop cover would be an infertile annual species that will die off after one year rather than reproduce and spread to surrounding areas.

This approach will provide initial assistance for endemic species by increasing protection against wind and soil erosion. If the use of introduced grasses and / or legumes is deemed necessary for erosion control in the bushland areas, pasture seed and fertiliser will be applied at a lower rate than for pasture outcomes to reduce competition with tree seed and / or seedlings.

Pasture species will be sown where the risk of erosion is less and on the more protected aspects of landforms. Aerial sowing and ground broadcasting will be conducted for pasture seed as the preferred sowing methods and grazing will be restricted whilst the vegetation is establishing.

Some seed germination rates are dramatically improved if the seeds are treated prior to planting. A range of treatments are available and would be investigated as necessary to maximise revegetation success and cost effectiveness.

Analogue sites may be required for the assessment of the success of rehabilitation activities. There are large areas of undisturbed remnant vegetation within the mining lease that provide ample opportunities to establish a suite of analogue sites. The specific sites can be identified and established at the appropriate time, subject to the recommendations of an AQP.

The description of topsoil and growth media resources on site has been discussed in section 8.4. It is anticipated that before the re-use of soils and growth media for rehabilitation, test work will be undertaken to assess the need (or not) for amelioration of the soils before use in rehabilitation. Control of weed growth in soil stockpiles will be undertaken before re-use in rehabilitation. Soils are variable but generally thin across the site, therefore spreading of topsoil to a minimum depth of 0.15m is proposed. Soils will be recovered from stockpiles by excavator, loaded into a suitable size dump truck and then applied to the rehabilitation area. Soils will be spread to the required thickness by grader before application of seed and fertiliser.

8.10 Tailings Storage Facilities

The characteristics of the waste materials has been discussed in detail in section 8.5.

As the mine has not yet commenced, there is very limited information on the physical and geotechnical properties of the tailings. Such test work will need to be conducted when tailings production on site has commenced. Notwithstanding this, world renowned tailings design engineers have prepared a comprehensive tailings dam design report for the New TSF, included as Appendix 7.

The New TSF design described by Golder includes;

- Lining of the embankment and base with HDPE
- Shallow groundwater bores installed immediately downstream of the embankment to provide for early leak / seepage detection
- The location in a steep sided valley and small footprint of the tailings dam is such that a single cell design has been utilised
- The need for, and design of a seepage collection system will be guided by the performance of the dam and results from seepage detection bores
- The design storage allowance has been calculated
- A spill way design is incorporated, to enable the passage of a 1 in 1000-year storm event
- The relatively small size of the tailings dam, and limited mine life mean that progressive rehabilitation of the tailings dam has not been incorporated into the design
- QA/QC requirements are documented.

At the Existing TSF, on commencement of mining, all water will be pumped to a water storage facility next to the process plant. Once the existing tailings material is exposed, it will be mined by excavator and taken by dump truck to the process plant where it will be slurried through the process plant recovering the minerals from the existing tailings before, pumping the barren tailings into the New TSF. The rehabilitation of the Existing TSF will include reshaping of the area to match the surrounding valley landform, removal of the embankment, with the embankment materials used as a growth media across the disturbed area, re-establishment of a free draining surface and a series of connected pools and channels in the valley floor. Re seeding will take place directly in the growth media. There will be no need for a capping system to be installed in this area as there is no residual tailings or waste rock remaining.

Final rehabilitation of the New TSF will incorporate capping as described in section 8.7 such that the surface will sustain vegetation but allow excess stormwater to be free draining. The exposed embankment will additionally have rocky mulch to be applied to enhance resistance to erosion.

8.11 Voids

The Dalcouth open cut pit will be backfilled with material from the waste rock dump such that no void will remain. During construction of the mine infrastructure and open cut pit, all topsoil will be gathered and stored as a safety berm around the pit rim for later use in the rehabilitation stage of the project. All other waste rock mined from the Dalcouth pit will be stored on a waste dump in close proximity of

the pit. Material from the waste rock dumps will be used to infill the Dalcouth pit. Following shaping, the backfilled pit will be capped, topsoiled and seeded.

When mining is complete, the Summerhill Pit area will be profiled to the final desired landform specifications to ensure that is safe and stable. Progressive rehabilitation of the upper benches will be a priority, as and when they become available. Subsoil and topsoil will be replaced on the profiled landform in the reverse order to which it was stripped from the open cut domain; that is the subsoil is placed on top of any returned overburden and the topsoil on top of the subsoil at an appropriate thickness. Before the topsoil is spread, the profiled landform will be scarified parallel to the contour to a nominal depth of 50 to 100mm to break up any hard setting surfaces and prevent lamination of the topsoil and profiled landform. Where required, contour banks will be progressively installed to minimise rill erosion and direct water off the profiled landform to either a stabile surface or dedicated stabilised drainage paths or flumes constructed on the final landform. The heights and depths of these contour banks will be determined through ongoing landform design.

The rehabilitated Summerhill pit will be free draining (there will be no remnant pit lake) and anticipated to be non-polluting when the benches have been capped with topsoil and revegetated. The base of the pit is above the local groundwater level and the nature of the Hodkinson Formation is such that any rainfall infiltration will be minimal.

8.12Underground Mining

Underground mining is not planned.

8.13 Built Infrastructure

The existing powerline infrastructure will be utilised for mining operations, however as the powerline existed prior to the grant of the Mining Leases, the powerline will be left as is for continued power distribution by Ergon. Similarly, the communication tower will remain in place for continued future use by the community as it belongs to Telstra.

This third party infrastructure is not part of the PRC Plan and is referenced here for information purposes only.

9 Risk Assessment

9.1 Risk Assessment Purpose

Section 1236C(1)(f) of the EP Act requires the PRCP to identify the risks for each PMLU of a stable condition not being achieved, and how the applicant intends to manage or minimise the risk.

The purpose of the risk assessment was to identify and assess the risks of a stable condition for the land not being achieved for the PMLU of grazing and any related potential for environmental harm. The purpose of the risk assessment is to also identify that action to be taken to manage and minimise any identified high risk.

The scope of the risk assessment is restricted to rehabilitation matters including the potential risks associated with the period following rehabilitation and mine closure. The scope covers risks that affect the successful achievement of PMLU type (grazing).

9.2 Risk Assessment Process

The risk assessment has been conducted in accordance with the principles outlined in AS/NZS ISO 31000:2018 *Risk Management – Guidelines* (Standards Australia, 2018).

Potential hazards were identified and considered for each rehabilitation area for the Project.

A risk assessment has been undertaken in accordance with the principles outlined in ISO31000:2018 taking into account the areas of impact, events and their causes and potential consequences for the period following mine closure. An assessment of likelihood and consequence of associated risks have been made based to determine unmitigated risk. Definitions of likelihood and consequence of the risk are shown in Table 49 and Table 50. Table 51 describes how the overall risk level is determined.

A risk assessment relating to mine closure is shown in Table 52. Proposed mitigation measures are specified. The residual risk based on effective and ongoing implementation of the mitigation measures is also included.

Table 49 Likelihood Definitions

Likelihood	Definition
Almost Certain; >90%; (5)	Greater than 90% likelihood of occurring. Has happened, will probably happen during the mine life and there is no reason to suspect it will not happen in the post-closure period.
Likely; 30% - 90%; (4)	Likelihood of occurring is equal to or more than 30% and less than 90%. This consequence is not uncommon in the mining industry/local area
Possible 10-29%; (3)	Likelihood of occurring is equal to or more than 10% and less than 30%. There is a possibility of this risk occurring as it has occurred before (albeit infrequently) in the mining industry/local area
Unlikely; 3% - 9% (2)	Likelihood of occurring is more than or equal to 3% and less than 10%. There are no specific circumstances to suggest this could happen.
Improbable; <3%; (1)	Likelihood of occurring is less than 3%. It would require a substantial change in circumstances to create an environment for this to occur, and even then, this is a rare occurrence.

Table 50 Consequence Definition

Consequence Type	Insignificant (1)	Minor (2)	Moderate (3)	High (4)	Major (5)
PMLU not being achieved	Lasting days or less; affecting small area (metres); groundcover affected with no loss of stability.	Lasting weeks; affecting limited area (tens of metres); groundcover affected on rehabilitated surfaces only and/or land slip of rehabilitated surface/profile or one incident of surface water quality deterioration.	Lasting months; affecting extended area (hundreds of metres); groundcover affected within Mine Activity Area only and/or erosion or slumping of rehabilitated surface/profile or successive incidents of surface water quality deterioration.	Lasting years; affecting area on ML area beyond the Mine Activity Area and undisturbed land; landform failure requiring re-mobilisation of rehabilitation efforts. Off lease impacts potential to cause environmental harm.	Permanent impact; affecting area beyond ML area and landholder property, reducing productivity of affected land permanently.

Table 51 Risk Level Matrix

Likelihood	Consequence Scale				
	Insignificant (1)	Minor (2)	Moderate (3)	High (4)	Major (5)
Almost Certain; >90%; (5)	5 (Medium)	10 (Significant)	15 (Significant)	20 (High)	25 (High)
Likely; 30% - 90%; (4)	4 (Medium)	8 (Medium)	12 (Significant)	16 (High)	20 (High)
Possible 10-29%; (3)	3 (Low)	6 (Medium)	9 (Medium)	12 (Significant)	15 (Significant)
Unlikely; 3% - 9% (2)	2 (Low)	4 (Medium)	6 (Medium)	8 (Medium)	10 (Significant)
Improbable; <3%; (1)	1 (Low)	2 (Low)	3 (Low)	4 (Medium)	5 (Medium)

The risk assessment outcome, including proposed mitigation measures are shown in Table 52.

Table 52 Risk Assessment for Achievement of PMLU

C = Consequence L= Likelihood R = Risk

RISK TO PMLU OUTCOME		Unmitigated Risk			Residual Risk			
Event	**Cause**	**C**	**L**	**R**	**Mitigation**	**C**	**L**	**R**
Revegetation fails/delayed establishment	Weed invasion of rehabilitated areas	3	4	12	Complete weed eradication from topsoil stockpile prior to use. Ensure fertiliser use is slow release to allow native species to out compete weeds. Keep weed hygiene measures in place for entire rehabilitation activity schedule. Consider weed control on areas adjacent to the Mine Activity Area. Selective weed eradication on revegetated areas based on weed type and control susceptibility.	2	3	6
	Unsuitable seed blend used	3	3	9	Reseed area with appropriate seed mix if inundation or persistent water accumulation.	2	3	6
	Extended drought event	3	3	9	Reseed area in the first available wet season following extended drought.	2	2	4
	Prolonged wet weather event/flooding	3	3	9	Ensure surface water diversions/runoff controls are constructed in accordance with design prior to commencing rehabilitation. Schedule reseeding works to commence prior to/at the beginning of the corresponding wet season. Inspect topsoiled/seeded areas once accessible and rework/reseed as required.	2	2	4
	Vehicle access prior to appropriate timing	3	3	9	Maintain fence until rehabilitation achieved.	2	2	4
	Native fauna access prior to rehabilitation achievement	3	3	9	Install tree guards around base of immature tree/shrubs in critical areas.	2	2	4
Instability of landform surface	Soil loss from topsoiled areas	3	3	9	Installation of runoff controls to limit the potential for erosive events. Confirmation of final profile over backfilled and topsoiled areas. Maintain fence until rehabilitation criteria met.	2	2	4
	Slumping of placed materials on slope	3	3	9	Confirmation of final profile over backfilled and topsoiled areas. Where placed material meets in situ materials key into slope and install water management to direct runoff to dedicated structures and away from placed materials.	2	2	4
	Water management controls fail	3	3	9	Maintain water management installations throughout rehabilitation schedule and annually prior to each wet season. Inspect status of installations following wet season.	2	2	4
	Final landform design not suitable	3	3	9	Geotechnical assessment to confirm available material can be installed as stable and if not include benching to final profile to decrease slope angle and length.	2	2	4

9.3 Risk Treatment Plan

The basis for selection of the various risk treatments is recorded in Table 53. The risk mitigations are presented in approximate sequence of application for each cause. It is possible that early treatments may be sufficient for risk eradication and that the full range of options may not be necessary for the mitigative effect to be completed.

Table 53 Risk Treatment

RISK TO PMLU OUTCOME		Treatment of Risk		
Cause	**Mitigation**	**Selection rationale**	**Actions and Performance measures**	**Reporting/Monitoring/Timing**
Revegetation fails/delayed establishment				
Weed invasion of rehabilitated areas	Complete weed eradication from topsoil stockpile prior to use.	Timely application of control in rehabilitation schedule	Apply suitable herbicide to weed infested areas seasonally.	Record weed status of stockpiled soils prior to re-spreading on regraded landforms.
	Ensure fertiliser use is low release to allow native species to out compete weeds.	Meets native species recommended outcome	Source suitable fertiliser for use throughout rehabilitation period	Record rate of use and weed emergence.
	Apply weed hygiene measures for entire rehabilitation activity schedule.	Protection of surrounding environment	Keep operational weed hygiene measures in place for entire rehabilitation activity schedule.	Record equipment and maintain hygiene records
	Selective weed eradication on revegetated areas based on weed type and control susceptibility.	Protection of surrounding environment	Surveillance of rehabilitation areas for weed emergence	Record weed emergence
Extended drought event	Reseed area in the first available wet season following extended drought.	Cost-benefit in post-closure period.	Check Mt Garnet rainfall records to confirm suitable conditions	Record timing and rate of seed application.
Prolonged wet weather event/flooding	Ensure surface water diversions /runoff controls are constructed in accordance with design prior to commencing rehabilitation.	Timely application of control in rehabilitation schedule	Final landform design plan/schematic to include location and materials for installation	Photo-monitoring of installed feature

RISK TO PMLU OUTCOME		Treatment of Risk		
Cause	**Mitigation**	**Selection rationale**	**Actions and Performance measures**	**Reporting/Monitoring/Timing**
	Schedule reseeding works to commence prior to/at the beginning of the corresponding wet season.	Cost-benefit in post-closure period.	Check seasonal extended weather outlook to confirm likely rainfall forecast. Seed as per AQP recommendations.	Record timing and rate of seed application.
	Inspect topsoiled/seeded areas once accessible and rework/reseed as required.	Timely application of control in rehabilitation schedule	Surveillance of rehabilitation areas	Inspection records
Vehicle access prior to rehabilitation achievement	Maintain fence until rehabilitation criteria are met.	Timely application of control in rehabilitation schedule	Maintenance inspections to ensure integrity of fence.	Implement prior to completion of rehabilitation works.
Native fauna access prior to rehabilitation achievement	Install tree guards around base of immature tree/shrubs in critical areas.	Cost-benefit in post-closure period	Observations of growth and groundcover to include signs of predation on emerging vegetation	Photo-monitoring of emerging tree/shrubs
Instability of landform surface				
Soil loss from topsoiled areas	Installation of runoff controls to limit the potential for erosive events.	Timely application of control in rehabilitation schedule	Final landform design plan/schematic to include location and materials for installation	Photo-monitoring of installed feature
	Confirmation of final design profile over backfilled and topsoiled areas	Timely application of control in rehabilitation schedule	Measure profiles as installed, prior to topsoiling and revegetating final landforms	Photo-monitoring of completed earthworks
Slumping of placed materials on slope	Confirmation of final design over backfilled and topsoiled areas	Timely application of control in rehabilitation schedule	Measure profiles as installed, prior to topsoiling and revegetating final landforms	Photo-monitoring of completed earthworks

RISK TO PMLU OUTCOME		Treatment of Risk		
Cause	**Mitigation**	**Selection rationale**	**Actions and Performance measures**	**Reporting/Monitoring/Timing**
	Where placed material meets in situ materials key into slope and install water management to direct runoff to dedicated structures and away from placed materials.	Timely application of control in rehabilitation schedule	Final landform design plan/schematic to include areas for keying and locations for installation of water management structures	Photo-monitoring of completed earthworks

RISK TO PMLU OUTCOME		Treatment of Risk		
Cause	**Mitigation**	**Selection rationale**	**Actions and Performance measures**	**Reporting/Monitoring/Timing**
	Where placed material meets in situ materials key into slope and install water management to direct runoff to dedicated structures and away from placed materials.	Timely application of control in rehabilitation schedule	Final landform design plan/schematic to include areas for keying and locations for installation of water management structures	Photo-monitoring of completed earthworks

10 Monitoring and Maintenance

Rehabilitation monitoring will comprise permanent monitoring locations at which visual and photographic surveys, transects / quadrats, ecosystem function analysis and remote sensing will be applied to determine change.

Rehabilitation monitoring will also include recording the rehabilitation activities in the area so that the performance of a rehabilitation practice can be related to its results. This would include at the time of establishment:

- ground preparation measures,
- topsoil source, handling and respreading rates,
- seeding source and rate of application of seed and timing,
- meteorological information such as rainfall, temperature and wind speed.
- Monitor erosion and sediment control (ESC) devices to ensure ongoing effectiveness and implement corrective actions should a fault in the ESC devices be identified.

Annual monitoring of the following to determine successful achievement of rehabilitation objectives:

- Monitoring of groundcover (percentage and diversity) over successive years
- Photo-monitoring of installed features for erosion protection and assessment of stability
- Monitoring of water quality downstream throughout rehabilitation and closure period.
- Record monitoring of rehabilitated landform and analysis of revegetation trends in strata establishment.

The identification and establishment of suitable analogue monitoring sites in the undisturbed area of the mining lease, will enable the comparison of revegetation success against undisturbed areas.

The ongoing monitoring of the management measures and assessment of attainment of milestone criteria will be conducted as specified in **Table 54**.

Table 54 Rehabilitation Milestone Management and Rehabilitation Criteria Monitoring Program

Milestone Reference	Rehabilitation Milestone	Milestone Criteria	Method of monitoring
RM1	Infrastructure Decommissioning and Removal	1. All services, e.g. water, electricity, gas, are disconnected and terminated 2. All pipelines associated with the mining activity are removed 3. All buildings are demolished and removed 4. All road materials (concrete, bitumen, gravel) removed where not to be retained 5. All fencing removed, where not be retained as part of the PMLU	Photo of location with date Waste disposal records

Milestone Reference	Rehabilitation Milestone	Milestone Criteria	Method of monitoring
		6. All machinery and equipment removed 7. All non-required surface water drainage infrastructure removed 8. All waste removed and disposed of in accordance with Environmental Authority (EA) EPVL00864413	
RM2	Remediation of Contaminated Land	1. A preliminary contaminated land investigation is undertaken and a report is prepared by an Appropriately Qualified Person (AQP)1. 2. All hazardous and contaminated materials have been assessed and identified by an AQP, and disposed of lawfully 3. A contaminated land investigation document has been prepared by an AQP containing a site suitability statement confirming that land is not contaminated and is suitable for the proposed PMLU.	CLID, incorporating site suitability statement
RM3	Landform Development and reshaping / reprofiling	1. Dalcouth Pit backfilled to at least pre-mining ground surface and consistent with pre-mining contours averaging 12% and self-draining 2. Waste rock dump cover installed (Min. 1m thickness of compacted rock) to minimise erosion and reduce rainfall infiltration 3. Upper surface of waste rock dump to be free draining slope of 1% 4. Dalcouth Pit backfill and waste rock dump side batters constructed to 5% slopes, where applicable 5. Geotechnical assessment of Summerhill Pit undertaken by AQP to ensure proposed design is safe and stable for the grazing PMLU 6. Batter slopes at Summerhill Pit achieve an overall slope angle of no greater than 48 degrees in	Earthworks and compaction testing records Survey and assessments completed by AQP

Milestone Reference	Rehabilitation Milestone	Milestone Criteria	Method of monitoring
		weathered rock, 57 degrees in fresh rock 7. Floor of Summerhill Pit achieve design slope of no more than 1% 8. New TSF capped installed (Min 0.2m trafficability layer, min 0.2m low permeability layer, min 0.4m capillary break) to provide geotechnical stability and reduce rainfall infiltration 9. New TSF Upper surface is free draining towards spillway (approx. 2 degrees slope) 10. Existing TSF embankment removed 11. Re-established approximate pre-disturbance contours in the Existing TSF valley area (slope approximately 10% to 30%) 12. All major earthworks completed 13. Drainage structures to be designed by AQP to meet criteria required at the time of construction 14. All erosion and sediment control systems have been installed 15. Final landform surveyed by an AQP as per the construction designs and assessed as geotechnically stable 16. Drainage rates from the cover system into the new TSF are <1x10-8 m/s 17. New TSF cover system has been constructed according to design and certified by AQP	
RM4	Surface Preparation	1. Spread adequate sub-soil material over shaped surfaces - minimum 22.5cm 2. Spread adequate topsoil material over shaped surfaces - average 15cm 3. An assessment of the placed growth media health and suitability completed by an AQP to confirm soil is suitable for target vegetation establishment	Photo of location with date Sub-soil depth measurement every 100m Topsoil depth measurement every 100m Record of ameliorants applied (sub-soil and topsoil), as applicable

Milestone Reference	Rehabilitation Milestone	Milestone Criteria	Method of monitoring
		4. Any fertilisers/ameliorants recommended as a result of the soil assessment have been applied at the rate recommended by the AQP 5. Perform ripping and/or surface contouring to minimise soil loss and encourage rain infiltration and vegetation uptake	Record of actions and amount applied Field assessment by AQP
RM5	Revegetation (Grazing)	1. Revegetation strategy reviewed by AQP and Revegetation Plan prepared, including selection of appropriate analogue and monitoring sites, if recommended 2. Seeding has been completed with recommended seeding mix shown at Table 1 at a rate of 1kg/ha for canopy species and up to 7kg/ha for grass/shrub species, or as amended by the AQP at RM5-1 3. Timing of seeding to align with wet weather to coincide with elevated levels of soil moisture 4. Stock exclusion fencing installed around all areas that have been seeded	Revegetation plan by AQP Field assessment by AQP Photo of location of fencing along with date
RM6	Achievement of Surface Requirements (Grazing)	1. Measured indices at rehabilitated sites for Grazing within a 50x5m plot: a) At least three of the tree and shrub species, and three of the ground cover species listed in Table 1 are present; b) ≥70% of target species have germinated c) Percentage ground cover ≥ 50% of that recorded at analogue sites as nominated in RM1-1; and d) Weed density no more than 10% greater than the percentage cover at analogue sites.	Field assessment by AQP Record of rehabilitation monitoring Statement by AQP Photo of location with date

Milestone Reference	Rehabilitation Milestone	Milestone Criteria	Method of monitoring
		2. Landform certified as geotechnically stable, i.e having achieved a safety factor greater than 1.5 3. Drainage meets design criteria as per RM3-13 4. No signs of active erosion meeting classification of Severe, i.e. erosion features that would prevent reinstatement of the grazing PMLU	
RM7	Achieved PMLU to Stable Condition(Grazing)	1. Measured indices at rehabilitated sites for Grazing within a 50x5m plot: 2. ≥70% of the productivity (carrying capacity measured as pasture biomass) of that recorded at analogue sites as nominated in RM5-1; 3. Percentage ground cover ≥ 50% of that recorded at analogue sites; and 4. Weed density no more than 10% greater than the percentage cover at analogue sites. 5. Land suitability class of ≤3, based on the latest version of the 'Guidelines for Agricultural Land Evaluation in Queensland' as assessed by an AQP. 6. Maintenance requirements for rehabilitated land is no greater than that required for the land prior to its disturbance. 7. Erosion assessment of final landform: No evidence of erosion classified as Moderate and Severe2; drainage follows intended and appropriate drainage paths 8. Average sediment erosion rate of less than 5 t/ha/y has been achieved	Field assessment by AQP Record of rehabilitation monitoring Statement by AQP Photo of location with date Records of water quality monitoring

PART B – ATTACHMENTS PRCP SCHEDULE

APPENDIX 1 – PRCP Schedule
APPENDIX 2 – EA EPVL00864413
APPENDIX 3 – Flood Model Results (CDM Smith, 2018)
APPENDIX 4 – Groundwater Assessment Report (Ardent Group, 2022)
APPENDIX 5 – Final Landform Design (Ausrocks, 2024)
APPENDIX 6 – Geotechnical Report (AMC)
APPENDIX 7 – TSF Design Report (Golder, 2021)
APPENDIX 8 – Ecology Assessment Chapter – 2018 EA Amendment Application
APPENDIX 9 – Protected Plants Survey – 2022

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APPENDIX 1 – PRCP Schedule

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