

Appendix J - Draft Mine Closure Plan

RUSTLERS ROOST & Q29 OPEN CUT MINE REDEVELOPMENT MINE CLOSURE PLAN 2021

Authorization to be confirmed

PRiMARY
GOLD

Tenements: ML 1083, ML 29783, ML 29814

Version 1

Hanking Australia Investments Pty Ltd

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OCTOBER 28, 2021

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Prepared for: Primary Gold Limited (subsidiary of Hanking Australia Investments Pty Ltd)

Project Name: Mine Closure Plan -Rustlers Roost and Quest 29 open cut mine redevelopment

Date issued	Author	Reviewed by	Approved by	Date approved	Revision type
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28/10/2021	Sally Horsnell	Charles Hastie	Charles Hastie	28/10/2021	Final

Mine Closure Plan Checklist

No.	Mine Closure Plan (MCP) Checklist	Y/N/NA	Page No.	Comments
1	Has the Checklist been endorsed by a senior representative within the tenement holder/operating company? (See bottom of checklist.)	Y		-Endorsed by parent company Hanking Australia Investments
Public Availability				
2	Are you aware that all approved MCPs will be made publicly available?	Y	-	-
3	Is there any information in this MCP that should not be publicly available?	N	-	-
4	If "Yes" to Q3, has confidential information been submitted in a separate document/section?	NA	-	-
Cover page, Table of Contents				
5	Does the MCP cover page include: <ul style="list-style-type: none"> • Project Title • Company Name • Contact Details (including telephone numbers and email addresses) • Document ID and version number • Date of submission (to match the date of this checklist) 	Y	Cover	-
Scope and Purpose				
6	State why the MCP is submitted (e.g., as part of a Mining Proposal, a reviewed MCP or to fulfil other legal requirements)	Y		EIS assessment
Project Overview				
7	Does the project summary include? <ul style="list-style-type: none"> • Land ownership details (include any land management agency responsible for the land / reserve and the purpose for which the land / reserve [including surrounding land] is being managed). • Location of the project. • Comprehensive site plan(s). • Background information on the history and status of the project. 	Y		Section 2
Legal Obligations and Commitments				
8	Does the MCP include a consolidated summary or register of closure obligations and commitments?	Y		Section 3 Appendix C
Stakeholder Engagement				
9	Have all stakeholders involved in closure been identified?	Y		Section 4

No.	Mine Closure Plan (MCP) Checklist	Y/N/NA	Page No.	Comments
10	Does the MCP include a summary or register of historic stakeholder engagement with details on who has been consulted and the outcomes?	Y	57	Section 4, Appendix A
11	Does the MCP include a stakeholder consultation strategy to be implemented in the future?	Y		Section 4
Post-Mining Land Use(s) and Closure Outcomes				
12	Does the MCP include agreed post-mining land use(s), closure outcomes and conceptual landform design diagram?	Y		Section 5
13	Does the MCP identify all potential (or pre-existing) environmental legacies, which may restrict the post-mining land use (including contaminated sites)?	Y		Section 2.4
14	Has any soil or groundwater contamination that occurred, or is suspected to have occurred, during the operation of the mine, been reported to NT EPA?	N		Section 2.4
Development of Completion Criteria				
15	Does the MCP include an appropriate set of specific completion criteria and closure performance indicators?	Y		Section 6
16	Does the MCP include baseline data (including pre-mining studies and environmental data)?	Y		Section 7
17	Has materials characterisation been carried out consistent with applicable standards and guidelines (e.g., GARD Guide)?	Y		Section 7.8.5
18	Does the MCP identify applicable closure learnings from benchmarking against other comparable mine sites?	Y		Section 5
19	Does the MCP identify all key issues impacting mine closure outcomes (including potential contamination impacts)?	Y		Section 8
20	Does the MCP include information relevant to mine closure for each domain or feature?	Y		Section 2
Identification and Management of Closure Issues				
21	Does the MCP include a gap analysis/risk assessment to determine if further information is required in relation to closure of each domain or feature?	Y		Section 8, Appendix B
22	Does the MCP include the process, methodology, and has the rationale been provided to justify identification and management of the issues?	Y		Section 8
Closure Implementation				
23	Does the MCP include a summary of closure implementation strategies and activities for the proposed operations or for the whole site?	Y		Section 9
24	Does the MCP include a closure work program for each domain or feature?	Y		Section 9
25	Does the MCP contain site layout plans to clearly show each type of disturbance?	Y		Section 2

No.	Mine Closure Plan (MCP) Checklist	Y/N/NA	Page No.	Comments
26	Does the MCP contain a schedule of research and trial activities?	Y		Section 7.1.2 and Section 9
27	Does the MCP contain a schedule of progressive rehabilitation activities?	Y		Section 10
28	Does the MCP include details of how unexpected closure and care and maintenance will be handled?	Y		Section 9.3
29	Does the MCP contain a schedule of decommissioning activities?	Y		Section 2. Details plan to be developed
30	Does the MCP contain a schedule of closure performance monitoring and maintenance activities?	Y		Section 12
Closure Monitoring and Maintenance				
31	Does the MCP contain a framework, including methodology, quality control and remedial strategy for closure performance monitoring including post-closure monitoring and maintenance?	Y		Section 12
Financial Provisioning for Closure				
32	Does the MCP include costing methodology, assumptions and financial provision to resource closure implementation and monitoring?	Y		Section 11
33	Does the MCP include a process for regular review of the financial provision?	Y		Section 11
Management of Information and Data				
34	Does the MCP contain a description of management strategies including systems and processes for the retention of records?	Y		Section 12

Corporate Endorsement:

I hereby certify that to the best of my knowledge, the information within this Mine Closure Plan and checklist is true and correct.

Name: **Mark Qiu**

Signed:

Position: **Managing Director**

Date:

28 October 2021

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Section 1 Introduction

Primary Gold Limited (PGL) is currently preparing an environmental Impact statement (EIS) for an open cut gold mine project known as the Rustlers Roost and Quest 29 open cut mine redevelopment (the Project). The Project will be assessed by the Northern Territory Environment Protection Authority (NT EPA) under the *Environment Protection Act 2019* (EP Act) at the level of an Environmental Impact Statement (EIS). PGL referred this Project to the NT EPA as a proponent initiated EIS Referral in February 2021 and the NT EPA approved the Terms of Reference (ToR) in May 2021.

The proposal was not referred under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) because the activities do not have the potential for a significant impact on any Matters of National Environmental Significance (MNES) protected under Part 3 of the Act (EcOz , 2021).

1.1 MCP Purpose

This Mine Closure Plan (MCP) will be submitted to the NT EPA to fulfill the EIS ToR requirements for a MCP in accordance with Section 2.2.6 'Rehabilitation and Closure' of the ToR, which outlines the planned rehabilitation, decommissioning and closure of the Project, and establishes closure objectives and goals.

Consistent with the TOR requirements (NT EPA, May 2021), the draft MCP will be developed in consideration of the:

- Mine Closure - Leading Practice Sustainable Development Program guidelines; and
- *International Council for Mining and Metals Planning for Integrated Mine Closure: Toolkit*

The NT Contaminated Land Guidelines (NT EPA 2017) will be referred to for rehabilitation and closure planning.'

The MCP will include the following:

- Future land tenure and land-use arrangements considering stakeholder engagement.
- Proposal-specific rehabilitation and closure objectives (including those associated with stakeholder expectations) and how those objectives would be achieved, including proposed standards and completion criteria.
- Landform designs (TSF, WRDs, and Annie's dam wall upgrade) and pit backfilling procedures that facilitate progressive rehabilitation and are safe, stable, and non-polluting at end of mine life and in perpetuity, designed by appropriately qualified professionals in accordance with accepted industry guidelines and standards.
- Assessment of predicted post-closure pit lakes including predicted water quality and water balance, accounting for potential density driven exchange between pit lakes and the surrounding groundwater resources.
- Material sources, characterisation, and indicative volumes available for site rehabilitation.

- Closure implementation, including rehabilitation techniques, staging, and timing of rehabilitation and closure, removal of all infrastructure, methods of stabilisation, an outline of final rehabilitation, revegetation, and closure plans for all key components, including
- Proposed methods for topsoil management and soil profile reconstruction, with demonstration of their effectiveness for rehabilitating disturbed areas.
- Proposed revegetation strategies, including seed collection and storage and any research and investigations that may be required.
- measures to stabilise soils to erosion levels like comparable landforms in surrounding undisturbed areas.
- Financial provisions for closure (both planned and unexpected), including responsibilities for post-closure management, and protocols for securing a safe, stable, and non-polluting mine-site in perpetuity.'

Six key environmental factors identified in the ToR and outlined in Table 1, were determined to have the potential to be significantly impacted by Project activities. The MCP assessed each of the six environmental factors to provide certainty around how the objectives will be met and are described below.

- The MCP establishes the direct disturbance areas including the existing mine disturbances (previous mining footprint) and proposed disturbance footprint (direct disturbance); and the broader area of influence (indirect disturbance) i.e., downstream aquatic and terrestrial ecosystems and surrounding land uses.
- A Stakeholder Engagement Programme which focuses on outcomes and objectives to enable the delivery of achieving effective engagement throughout LOM.
- The risk assessment addresses identified issues that may have the potential to impact PGLs ability to meet post mining land use objectives and closure criteria and site relinquishment. For each potential impact, mitigation measures have been identified to reduce risk to as low as reasonably practicable (ALARP)
- The MCP considers the potential impacts associated with normal operations or in the event of premature closure, suspended operations, or permanent closure.
- PGL commitment to ensuring the MCP is routinely reviewed and updated to reflect current and progressive closure planning, technical information, and end land use criteria.

Table 1 EIS NT EPA key environmental factors

Theme	Factor	Environmental Objective
Land	Terrestrial environmental Quality	Protect the quality and integrity of land and soils so that environmental values are supported and maintained.
	Terrestrial Ecosystem	Protect terrestrial habitats to maintain environmental values including biodiversity, ecological integrity, and ecological functioning.
Water	Hydrological processes	Protect the hydrological regimes of groundwater and surface water so that environmental values including ecological health, land uses, and the welfare and amenity of people are maintained.
	Inland water environmental quality	Protect the quality of groundwater and surface water so that environmental values including ecological health, land uses, and the welfare and amenity of people are maintained.
	Aquatic ecosystems	Protect aquatic habitats to maintain environmental values including biodiversity, ecological integrity, and ecological functioning
People	Community and economy	Enhance communities and the economy for the welfare, amenity, and benefit of current and future generations of Territorians

1.2 MCP Scope

PGL propose to redevelop and expand former open pit gold mining operation in the Mount Bunday locality, 100km south-east of Darwin. The Proposal involves open cut mining, mining overburden and waste rock facilities, tailing storage facility, process and support infrastructure which will lie within a mine disturbance footprint of 790 Ha.

Project site preparation and construction is anticipated to commence in mid Q2 2022 once all PGL and regulatory approvals are secured. The Project operation is anticipated to commence in Q1 2023 with a forecast rate of production up to 5 Mtpa over an approximate 10-year Life of Mine (LOM).

1.2.1 MCP structure and content

This MCP has been developed in accordance with the Western Australia Department of Mines, Industry Regulation and Safety (DMIRS) *'Statutory Guidelines for Mine Closure Plans'* (DMIRS, 2020a). The Northern Territory Department of Tourism and Trade (NT DITT) have *Draft Guidelines for Mine Closure Plan* (May and August 2016); however, these guidelines have not progressed to an approved final version.

For consistency of terminology the MCP will adopt the same used in the Projects EIS to assess the overall extent of potential disturbance and includes, 'The disturbance footprint is defined as the direct disturbance area. And the mine development envelope is defined as the maximum area within which the proposed footprint will occur.'

The MCP will consider all closure infrastructure incorporating the existing and proposed disturbance footprints which is known as the disturbance area.

Detailed information on Project operations is outlined in the following sections and listed in Domains. For this MCP structure, Domains are used to describe the footprint areas containing discrete geophysical and geochemical characteristics and infrastructure that require specific rehabilitation treatments, rehabilitation objectives, and closure criteria to achieve the final land use.

The MCP structure is as follows:

Section 1: Introduction (Scope and Purpose) - outlines the scope and purpose of the MCP.

Section 2: Project Overview - provides an overview of the project, including land ownership, tenure, location, mining history of the Project areas, planned operations and main my components.

Section 3: Identification of Closure Obligations and Commitments - summarises the legal obligations and specific legally binding closure commitments relating to the project.

Section 4 Stakeholder Engagement - describes the process used to identify stakeholders relevant to mine closure, lists the stakeholders identified, and provides a summary of how each has been, and will continue to be, consulted in relation to mine closure.

Section 5: Post-Mining Land Use and Closure Objectives - identifies post-mining land use and closure objectives based on the proposed land use.

Section 6: Development of Completion Criteria - describes the development of site-specific completion criteria by which success of closure will be measured.

Section 7: Collection and Analysis of Closure Data - provides environmental data relevant to closure, including a summary of baseline studies completed prior to project commencement and how these aspects impact on closure of the project.

Section 8: Identification and Management of Closure Issues - outlines the risk assessment process for identifying the key closure issues and provides a summary of key risks and management measures.

Section 9: Closure Implementation - provides a closure implementation plan that includes planned closure, suspension, and early closure.

Section 10 Closure Monitoring and Maintenance - describes the proposed environmental monitoring program and maintenance response requirements.

Section 11: Financial Provision for Closure - describes the process used to estimate the closure financial provision, including the internal calculations and third-party review.

Section 12: Management of Information and Data - provides a description of how relevant information and data will be managed during ongoing closure planning and implementation.

Section 13: Reviewed Mine Closure Plans- provides a description and commitment for when MCP are to be reviewed and updated.

Section 2 Project Overview

The Project involves open cut mining to extract ore from several pits presently located across two separate mineral lease areas, referred to as Rustlers Roost and Quest 29 (Q29) mine sites. A mining camp will be constructed on mineral lease (ML 29814).

The key components of the Project and MCP include:

- open-cut gold mining and expansion of all existing open-cut pits, and two additional new pits at Rustlers Roost.
- supporting infrastructure (buildings, camp, structures, and laydown areas).
- processing infrastructure including a tailings storage facility.
- waste rock dumps and temporary stockpiles.
- water supply, storage, and drainage infrastructure.
- haul road and access roads.
- services (water and power supply).
- hazardous materials and waste storage facility, explosive and fuel storage.
- existing mined disturbances (heaps leach pad and ponds, WRD's and open pits at Rustlers Roost and Q29).

Ore mined at Rustlers Roost and Q29 will be hauled and processed at a new purpose-built processing located at the Rustlers Roost site to produce gold bullion. Mine ore from both areas will be processed using a Carbon in Leach (CIL) processing method at a central processing facility and deposited in a tailing's storage facility at Rustlers Roost. Waste rock will be deposited in surface waste rock dumps (WRDs) and backfilled into a number of pits where mine scheduling permits. An accommodation village for up to 210 employees will be constructed to support the operational site staff.

The forecast rate of production will be up to 5 Mtpa over an approximately 10-year Life of mine (LOM) after which PGL will rehabilitate the Project areas. Project operations are outlined in Section 2.5 of this MCP and a comprehensive outline of operational information is detailed in the Project's EIS.

Rustlers Roost and Quest 29 mine sites existing and proposed disturbance footprints are presented in Section 2.

2.1 Location

The Project is situated in the Mount Bunday locality, approximately 100 kilometres (km) south-east of Darwin in the Northern Territory (NT) Figure 1. Project activities are proposed to occur over three tenements (ML 1083, ML 29783 and ML 29814) all of which are situated within and amongst pastoral land and brown field mine sites Table 3 and Figure 2.

Access to all four tenements area is gained from the Arnhem highway via a private gravel access road. Access is restricted by locked gates at the highway and mine entry points.

Rustlers Roost (ML 1083) is located 15km south-west of the Arnhem highway main access gate. Quest 29 (ML 29783) is located 14km south of the Arnhem highway main access gate. The accommodation camp (ML 29814) is located 8 km along north-west of the Arnhem Highway.

Rustlers Roost and the proposed accommodation camp tenements are situated 100% on Old Mount Bunday Station, Perpetual Pastoral Lease (PPL) 1163, NT Portion 4937 and Quest 29 tenements are situated on McKinlay River Pastoral Station (PPL1184) and PPL 1163 (refer to Table 3 and Figure 2.

2.2 Proponent details

The Projects tenement holder is Primary Minerals Pty Ltd (PGL) and is a wholly owned subsidiary of PGL (a fully owned subsidiary of Hanking Australia Investment Pty Ltd). Contact details are provided in Table 2.

Table 2 Proponent details

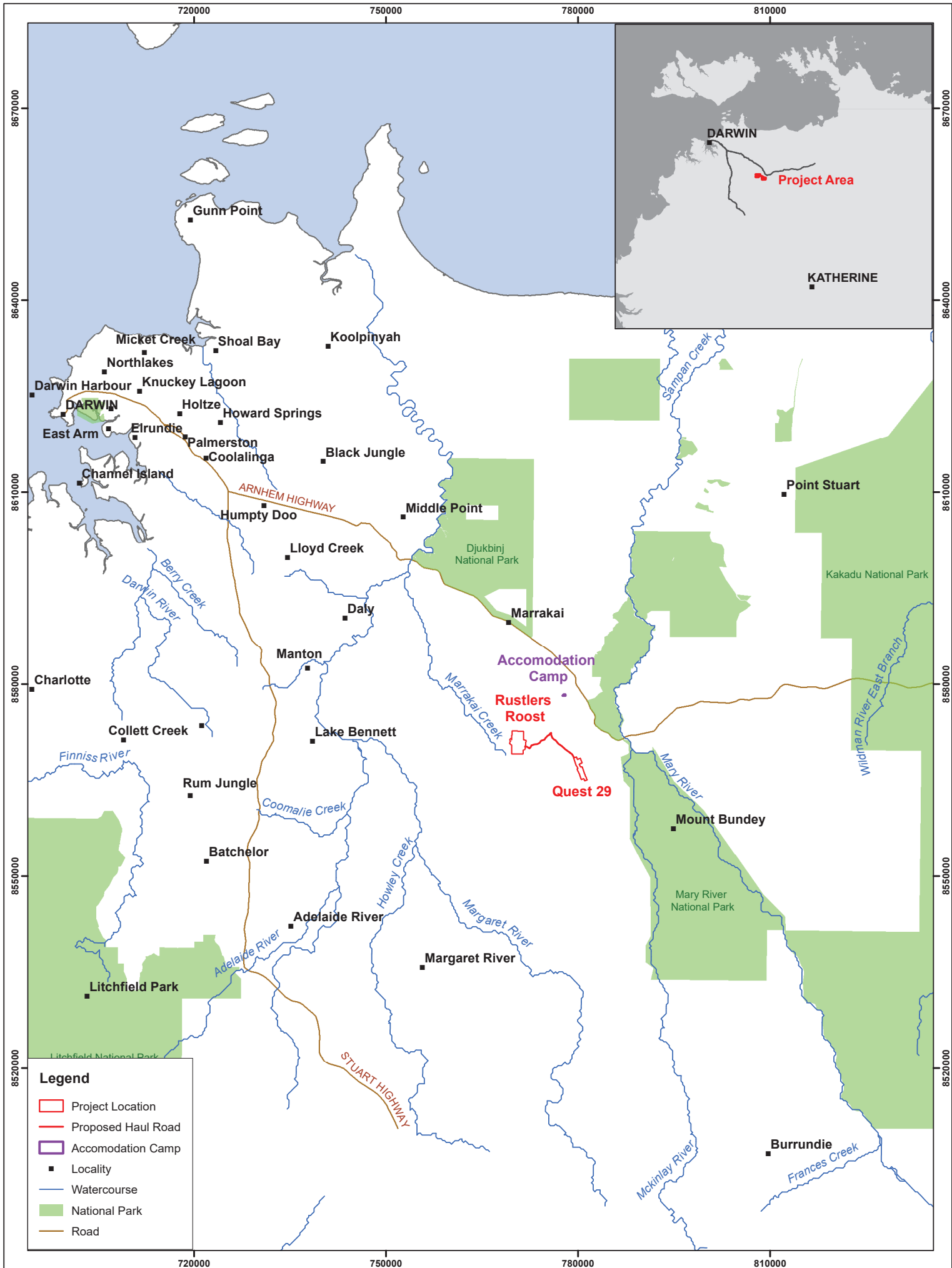
Tenement Holder Information			
Business Name	Primary Gold Limited (PGL)		
ACN/ABN	ACN: 122 726 283		
Street and Postal Address	Level 26, 140 St Georges Terrace, Perth WA 6000		
Key Contact	Name:	Dr Mark Qiu	Charles Hastie
	Position:	Managing Director	Chief Mining Engineer
	Phone number:	0424288016	0419 963 250
	Email:	quiym@hanking.com.au	Charles.Hastie@hanking.com.au

2.3 Tenure

Table 3 outlines the Project tenements including a brief description of the proposed mining activities. Presently these tenements are held under separate Authorizations. On approval of the EIS, it is the intention of PGL to apply for an authorisation from the Northern Territory Department of Industry Tourism and Trade (DITT) to incorporate the subject mining leases under one Authorisation.

Table 3 Tenement details

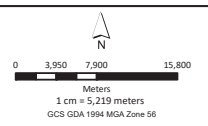
Tenement Information							
Site Name	Title Number	Proposed Activity	Pastoral Lease	Title Holder	Grant Date	Area (Ha)	Expiry Date
Rustlers Roost PA	ML 1083	Open cut mining, ROM, processing, administration, workshop, landfill, access roads	Old Mount Bunday Station, Perpetual Pastoral Lease (PPL) 1163	Primary Minerals Pty Ltd	01/01/2021	755.6	31 /12/2045
Quest29 PA	ML 29783	Open cut mining, haul road, access roads	McKinlay River Pastoral Station (PPL1184) and Old Mount Bunday Station, Perpetual Pastoral Lease (PPL) 1163.	Primary Minerals Pty Ltd	06/02/2013	285.2	05/02/2023
Toms Gully PA	ML 29814	Accommodation camp site	Old Mount Bunday Station, Perpetual Pastoral Lease (PPL) 1163	Primary Minerals Pty Ltd	06/02/2013	84.29	05/02/2023



Legend

- Project Location
- Proposed Haul Road
- Accomodation Camp
- Locality
- Watercourse
- National Park
- Road

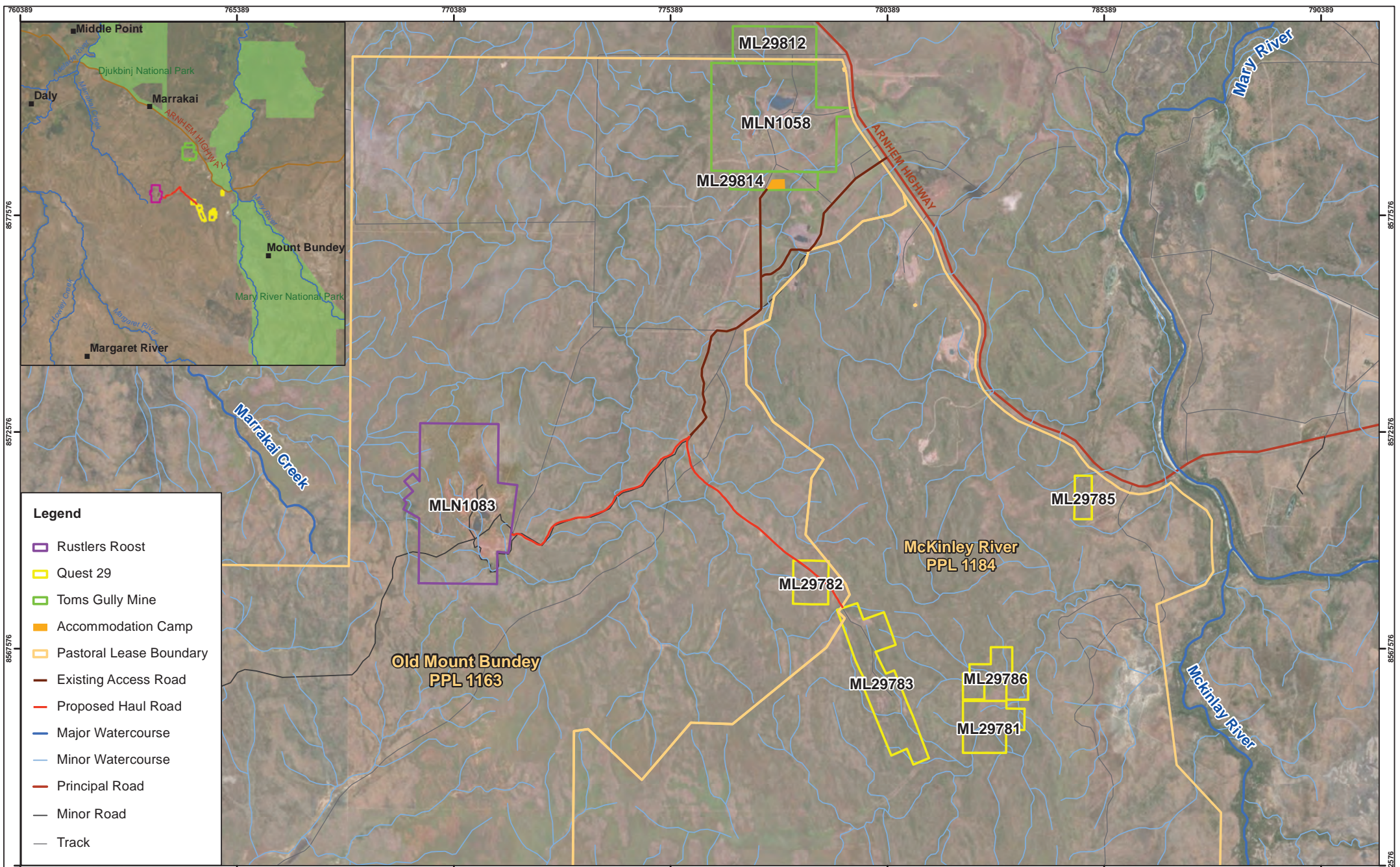
R	Details	Date	©COPYRIGHT CDM SMITH This drawing is confidential and shall only be used for the purpose of this project.			
1	First Draft	29/06/21	DESIGNED	SS	CHECKED	TK
2	Final	27/07/21	DRAWN	SS	CHECKED	TK
			APPROVED	TK	DATE	27/07/21
Notes:						



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FIGURE 1
Project Location and Regional Setting
DRG Ref: 1001087-EIS-01-1.1

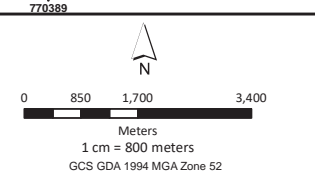


Legend

- Rustlers Roost
- Quest 29
- Toms Gully Mine
- Accommodation Camp
- Pastoral Lease Boundary
- Existing Access Road
- Proposed Haul Road
- Major Watercourse
- Minor Watercourse
- Principal Road
- Minor Road
- Track

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1	First Draft	29/06/21	DESIGNED	SS	CHECKED	JM
2	Second Draft	21/07/21	DRAWN	SS	CHECKED	JM
-	-	-	APPROVED	-	DATE	22/09/21
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FIGURE 2

Rustlers Roost and Quest 29 Project Location

DRG Ref: 1001087-EIS-01-1.4

2.4 History of Project Areas and Current Status

Since the 1940's Rustlers Roost and Quest 29 mine sites were mined, and to some extent, rehabilitated. A brief overview of each sites mining history is outlined in Table 4 and Table 5 and PGL status is outlined in Table 6.

2.4.1 Project Area History

Table 4 Rustlers Roost mining history overview

Date	Rustlers Roost Previous Mining Activity	
1940's	Gold was first discovered at the Rustlers Roost site and an 8-hectare (ha) mining claim was pegged and worked for 3 to 4 years. Ore was trucked to a nearby stamp battery. The mine was abandoned. 120 ounces (oz) of gold was produced from 200-250 tonnes(t) of ore processed.	
Early 1970's-1980's	Sporadic alluvial gold mining was undertaken.	
1988	Reconnaissance exploration Kintaro Mines Pty Ltd (Kintaro) and their Joint Venture (JV) partners.	
1991	Rustlers Roost site tenement ML 1083 granted to Kintaro (80%) and JV partners Ben Hall (10%) and Stanley Fletcher (10%).	
1993	Valdora Mining Pty Ltd (Valdora) acquired the Kintaro interest.	
1994	A Preliminary Environmental Report was lodged by Valdora for four oxide pits, construction of two Waste Rock Dumps (WRDs), four Heap Leach Pads, surface water containment infrastructure, crushing site, processing facilities and haul/access roads over an area of 110.5ha.	
1994	In April, approval to mine was granted.	Approximately 4.5 million tonnes (Mt) of ore were mined and processed from July 1994 to June 1998 for around 110,000oz of gold and 11,000oz of silver.
1994	In October, first gold was poured.	
1995	Valdora was taken over by William Resources Inc.	
1996	Valdora was renamed to Rustlers Roost Mining Pty Ltd (RRMPL).	
1996	In August, RRMPL lodged a Notice of Intent for the Stage 2 expansion.	
1997	In January, A Draft Environmental Impact Statement (EIS) was prepared which outlined the proposed combining and deepening of the existing pits, combining, and increasing the height of the WRDs, installation of a new Resin in Leach process and the addition of a Tailings Storage Facility (TSF) over an area of 181ha.	
1997	In August, assessment of the Draft EIS (and supplementary information) was completed. The Environmental Assessment Report and Recommendations accepted the proposal and noted that several matters needed to be further addressed before granting approval.	
1997	In August, mining ceased due to low commodity prices, the Rustlers Roost site never realised planned production levels and Stage 2 expansion did not proceed.	

Date	Rustlers Roost Previous Mining Activity	
1997	A Rustlers Roost decommissioning plan and rehabilitation plan were prepared for William Resources Inc. These plans were not fully implemented. All plant, buildings and other mining infrastructure have been removed from the site, although three (3) large tanks, lined Leach/Storm Water Ponds and some minor concrete footings remain. Following the cessation of mining, the pits have flooded and for practical purposes are now considered as one pit. Final stabilisation and closure of built landforms has not been undertaken and there has been no further progress towards closure.	
1998	In June ore processing was completed.	
1998	In July the Rustlers Roost site was placed into Care and Maintenance.	
2003	RRMPL conducted exploration work at the Rustlers Roost site drilling deep holes underneath pits in transitional and fresh rock material.	
2007	In July, GBS Gold Australia Pty Ltd (GBS) acquired mining and exploration assets in the Mount Bundy Region, including the Rustlers Roost site. However, prior to undertaking any work GBS went into administration.	
2010	In July, Crocodile Gold Australian Operations (CGAO) acquired ownership of the Rustlers Roost site.	
2013	CGAO sold the Rustlers Roost site (and other nearby assets) to PGL, and the site remains on Care and Maintenance.	

Table 5 Quest 29 Mining History overview

Date	Quest 29 Previous Mining Activity
Mid 1970's	Gold was first discovered at the Q29 by Geopeko
1980's/1990's	Explored by a variety of companies
1989-1991	Exploration was conducted by Carpentaria and MIM Exploration
1993-1995	Exploration was conducted by KRL and Pinnacle Mining,
1996-1998	Exploration was conducted by Valencia Ventures Inc.
1998-2002	Exploration was conducted by Sirocco/Renison.
1998-2004	Environmental approval under the then NT <i>Environmental Assessment Act</i> assessed the project at the level of a PER which was approved in late 1999 early 2000. Sirocco Resources carried out intermittently where mining was largely undertaken on a seasonal campaign basis. Minor high-grade material was trucked to Toms Gully for processing through the Toms Gully CIL plant however most of the oxide ore was trucked and treated at the heap leach facility at the northern end of ML 29383.
2010	In July, Crocodile Gold Australian Operations (CGAO) acquired ownership of the Q29.

Date	Quest 29 Previous Mining Activity
2013	ML 29383 which was granted on the 6th of February 2013 and is a consolidation of the historic MCN's 84-91, MCN337-339 and MCN369- 373. No mining operations have occurred at the Q29 since 2004, and the site has on care and maintenance
2013	CGAO sold the Q29 (and other nearby assets) to PGL and the site remains on Care and Maintenance.

2.4.2 Current Status

Table 6 Current (2013 to date) mining activity for Rustlers Roost and Quest 29 Project Areas

Date	Rustlers Roost Project Area and Quest 29 Project Area
2013 to date	<p>CGAO sold the Rustlers Roost site and Q29 (and other nearby assets) to PGL and the site remains on Care and Maintenance.</p> <p>Since its purchase PGL has conducted:</p> <ul style="list-style-type: none"> - Reconnaissance and desktop geological work. - During Care and Maintenance, site environmental monitoring, maintenance, reporting and caretaking activities in accordance with the MMP. - Priority site remediation works, and studies identified as part to reduce (or further define) the risk of potential long-term environmental impacts arising from historical mining infrastructure. <p>PGL aim to return their flagship TGPA to operational status and utilise this infrastructure to develop the unmined gold resource at the Rustlers Roost site. The 2019 Pre-feasibility study assessment of the Mineral Resource has defined a Mineable Reserve of ~19Mt at 0.93g/t for 578koz of gold. A LOM Plan is currently being developed by PGL to return the RPPA into operational status in the next 2-5 years. The development of the LOM Plan will help shape the long-term options for the Rustlers Roost site, be that remaining on Care and Maintenance, returning to operational status, or transitioning to planned closure. Until the Rustlers Roost site mine plans have been finalised (and approvals granted) the site will remain in Care and Maintenance.</p>
2019	Pre-Feasibility Study assessment of the Mineral Resource has defined a Mineable Reserve of ~19Mt at 0.93g/t for 578koz of gold. A LOM Plan was prepared by PGL to return the RPPA and Q29 into operational status in the next 2-5 years.
2021	On 2 February, PGL submitted to the NT EPA a Proponent initiated EIS referral application and draft Terms of Reference for the preparation of an EIS for a project to recommence and expand open-cut gold mining across Rustlers Roost and Quest 29 Project Areas.
2021	On 23 February, NT EPA accepted PGLs Proponent initiated EIS referral application and draft Terms of Reference.(This notice of decision is made under regulation 50 of the Environment Protection Regulations 2020 (EP Regulations))
2021	In May, NT EPA provided PGL with the Notice of Decision and Statement of Reasons, and TOR to conduct a standard EIA assessment in accordance with section 55 of the EP Act and regulation

	58(1)(b)(i) of the EP Regulations; and develop an environmental impact statement (EIS) in accordance with regulation 58(1)(b)(ii) of the EP Regulations.
2021	In August, The NT EPA issued a notice of decision to accept the significant variation to the action and the documents associated with the variation were made available for public consultation from 30 August 2021 to 24 September 2021.

2.4.3 Existing mine activities and disturbance areas

This section provides an overview of existing mine disturbances situated on Rustlers Roost (ML 1083) and Q29 (ML 29783) tenements including any remaining mining infrastructure used during previous mining operations.

Each disturbance has been classified by domain and footprint outlined in Table 7. A plan showing the existing disturbance areas is provided in Figure 3 and Figure 4.

The Project will address each of the existing mine disturbances rehabilitation throughout this Project. Details of these activities are outlined in the following chapters.

Below are various photos taken in 2021 of some existing disturbances at Rustlers Roost and Q29 sites.



Scrap steel, Rustlers Roost



Concrete footings and pads, Rustlers Roost



Stormwater pond, Rustler Roost



Annie's Dam, Rustlers Roost



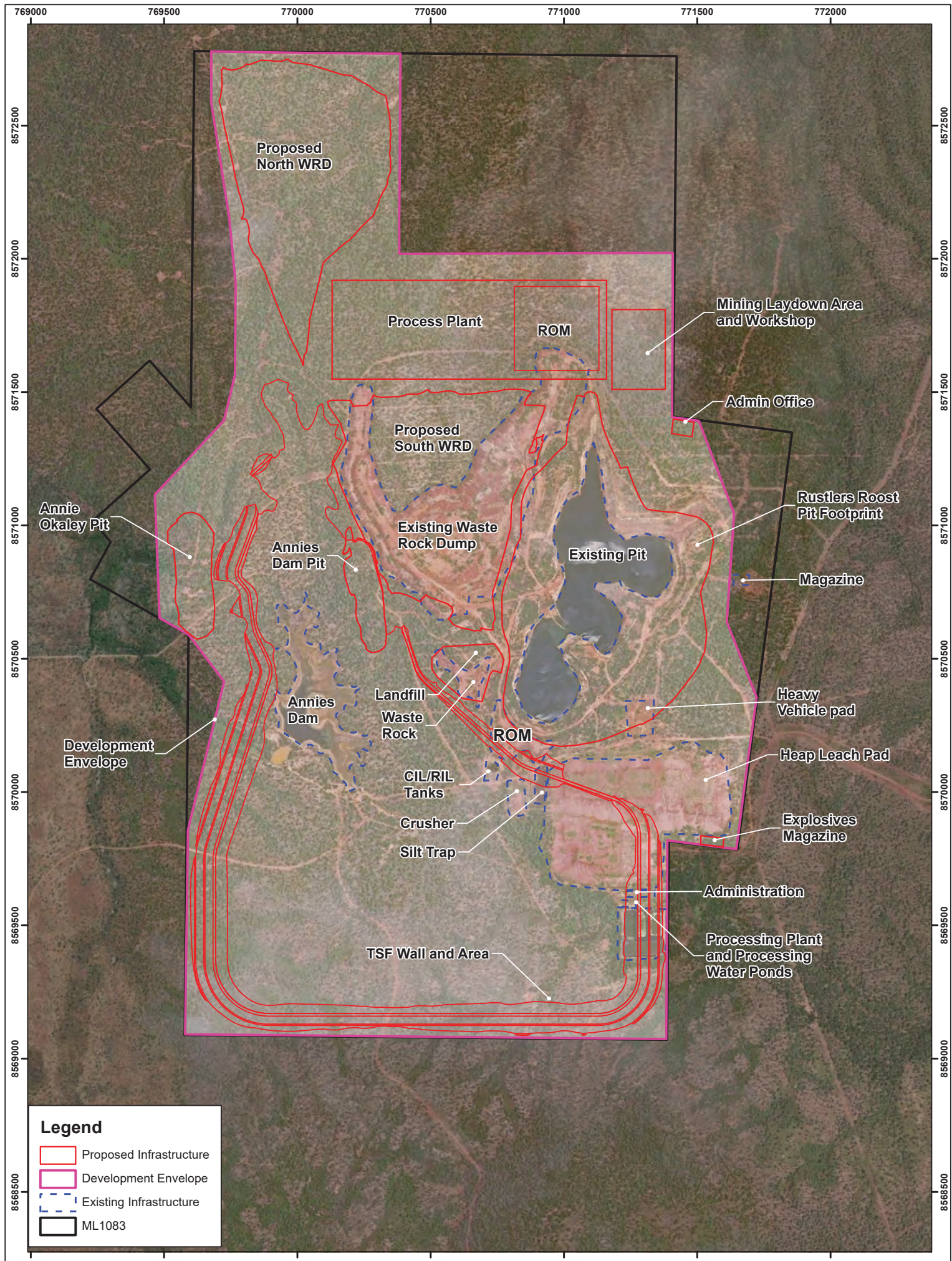
Main pit, Rustlers Roost



Table 7 Rustlers Roost, Q29, accommodation camp area and haul road route existing mine disturbance areas.

Site	Element	Activity	Sub Domain/feature	Disturbance Area (Ha)
Rustlers Roost	Mine and processing support infrastructure	Access and Haul roads	Haul road	5
			access roads	14.64
		Dams/water dams and ponds	Heap leach and stormwater ponds x (3)	3.3
			Silt trap from ROM	
		Supporting infrastructure, administration	Existing administration footings	2
			Accommodation/Camp footings	
		Processing and support infrastructure	Existing crusher area footings	8.4
			Main workshop and stores, contractors' workshop, and explosives area footings	
			CIL/RIL tanks large steel tanks x (2)	
			Existing process plant footings	
	Heap leach pads Pad A			
	Heap leach pads Pad B			
	ROM area			
	Miscellaneous			
Mine pits	Hard rock open pits	Open pit (incorporating Dolly Pot Pit, Sweat Ridge Pit, Backhoe Pit, Beef Bucket Pit)	27	
Mining overburden and waste facilities	Oxide WRD's and extractive stockpiles	WRD	66.2	
Pastoral feature	Dams/water dams and ponds	Annie's Dam	NA	
Rustlers Roost existing disturbance footprint total				126.5 (Ha)
Q29	Mine and processing support infrastructure	Dams/Water Dams and Ponds	Heap leach ponds (3)	1.3
		Processing and support infrastructure	CIL plant and footings	0
			Heap leach pad	5
	Access roads	Access roads on and off tenement	0	
	Existing mine pits	Hard rock open pits	BHS oxide open cut pit	8.65
			South Koolpin oxide open cut pit	
			Zamu oxide open cut pit	
North Koolpin open cut pit				
Taipan oxide open cut pit				
North Koolpin WRD	5.95			

Site	Element	Activity	Sub Domain/feature	Disturbance Area (Ha)
	Existing mining overburden and waste facilities	Oxide WRD's and extractive product stockpiles	South Koolpin WRD	
			Zamu WRD	
			Taipan WRD	
Q29 existing disturbance footprint total				20.9 (Ha)
Accommodation camp	Mine and processing support infrastructure	Access and Haul roads	Existing road disturbance	2.3
Accommodation camp existing disturbance footprint total				2.3 (Ha)
Haul road	Mine and processing support infrastructure	Access and Haul roads	Existing road disturbance	2.3
Haul road existing disturbance footprint total				19.7 (Ha)
Total existing disturbance footprint				169.4 (Ha)



Legend

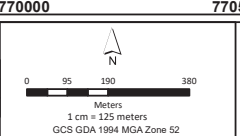
- Proposed Infrastructure
- Development Envelope
- Existing Infrastructure
- ML1083

R	Details	Date
1	First Draft	30/06/21
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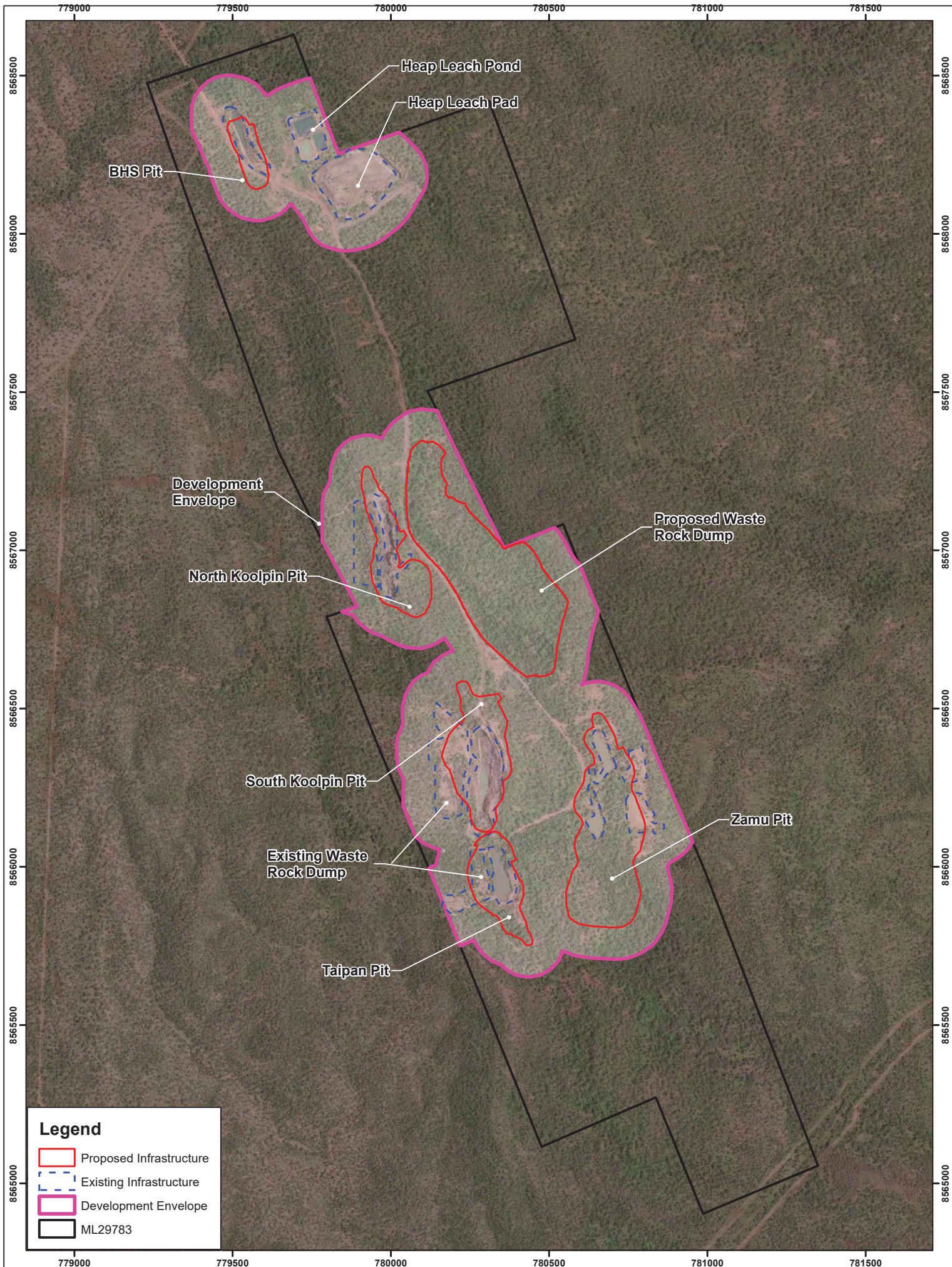


FIGURE 3

Rustlers Roost Existing and Proposed Disturbance Footprint

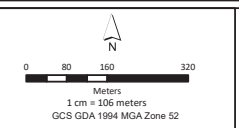
DRG Ref: 1001087-EIS-04-4.1

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R	Details	Date
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2	Final	22/07/21

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FIGURE 4

Quest 29 Existing and Proposed Disturbance Footprint

DRG Ref: 1001087-EIS-04-4.2

2.5 Proposed mining operations and mine layout

PGL propose to redevelop and expand former open pit gold mining operations in the Mount Bunday locality, 100km south-east of Darwin.

Rustlers Roost and Q29 sites were mined in the 1990's and contain existing mine infrastructure and landforms. Both sites have remained in a care and maintenance since 2000 predominantly undertaking land management, water monitoring activities and exploration drilling. Most of the existing mine infrastructure is removed from both sites, however some of the existing landforms remain unrehabilitated.

Project site preparation and construction is anticipated to commence in mid Q2 2022 once all PGL and regulatory approvals are secured. The Project operation is anticipated to commence in Q1 2023 with a forecast rate of production up to 5 Mtpa over an approximate 10-year Life of Mine (LOM) Table 8.

Open cut mining will involve the expansion of all existing open cut pits and an additional two new pits located across Rustlers Roost and Quest 29 (Q29) mine sites . The proposed project infrastructure footprint is 491.12 Ha and the Project development envelope is 790.5 Ha. Rustlers Roost site layout is detailed in Figure 3, Quest 29 site layout is detailed in Figure 4 and accommodation camp site is detailed in Figure 5. Haul road routes are illustrated in Figure 7 and Figure 8 and a broad spatial overview of the Haul Road alignment, access roads and other mining and extractive industries in the Mount Bunday area are illustrated in Figure 9.

Both mine sites area located approximately 11 km apart and are connected by an existing unsealed access track, which will be upgraded to accommodate haulage of ore from the Q29 satellite pits to the Rustlers Roost processing facility. Mined ore will be processed at a new purpose-built processing facility including tailings dam at Rustlers Roost to produce gold bullion. Mining operations will use a drill and blast technique involving the use of ammonium nitrate (ANFO).

The mining methodology will be consistent over both sites, with the open-cut mining operation being conducted with conventional truck and shovel methods. Mining at both sites will be undertaken concurrently with each site having their own mining fleet. The fleet will be comprised of excavators, haul and dump trucks, dozers, grader, water cart and front-end loader at each project.

Waste rock generated in the extraction and production process will be deposited in surface waste rock dumps (WRDs) and backfilled into several pits where mine scheduling permits.

Mined ore from each of the Q29 pits will be placed on the surface crest of each pit where it will be loaded into a haul truck and transported to the Rustlers Roost ROM for processing. At Q29, a new surface WRD (East Koolpin WRD) is proposed to be developed to dispose of the waste from mining Zamu pit, with waste material from the remaining pits to be backfilled into Zamu pit.

Mined ore from the Rustlers Roost pits will be loaded directly onto haul trucks and transported to the Rustlers Roost ROM for processing. At Rustlers Roost, most of the waste rock material will be deposited within the existing surface South WRD, Annie’s Dam pit and Annie Oakley pit and a portion backfilled into the existing Rustlers Roost pit. Section 2.6 Domain 1 – Waste Rock Dumps provides further detail.

Mined ore from both areas will be processed using a Carbon in Leach (CIL) processing method at a central processing facility at Rustlers Roost which extracts gold from the ore by mixing with a cyanide solution. Tailings produced from the processing facility will be deposited in the tailing storage facility (TSF) to be constructed as part of the proposal. Section 2.7 Domain 2 -Tailings Storage Facility.

The mining operations is expected to employ up to 210 staff. An accommodation village will be constructed ML 29814 to support the operational site staff. Layout details are provided in Figure 6.

Estimated closure date will commence on 31st October 2031 for 10 years post closure management and monitoring with an expected closure end date 31st October 2041.

Table 8 Rustler Roost and Q29 redevelopment mining schedule summary

Mining Schedule	Approvals	Construction	Operations										Closure	Post Closure
YEARS	1.5	10 years										10 years		
	2021/	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2031/ 2041		
Approvals	Q1 21'-Q3 22'													
Construction		Q3 22'-Q1-23'												
Commissioning			Q1											
Operations			Q1 23' to Q3 31'											
Annie’s Dam pit			Q1 23' to Q1											
Annie Oakley pit				Q1/Q2 24'										
Rustlers Roost main			Q1 23' - Q3 31'											
Zamu pit					Q2 25'- Q4 29'									
South Koolpin pit										Q2 30'– Q2				
North Koolpin pit										Q2 30' - Q3				
Taipan pit										Q2 30' - Q3				
BHS pit											Q2/ Q4 -			

Mining Schedule	Approvals	Construction	Operations										Closure	Post Closure
YEARS	1.5	10 years										10 years		
	21'	22'	23'	24'	25'	26'	27'	28'	29'	30'	31'	2031/ 2041		
Prog/ Rehabilitation			23'-33'											
Final haul of ore												Q4		
Final mill feed													Q2 32'	
Decommissioning													32'/33'	
TSF ready for capping													Q3 33'-	
Closure													32'/33'	
Post Closure													34'/41'	
Stakeholder Eng'mt	21'-41'													

2.5.1 Existing mined disturbances

All the existing mine disturbances will be incorporated into the Project activities, and will either be expanded and re-mined, or fully decommissioned, removed, contamination remediated and rehabilitated. Rehabilitation will reflect the agreed post-mining land use and in consultation with key stakeholders. Refer to section 9.2.9 of this MCP outlining closure implementation (Table 7).

2.5.2 Project layout

A summary of physical and operational components of the Project is listed in Table 9 and Table 10.

The total additional clearing for each site includes the previously cleared mined areas within a total mine development footprint.

The Project development envelope is defined as the maximum area within which the activity could occur. To re-phrase it, it presents the maximum (worst-case) extent of potential disturbance.

Detailed information on Project operations is outlined and listed in Domains. Domains are used to describe the footprint areas containing discrete geophysical and geochemical characteristics and infrastructure that require specific rehabilitation treatments, rehabilitation objectives, and closure criteria to achieve the final land use.

Table 9 Proposed extent of Project physical components

Elements	Domain	Sub domain name and description	Approximate dimensions	Proposed extent (Ha)
Rustlers Roost Project Area Physical Components				
Rustlers Roost additional land clearing for disturbance footprint				333.4
Rustlers Roost project development envelope				611
Rustlers Roost infrastructure/domain layout footprint (detailed below)				445.72
Mine Overburden and Waste Facilities	Domain 1			
	(New) North Waste Rock Dump	sulphide/oxide WRD	50m high, 780m by 635m	48.9
	(Extended) South Waste Rock Dump	Sulphide/oxide WRD	50m high, 923m by 685m	43.2
Tailing Storage Facility	Domain 2			
	(New) Tailing Storage Facility	Tailing Storage Facility	20m high, 1775m by 2370	257.1
Mine Pits	Domain 3			
	(New) Annie Oakley pit	Hard rock open oxide pits	50m deep, 574m by 140m	6.2*
	(New) Annie's Dam pit	Hard rock open oxide pits	44m deep, 430m by 120m	
	(Extended) Main pit	Hard rock open oxide pits	Nominally 185m deep, 1230m by 700m	69.9
Domain 4				

Elements	Domain	Sub domain name and description	Approximate dimensions	Proposed extent (Ha)
Mine and Processing Support Infrastructure	(New)ROM	ROM Pad, turn around bay, loading area to crusher.	11m high, 350m by 360m	6
	(new) Process Plant	Process plant infrastructure tanks, conveyor, crusher and mill, cyanide store, acid stores, gold room, ponds, bunding.	670m by 360m	
	(New) Miscellaneous Processing Infrastructure areas	Offices, crib, Weigh bridge, infrastructure (power lines, pumps, pipes etc...)	various	
	Domain 5			
	(New) Mining and maintenance	Offices, laydown, workshops, truck washbay and oily water separator, stores, bulk fuel storage area, explosive magazine, chemical and hazardous materials stores		4.42
(New) Miscellaneous mining and maintenance Infrastructure areas	Administration offices, safety/first aid, crib, front gate, vehicle washbay, office, helipad, landfill, ERT training area			
Q29 Physical Components				
Q29 Additional land clearing for disturbance footprint				26.17
Q29 Project development envelope				139.6
Q29 Infrastructure/Domain layout footprint (detailed below)				18.9
Mine Overburden and Waste Facilities	Domain 1			
	(New) East Koolpin WRD	sulphide/oxide WRD	40m high, 870m by 285m	7.9
Mine Pits	Domain 3			
	(Extended) BHS Pit	Hard rock open sulphide/oxide pits		8
	(Extended) Zamu Pit	Hard rock open sulphide/oxide pits		
	(Extended) North Koolpin Pit	Hard rock open sulphide/oxide pits		

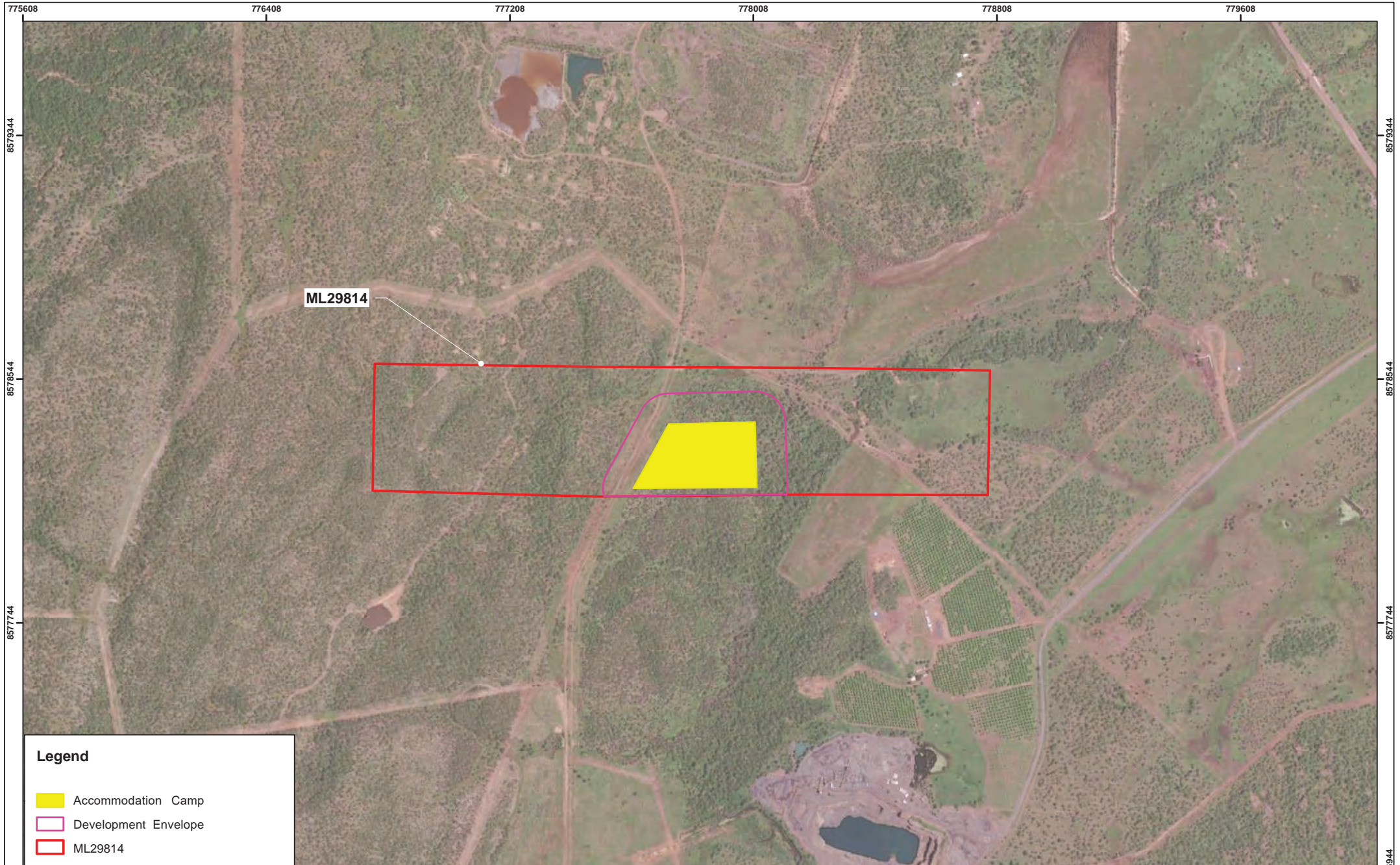
Elements	Domain	Sub domain name and description	Approximate dimensions	Proposed extent (Ha)
	(Extended) South Koolpin Pit	Hard rock open sulphide/oxide pits		
	(Extended) Taipan Pit	Hard rock open sulphide/oxide pits		
Mine and Processing Support Infrastructure	Domain 5			
	(New) Miscellaneous Infrastructure areas	Go line, office/crib, infrastructure (pumps, pipes etc...)		3
	(New)Fences/Gates	Tenement perimeter and internal.		-
Accommodation Camp				
Accommodation camp additional land clearing for disturbance footprint				7.3
Accommodation camp development envelope				17.8
Accommodation camp Infrastructure/Domain layout footprint (detailed below)				9.6
Mine and Processing Support Infrastructure	Domain 5			
	(New) Accommodation Mine Camp	Camp area, office, accommodation demountable (192 rooms), kitchen, wet mess, wastewater treatment plant ,water tanks/bore carpark, perimeter stock fence and gates.		9.6
Haul roads (11km long x 20m wide)				
Haul road additional land clearing for disturbance footprint				2
Haul road Project development envelope				21.7
Haul road Project infrastructure/domain layout footprint (detailed below)				21.9
Mine and Processing Support Infrastructure	Domain 6			
	(New) Haul road	Q29 to Rustlers Roost 11km long; Rustlers Roost site 3km (20m wide). Of the 21.7 Ha of haul road only 2 Ha will require additional clearing.		2

Elements	Domain	Sub domain name and description	Approximate dimensions	Proposed extent (Ha)
Access roads	(New and Extended) Rustlers Roost (ML 1083) and Quest 29 (ML 29783)	Use of existing unsealed access roads used for pastoral activities, culvert crossings, bridge, signage.		-
				-
Total Project additional land clearing for disturbance footprint				368.86 Ha
Total Project development envelope				790.5 Ha
Total Project infrastructure/domain layout footprint (detailed below)				491.12 Ha

*Accounts only for Annie's Oakley pit footprint as Annie's Dam is within the TSF footprint

Table 10 Project key operational components

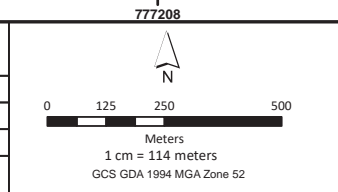
Project Operational Components	
Overall water demand for operations	3.3-6.5 GL/yr.
Mine site dewatering	(To be used for processing)
Power supply	30 MW supply
Gas supply (power generation and mineral processing)	4 to 5 TJ per day
Overburden/waste rock Oxide	Disposal of up to 25.3 Mt (over 10-year LOM)
Overburden/waste rock Transitional	Disposal of up to 11.8 Mt (over 10-year LOM)
Overburden/waste rock Fresh	Disposal of up to 31.4 Mt (over 10-year LOM)
Total mine operation	5 Mtpa over 10 years (total 48Mt)



- Legend**
- Accommodation Camp
 - Development Envelope
 - ML29814

R	Details	Date	
1	Final	07/09/21	
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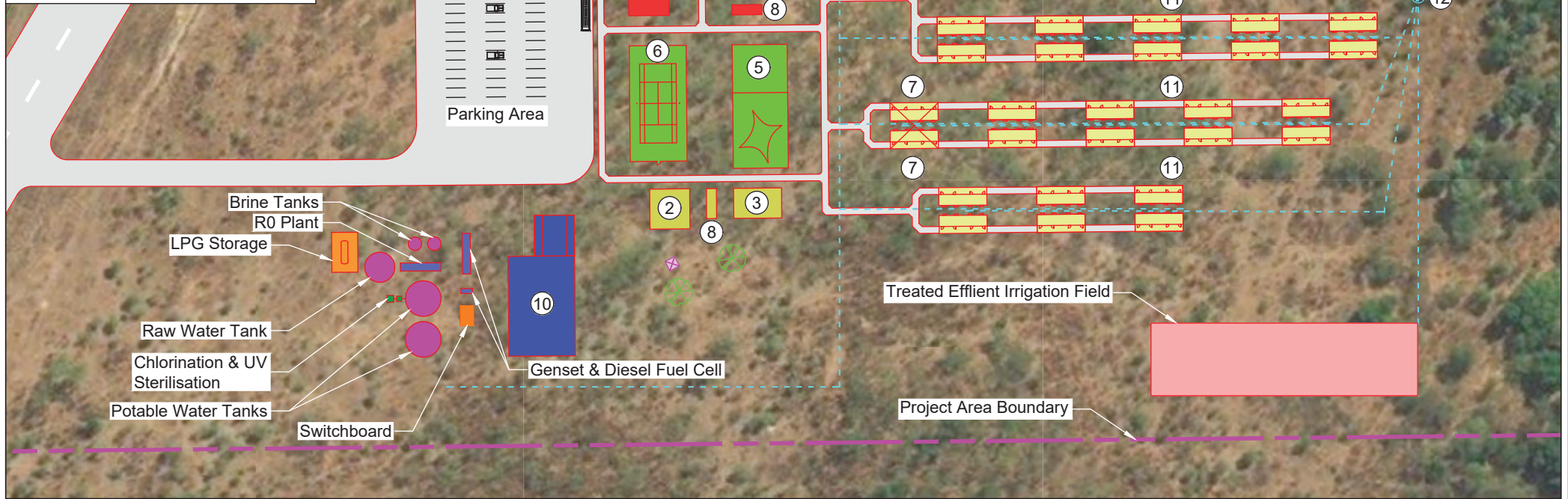


Figure 5

Accommodation Camp Disturbance Area

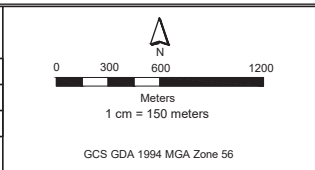
DRG Ref: 1001087-MCP-1.3

Legend	
No.	Description
1	Admin / First Aid / Retail / Communications
2	Gym
3	Recreation / Tv room
4	Dry Mess & Kitchen
5	Wet Mess
6	Multi-Purpose Court
7	Laundry
8	Toilet Block
9	Ice Room
10	Maintenance Workshop
11	Accommodation - 4 per unit - 50 units
12	Sewerage Pump Pit
13	Baggage Store
14	Garbage Storage Facility
15	Bulk Deliveries
16	Bulk Linen Store
- - - - - Buried Services	
- - - - - Project Area Boundary	
◆ Gazebo	



R	Details	Date
1	Final	18-08-21
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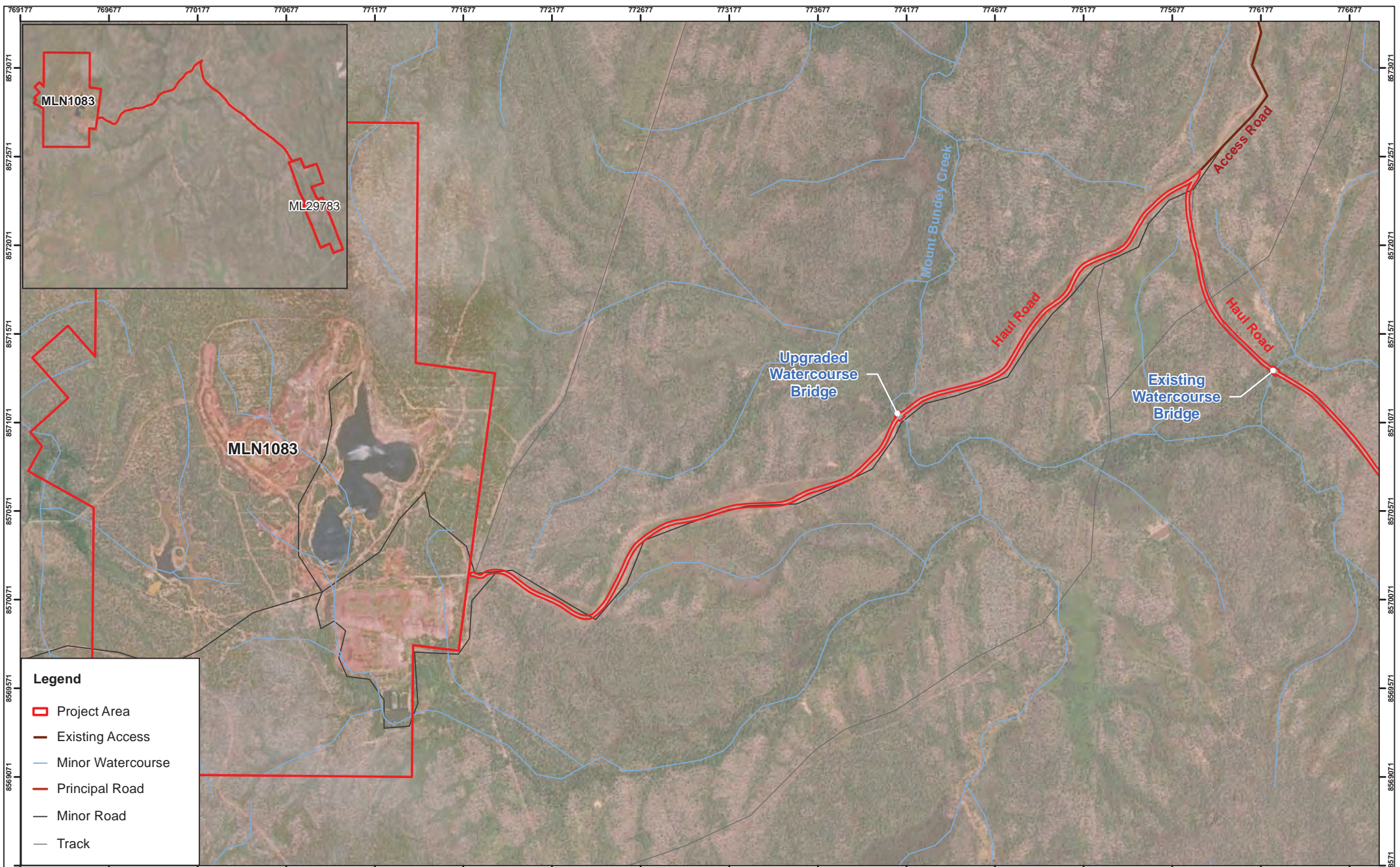


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DATA SOURCE
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FIGURE 6
Accommodation Camp Proposed Site Layout
DRG Ref: 1001087-EIS-04-4.16

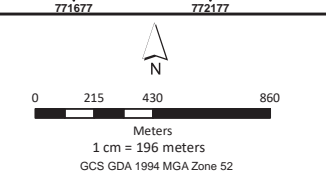


Legend

- ▭ Project Area
- Existing Access
- Minor Watercourse
- = Principal Road
- Minor Road
- Track

R	Details	Date	©COPYRIGHT CDM SMITH This drawing is confidential and shall only be used for the purpose of this project.			
1	Final	29/07/21	DESIGNED	SS	CHECKED	TK
-	-	-	DRAWN	SS	CHECKED	TK
-	-	-	APPROVED	TK	DATE	29/07/21
Notes:						

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DESIGNED	SS	CHECKED	TK			
DRAWN	SS	CHECKED	TK			
APPROVED	TK	DATE	29/07/21			
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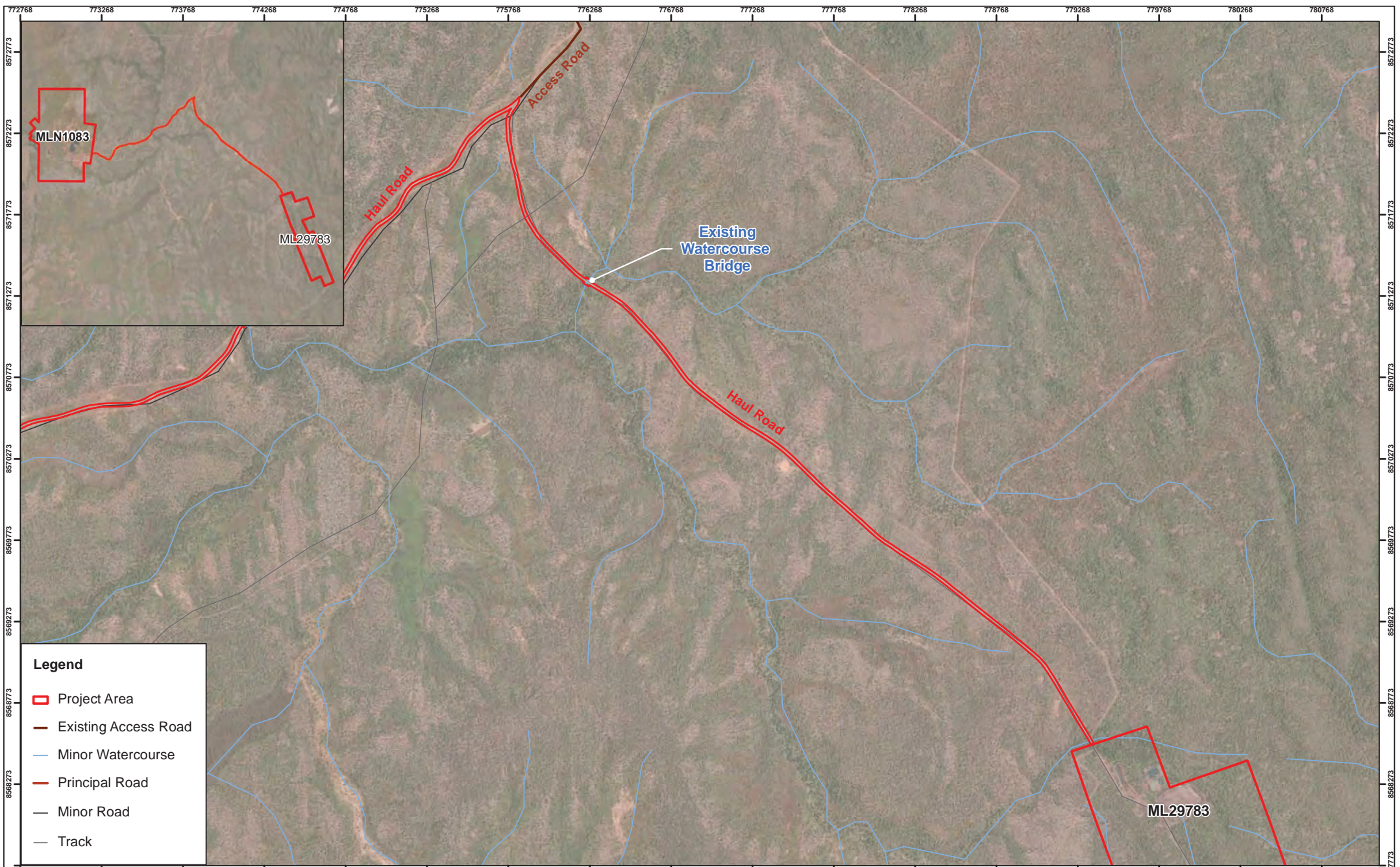
DATA SOURCE
 NT Government Open Source Data



FIGURE 7

**Project Proposed Haul Road
 - Overview A Rustlers Roost**

DRG Ref: 1001087-EIS-04-4.8



Legend

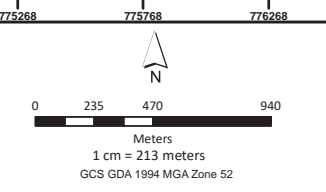
- ▭ Project Area
- Existing Access Road
- Minor Watercourse
- Principal Road
- Minor Road
- Track

R	Details	Date
1	First Draft	29/07/21
-	-	-
-	-	-
-	-	-
-	-	-
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DESIGNED	SS	CHECKED	TK
DRAWN	SS	CHECKED	TK
APPROVED	TK	DATE	29/07/21

Notes:



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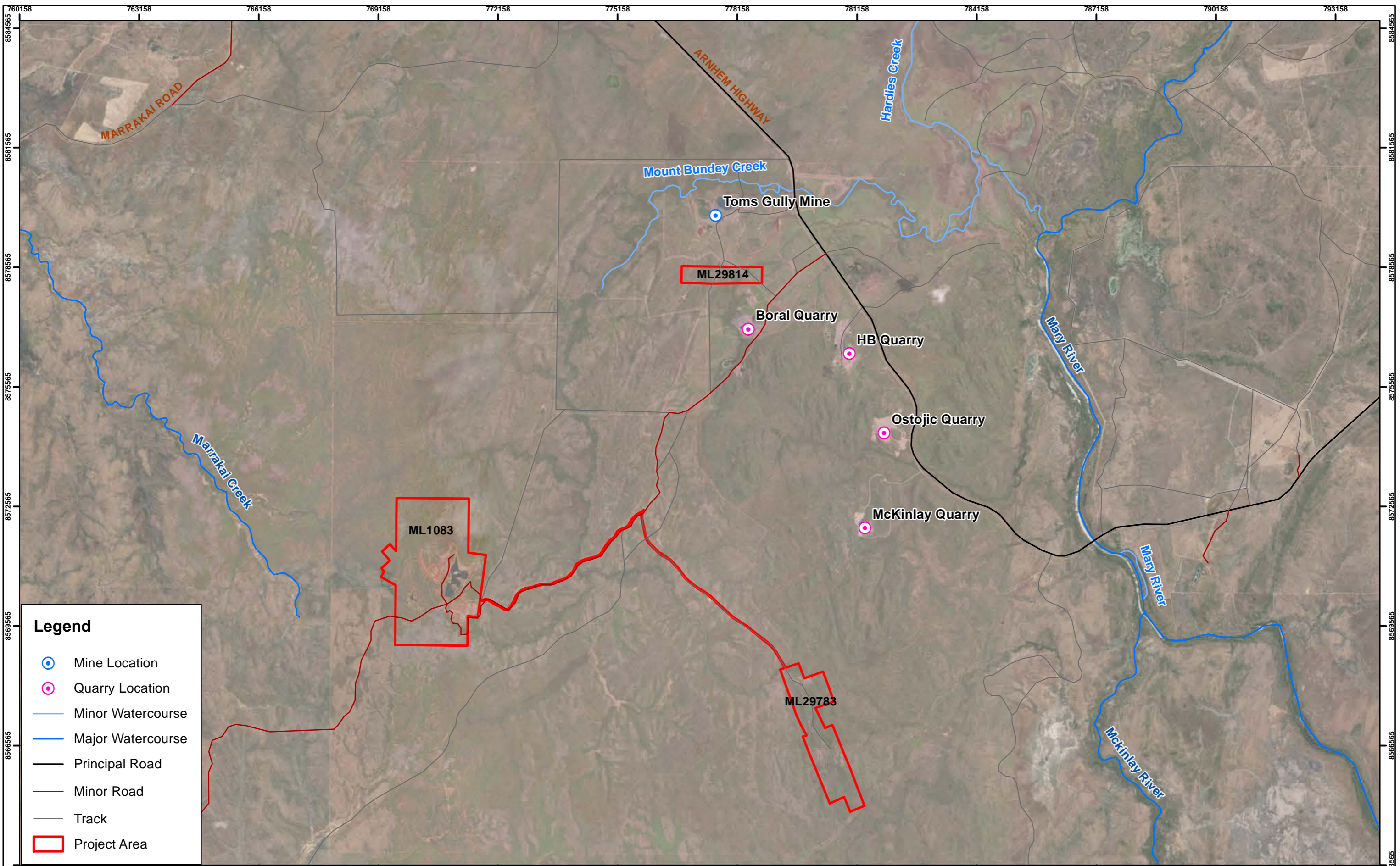
DATA SOURCE
NT Government Open Source Data



FIGURE 8

**Project Proposed Haul Road
- Overview B Quest 29**

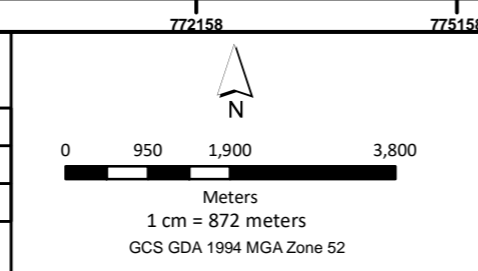
DRG Ref: 1001087-EIS-04-4.9



R	Details	Date
1	First Draft	06/08/21
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DESIGNED	SS	CHECKED	TK
DRAWN	SS	CHECKED	TK
APPROVED	TK	DATE	06/08/21
Notes:			



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DATA SOURCE
QLD Government Open Source Data



FIGURE 9

Project haul road route illustrating other mining/ extractive activity in the region

DRG Ref: 1001087-EIS-07-7.19

2.6 Domain 1 – Waste Rock Dumps

The sulphide/oxide waste rock dump sub domains are located at Rustlers Roost and Quest 29 Sites and include:

Site: Rustlers Roost (ML 1083) **Sub domain/feature name:** South WRD, North WRD

Site: Quest 29 (ML 29783) **Sub domain/feature name:** East Koolpin WRD.

For this Project, waste rock generated in the extraction and production process will be deposited in surface waste rock dumps (WRDs) and will be used to backfill several pits where mine scheduling permits.

2.6.1 Rustlers Roost WRD's

2.6.1.1 South WRD

At Rustlers Roost, most of the waste rock material will be deposited within the existing South WRD with proposed expansion to the north-west and North WRD. Annie's Dam pit will be backfilled with transition and fresh waste from Rustlers Roost main pit with the tailings dam footprint covering overtop. A portion of waste rock will be backfilled into the existing Rustlers Roost pit.

The area to the north of the existing U-shaped South WRD will be the designated location for the disposal of waste rock from Rustlers Roost pit. The expansion of the existing WRD was selected to minimise haulage distances and keep haulage costs low as it is close to the main pit exit.

During construction the WRD, face angle will be 37°, with a berm width of 19.5 m and 3 x 10 m lifts. Final landform WRD design will have a continuous 17° slope and a height of 50 m over 62.7 Ha.

Material classified as Non-acid forming (NAF) will be placed at the outer annulus of the WRD. NAF material with sufficient acid neutralising capacity (ANC) will be placed on the natural surface, lining the drainage lines. Potentially-acid forming (PAF) material will be encapsulated with the central areas of the dump, not near the outer slopes or toe areas and covered with NAF waste material from the outer perimeter of the existing WRD.

A total of 50.9 Mt of waste material will be produced from Rustlers Roost pit. Approximately 24 Mt will be placed within the existing South WRD expansion, and 21.4 Mt will be placed in the North WRD and 5.4 Mt of the fresh waste will be backfilled into the Annie's Dam pit and Annie Oakley pit. This waste material will be fresh (53%, transitional (18%) and oxide 30%). Most of the fresh waste will be placed in the South WRD and backfilling in Annie's dam pit and Annie Oakley pit.

The final WRD design will be developed following geochemical characterisation of waste material. This acid-formation potential and multi-element composition of waste-rock and ores samples (Graeme Campbell and Associates 1997) undertook a material characterisation program as part of the 1997 PER for stage 2 development. All fresh material was determined to be PAF, and transitional material was a mixture of NAF and PAF. An assessment of recent drilling is currently being undertaken to further characterise the material, classification volumes and determine appropriate management of PAF material.

2.6.1.2 North WRD

The North WRD is a new landform located just north of the South WRD. The North WRD will be mainly oxide waste with a small core of fresh material that does not fit into the South WRD. Oxide waste for the rehabilitation of the South WRD will be stored on the WRD until required.

During construction the North WRD, face angle will be 37°, with a berm width of 19.5m and 5 x 10 m lifts. Final landform WRD design will have a continuous 17° slope and a height of 50 m.

Material classified as No-acid forming (NAF) will be placed at the outer annulus of the WRD. NAF material with sufficient acid neutralising capacity (ANC) will be placed on the natural surface, lining the drainage lines. A small amount of potentially-acid forming (PAF) material will be encapsulated with the central areas of the dump, not near the outer slopes or toe areas and covered with NAF waste material from the outer perimeter of the existing WRD.

2.6.2 Q29 WRD

2.6.2.1 East Koolpin WRD

At Q29, a new surface WRD (East Koolpin WRD) is proposed to be developed from Zamu Pit waste rock. The area to the north of Zamu pit will be the location of the proposed surface WRD (Figure 10). During construction the WRD face angle will be 37°, with a berm width of 19.5 m and 4 x 10 m lifts. The WRD construction will commence with the placement of NAF material for the base and outer annulus. PAF material encountered will be placed onto of the NAF base, encapsulated within the centre of the WRD. No PAF material will be placed on outer perimeter, slopes, toe, surface, or base of the dump. Final landform WRD design will have a continuous 17° slope and a maximum height of 40 m in total from the initial surface.

A total of 5.4 Mt of waste rock from Zamu pit will be placed on the east Koolpin WRD. Refer to 2.8.2.2 for details of Zamu pit mining.

A surface perimeter drains, and sediment basin constructed at the down-gradient base of the dump (toe drain) to manage sediment and monitor surface water quality runoff and seepage. Sediment will be cleaned out of the sediment basin as required. The sediment basin will remain post rehabilitation until the landform is stable.

On completion of mining Zamu pit, the pit will be backfilled with waste material from mining of the remaining pits. Volumes and placement of waste material produced at Q29 is detailed below.

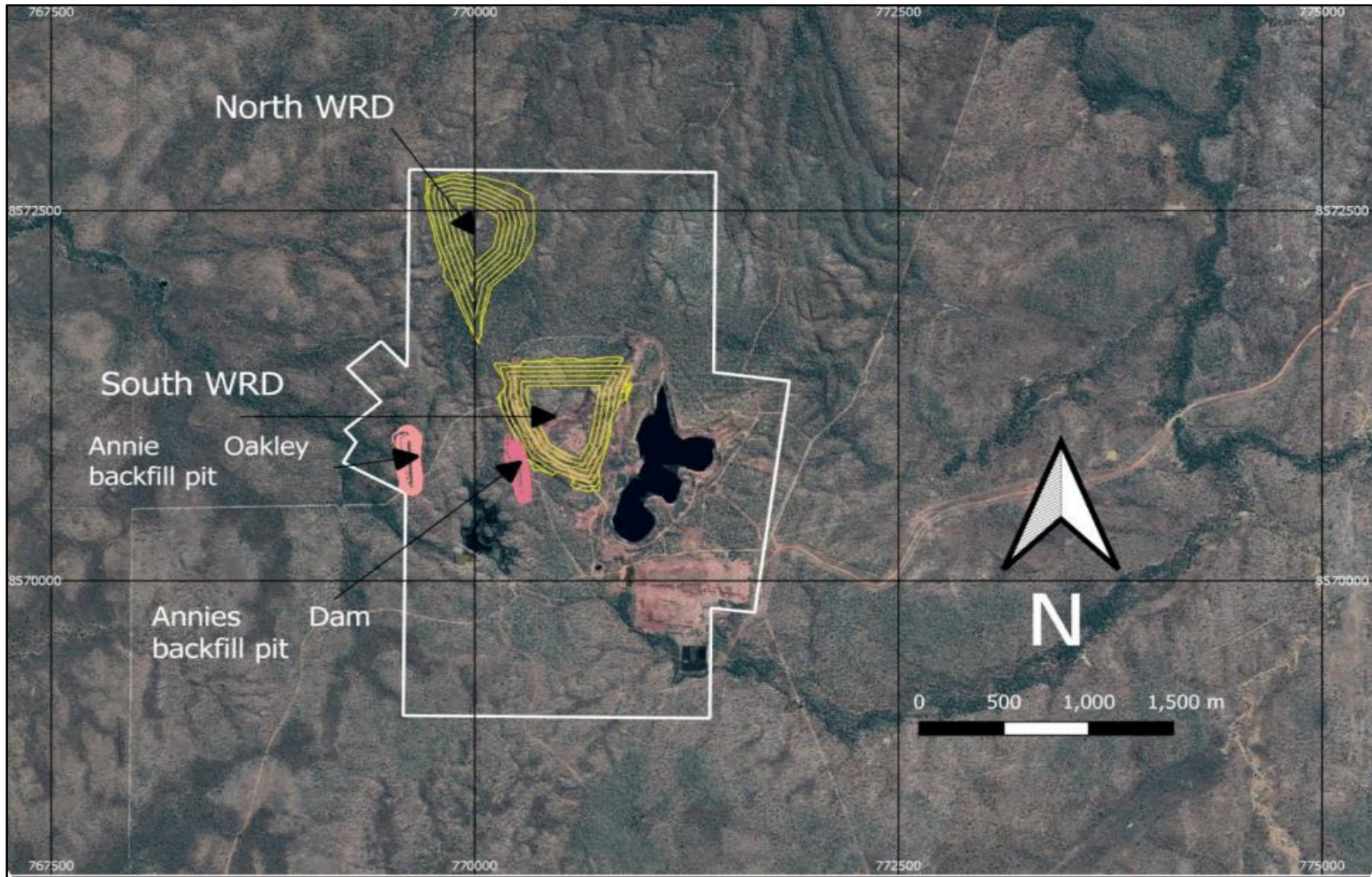


Figure 10 Rustlers Roost North and South waste rock dump profiles

2.7 Domain 2 -Tailings Storage Facility

2.7.1 Processing and tailings storage facility

The Tailings Storage Facility domain is located at Rustlers Roost Site and includes:

Site: Rustlers Roost (ML 1083) **Sub domain/feature name:** Tailing Storage Facility (TSF)

2.7.2 Tailings Storage Facility

The TSF location is in the southern section of ML 1083 occupying 243 ha of land. Option two design was considered the best option of three, based on the smaller embankment volume (Figure 11).

The TSF storage capacity volume is designed to hold 48 Mt . With this operation, there will be 4 Mt/year of tailings produced with a final stage of 48 Mt (12 years). Maximum embankment height is 33 metres (crest level 85.3m RL) progressively raised throughout operations. The TSF design details are outlined in Table 11 and Table 12 .

The TSF embankment alignment is designed to take advantage of natural topography (ridge lines), to reduce the volume of embankment construction materials and encapsulates Annie's Dam. The TSF footprint has been limited to provide a 50 m corridor between the downstream toe of the embankment and the site boundary.

The TSF stormwater storage capacity was confirmed from the dam break and consequence category assessment for the TSF completed in accordance with ANCOLD (further details are included in main EIS document). The embankment will be constructed in staged raises, with the upstream low permeability zone and any transitional material zones being constructed by a specialised earthworks contractor. The downstream structural fill zones will be progressively constructed by the mining fleet as part of my operations. TSF construction will commence during dry season months sourcing material from within the TSF basin as well as pre-stripped areas of the main pit redevelopment. Suitable (geochemically benign and structurally apt) mine waste material (waste rock and existing heap leach dump) will be used for the TSF construction. The current estimate of construction material volumes is 1,177,000 m³ over a 21.4 ha embankment as part of the initial stage (stage 1) of TSF development, and 9,646,000 m³ over 78.3 ha embankment part of subsequent stages (stage 2+) based on a centreline raise methodology) for the final layout.

The finalised TSF lining design requirements will be determined from the geochemical characterisation of the ore. It is not expected that tailings will contain high levels of cyanide, as residual cyanide will be removed from tailings during the refining process and re-used in the processing circuit.

Table 11 Tailing Storage Facility (TSF) design parameter, (Knight Piesold, 2021)

Component	Criteria
Throughput	4.0 Mtpa
Storage Capacity	
- Stage 1	5.33 Mt (16 months)
- Stage 10 (Final)	48 Mt (12 years)
Tailing's density ¹	
- Stage 1	1.0 t/m ³
- Final	1.4 t/m ³
Tailings beach slope	150H:1V
Cut-off Trench	Upstream toe cut-off through residual/transported material.
Embankment	Multi-zoned earth fill embankment, with upstream low permeability zone and downstream structural zone.
Raise technique	Downstream raise construction methods for all raises
Basin treatment	Compacted Soil Liner (CSL) over entire TSF basin area.
Underdrainage	System of finger and collector drains within low lying areas of the TSF basin.
Design speed	A Turret system connected to an access causeway located with the TSF basin and will be used to draw water from the supernatant pond and will be relocated as required (nominally every 2-3 months during early stages of operation, reducing to annually) as the supernatant pond migrates up the valleys. The Turret system will be located initially within the eastern valley of the TSF, before being relocated to the western valley in approximately month 8 of operation. The Turret will be moved along the causeway to in the latter stages of Stage 1, before being lifted into Annie's Dam reservoir, where the Turret will remain during subsequent operation (with some migration further up slope as required).
Construction materials	Selected low permeability borrow material or selected mine waste stockpile for use by civil contractor fleet.
Low permeability fill (Zone A)	
Structural fill (Zone C)	Mine waste (placed by the mining operations) and traffic compacted by loaded haul trucks.
Embankment slopes	3H:1V Downstream
- Intermediate	2H:1V Upstream
- Closure	3.5H:1V downstream (overall), with 5 m horizontal benches at 10 m height increments.
Cover profile	Generally shaped to achieve dry closure with no ponding (Water shedding).
Capping	Coarse rockfill over tailings (nominal 0.5 m thickness), Low permeability mine waste (nominal 0.3 m thickness), Covered with topsoil (0.2 m), re-vegetation.

Note: ¹ Assume tailings parameters to be confirmed during subsequent design.

2.7.2.1 Dam Break and Consequence Assessment

The TSF dam break and consequence assessment was completed during the PFS stage to establish severity of impact and population at risk in the event of a dam failure, and to assign minimum design criteria and control measures for the TSF (further details are included in main EIS document).

The consequence assessment was completed in accordance with the requirements of the Australian National Committee on Large Dams (ANCOLD) "Guidelines on the Consequence Categories for Dams" (2012). The severity rating of a facility is derived by considering the potential impacts of a significant embankment breach and release of tailings slurry in terms of safety, environmental and economic factors.

The TSF failure consequence category was rated as high A. Further details are provided in Table 12.

A dam breach assessment was conducted for potential dam break scenarios for both the eastern and western embankments assuming significant loss of containment. Dam breach modelling is based on the impact should a failure occur and does not consider the likelihood of such a failure occurring. The identified flow paths identified the population at risk, the severity of damage and loss, providing a consequence category of the facility. For this assessment, the possible breach flow paths for each embankment at final height (when the facility is at its maximum tailings storage volume) were assessed.

Based on analysis of aerial imagery and topography, it is recognised there is risk of a tailings breach impacting downstream receptors including the Adelaide River or Mary River, national parks, local agriculture, and large floodplains. Several sites and local access roads are at risk of being cut off and several unclassified buildings are located downstream of the TSF. The dam break and consequence category assessment will be further refined as design is progressed and data becomes available.

Table 12 ANCOLD TSF design parameters -minimum (Knight Piesold, 2021)

Component	Criteria
Dam failure consequence category	High A
Dam spill consequence category	Significant
Design Storage Allowance Parameters	
Design storage allowance	10% AEP notional wet season runoff (1 in 10)
Extreme storm storage	1% AEP, 72-hr flood (1 in 100)
Contingency freeboard (wave run-up)	10% AEP wind
Contingency freeboard (additional freeboard)	0.3
Emergency Spillway Design Parameters	
Design flood	Probable maximum flood
Wave freeboard allowance	Nil for given design flood
Design Earthquake Loadings	
Operating basis earthquake	0.1% AEP
Safety evaluation earthquake	0.01% AEP (median 50% percentile 1 in 10,000)
Maximum credible earthquake for post closure	Ground motion from known active faults calculated deterministically or probabilistically 1 in 10,000 AEP
Factors of Safety	
Long-term drained	1.5 (effective strength)
Short-term under drained (potential loss of containment)	1.5 (consolidated under drained strength)
Short-term under drained (no potential loss of containment)	1.3 (consolidated under drained strength)
Post-seismic	1.0-1.2 (post seismic shear strength)
Dam Safety / Inspection Frequency	
Comprehensive inspection	By Dams Engineer and Specialist (where relevant) after first year of operation then every five years.
Intermediate inspection	By Dams Engineer annually
Routine inspection	Weekly to twice weekly inspection by operations personnel/inspector

2.7.2.2 Tailing's deposition system

Tailings will be discharged by sub-aerial deposition methods, using banks of spigots at regular intervals from the main embankments for supernatant pond location control. The active tailings beach will be rotated around the facility to maximise tailings density and control the supernatant pond. Later stages of operation will involve deposition to the head of the northern valley to push the supernatant pond further south towards the closure spillway location.

2.7.2.3 Seepage control

Seepage control involves a compacted soil liner over the entire TSF, except Annie's Dam. The design consists of a gravity feed underdrainage system to reduce pressure head acting on the soil liner, reduce seepage, increase tailings densities,

and improve embankment geotechnical stability. Seepage will drain to a collection sump situated at the basins lowest point and then pumped to the process plant for re-use.

2.7.2.4 Decant water return system

A decant turret system will recycle water from the TSF supernatant pond for use in the process. This technology allows for maximum uptake whilst preventing tailings entering the pump intake.

2.7.2.5 Emergency spillway

The TSF will be designed to contain a range of design storm and rainfall sequences events up to and greater than the required design criteria. The TSF design criteria will be governed by the ANCOLD consequence category, to be determined during the subsequent design phase based on a TSF dam break assessment.

If a storm event greater than the TSF design criteria occurs, rainfall and supernatant water which cannot be stored will discharge from the TSF in a controlled manner via an engineered spillway. The operational emergency spillway will be constructed as part of each embankment raise.

2.7.2.6 Monitoring

The comprehensive risk-based monitoring systems will include the following items:

- Regular inspections of all TSF infrastructure;
- Survey pins to monitor embankment displacement;
- Piezometers to measure pore water pressure within the embankment;
- Boreholes to monitor water quality and seepage levels downstream of the TSF;
- Surface water monitoring stations to monitor water quality in surface flows downstream of the TSF; and
- Ongoing operational monitoring and water balance calibration for the TSF.

Any problems identified will result in an increase in monitoring frequency and the Engineer of Record will be notified immediately to assess the situation.

2.7.2.7 Emergency controls

In the event of an emergency, the following TSF operational emergency controls:

- The tailings pipeline will be located on the upstream crest of the embankment, which will have a minimum cross fall to the tailing's beaches of 2%. Any leakage from the pipeline will flow towards the TSF;
- The facility is protected by a spillway so that in the unlikely event of an overflow, water will be discharged, and the embankment will not be overtopped; and

- Between the plant site and TSF, the tailings pipeline, and water return lines will be contained within a bunded corridor.

2.7.2.8 Rehabilitation

The focus of the TSF rehabilitation will be re-vegetation, erosion control and stormwater management. The TSF embankment will have a final downstream slope of 3H:1V with 5 m benches at 10 m intervals for erosion and drainage control and profile for re-vegetation.

During the later stages of operation, deposition will be relocated to the head of the northern valley to push the supernatant pond further south towards an existing drainage course in the east of the Annie's Dam basin. The TSF closure spillway will be excavated from this valley, running around the waste dump, and discharging into the open pit.

Rehabilitation of the tailings surface will commence upon termination of tailings deposition. At this stage, soil fill covers are proposed for the TSF as the most appropriate long-term solution. This is subject to ongoing geochemistry testing during operation. Suitable vegetation covers will also be determined throughout operations.

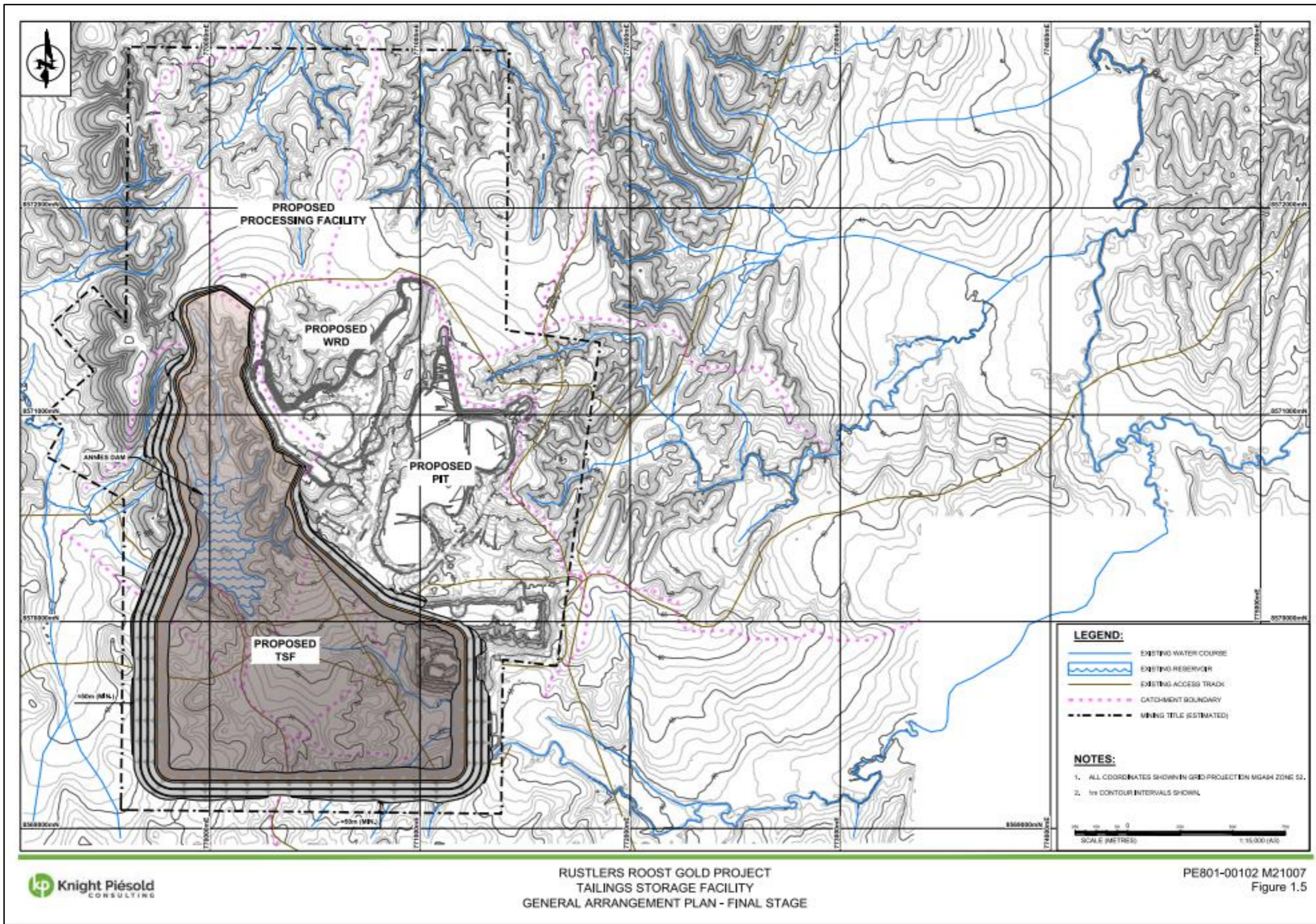


Figure 11 Rustlers Roost TSF general arrangement plan - Final Design

2.8 Domain 3 -Open Pit Voids

The hard rock open pit sub domains are located at Rustlers Roost and Q29 Sites and include:

Site: Rustlers Roost (ML 1083) **Sub domain/feature name:** Annie Oakley Oxide Pit, Annie's Dam Oxide pit, Main pit

Site: Quest 29 (ML 29783) **Sub domain/feature name:** BHS pit, Zamu pit, North Koolpin pit, South Koolpin pit, Taipan pit.

Land and Water consulting was commissioned by PGL in 2020 to conduct a geochemical assessment of Rustlers Roost and Q29 sites to understand the risk of acid and/or metalliferous drainage (AMD) at the Rustlers Roost and Q29 brown field mine sites. Details of the report is included in 7.10 of this MCP which involved a desktop study, static kinetic geochemical assessment of Rustlers Roost and Q29 sites. The study used the lithological classification (oxide, transitional and fresh) and determined that potential acid forming material (PAF) is present across all weathering zones. However, although PAF is present in the oxide and transition zone, these lithologies contain significant acid buffering capacity. Oxide material will primarily be used as construction material around both sites and as capping and cover material, subject to further analysis of its physical and structural suitability for capping and cover.

A total of 68.5 Mt of waste material will be produced during the Project LOM. A large portion of this waste material will be oxide zone material 25.3 Mt (37 % of total waste) and fresh zone materials 31.4 Mt (46 % of total waste) and to a lesser extent transitional zone materials 11.8 Mt (17 % of total waste). Table 13 outlines Rustlers Roost and Q29 waste weathered zones volumes (in Mt and percentage) by weathered profile for each mine site and combined total for the Project.

Table 13 Waste rock profile volumes (Mt and %) separated by weathered zones at each mine and total project area

Mine Sites/Project site	Oxide		Transitional		Fresh		Total (Mt)	Total (%)
	Mt	%	Mt	%	Mt	%		
Rustlers Roost total waste in Mt and %	20.7	81.75	9	76.92	26.7	85.03	56.4	82.43
Quest 29 total waste in Mt and %	4.6	18.25	2.8	23.08	4.7	14.97	12.1	17.57
Combined Rustlers Roost and Quest 29 total waste in Mt and %	25.2	100.00	11.70	100.00	31.4	100.00	68.5	100%

2.8.1 Rustlers Roost

Rustlers Roost mining will produce just over 56 Mt (82%) of the total waste produced over the Projects. The greatest portion is fresh waste 26.7 Mt (47%) and oxide waste 20.7 Mt (37%) and to a lesser extent transitional waste of 9 Mt (16%).

2.8.1.1 Main pit

The Main pit is located at Rustlers Roost site and is an existing open cut void approximately 22.9 ha. The Main pit is situated to the east of ML 1083. Mining will extend to a total of 70 Ha which is an overall footprint increase of 47 Ha. Mining will occur over a period of 8 years and 8 months commencing in March 2023 until October 2031.

An estimated 50.8 Mt of waste rock will be produced. This volume equates to 90% of total waste rock produced at Rustlers Roost of which 26.7 Mt (53%) consist of fresh waste rock, and 15.1 Mt (30%) consist of oxide waste and 9 Mt (18%) consisting of transitional waste. Approximately 24 Mt will be placed within the existing surface South WRD expansion, 21.4 Mt will be placed in the North WRD, and 5.4 Mt of the fresh waste will be backfilled into the Annie’s Dam pit and Annie Oakley pit. This waste material will be fresh (53%), transitional (18%) and oxide (30%). Most of the fresh material will be placed in the South WRD and Backfilling in Annie’s dam pit and Annie Oakley pit.

Rustlers Roost main pit		
Existing dimensions	22.9 Ha	
Proposed dimensions	69.9 Ha	
Increased area of disturbance	47 Ha	
Life of mine	March 2023 to Oct 2031 (8 years and 8 months)	
Ore extracted	39.6 Mt	
Waste oxide	15.1 Mt	30%
Waste Transition	9.0 Mt	18%
Waste fresh	26.7 Mt	52%

At Rustlers Roost, the expansion of the existing main open pit will be developed in five stages. Each stage aims to balance the amount of waste stripping in the early stages, whilst aiming to maintain a continuous supply of ore to the processing facility. Most of the waste rock material will be deposited within the existing surface WRD (expansion to the north-west) and North WRD and a portion backfilled into Rustlers Roost pit.

2.8.1.2 Annie Oakley Oxide Pit

The Annie Oakley pit is located at Rustlers Roost site and is a new proposed open cut oxide void approximately 4.4 ha. This small pit is located between the western edge of Rustlers Roost development envelop and TSF. Recent drilling has indicated gold reserves and to avoid long term sterilization of the resource, due to proximity near the TSF. Annie’ Oakley pit is proposed to be mined over a 4-month period from February to May 2024.

Annie Oakley Pit produces 3.9 Mt (19%) of total of oxide waste rock produced at Rustlers Roost. The optimised pit shell will comprise one design sector where the rock encountered will be only weathered oxide with no transitional or fresh material will be encountered during mining.

Annie Oakley pit will be completely backfilled. Fresh waste from the Main pit will be placed in the pit base and covered with oxide waste overburden from the Main pit. This approach will encapsulate fresh waste deeper within the pit backfill, surrounded by NAF bedrock on the pit walls and floor, and limit the amount of water and oxygen contact with PAF material.

Annie Oakley pit		
Existing dimensions	-	
Proposed dimensions	4.4 Ha	
Increased area of disturbance	-	
Life of mine	Feb 2024 to May 2024 (4 Months)	
Ore extracted	2.03 Mt	
Waste oxide	3.9 Mt	100%
Waste Transition	0.0 Mt	0.00%
Waste fresh	0.0 Mt	0.00%

2.8.1.3 Annie's Dam Pit

Annie's dam pit is located at Rustlers Roost site and is a new proposed open cut oxide void approximately 6.23 ha. This small pit is located to the west of ML 1083 situated in the TSF footprint at the Rustlers Roost site. Recent drilling has indicated gold reserves and to avoid long term sterilization of the resource, due to proximity near the TSF. Annie's Dam Pit is proposed to be mined in over a 11-month period from March 2023 until January 2024.

Annie's dam Pit produces 1.6 Mt (7.8%) of total of oxide waste rock produced at Rustlers Roost. The optimised pit shell will comprise one design sector where the rock encountered will be only weathered oxide with no transitional or fresh material will be encountered during mining.

Annie's Dam pit		
Existing dimensions	-	
Proposed dimensions	6.23 Ha	
Increased area of disturbance	-	
Life of mine	March 2023 to Jan 2024 (11 months)	
Ore extracted	4.9 Mt	
Waste oxide	1.6 Mt	100%
Waste Transition	0.0 Mt	0.00%
Waste fresh	0.0 Mt	0.00%

2.8.2 Q29

12.1 Mt (18%) of the total waste produced over the Projects LOM will come from Quest 29 site. The greatest portion is fresh waste 4.7 Mt (39%) and oxide waste 4.6 Mt (38%) and to a lesser extent transitional waste of 2.8Mt (23%).

2.8.2.1 BHS Pit

BHS pit is located at Q29 site and is an existing open cut oxide void approximately 1.0 ha. BHS pit is situated at the northern end of ML 29783. Mining will extend a total of 1.7 ha which is an overall increase 0.7 ha. Mining will occur over a period of 4 months from July to Oct 2031. An estimated 0.4 Mt of only oxide waste rock will be produced and either

be used for beneficial mine closure purposes, such as use in rehabilitation (capping) of the decommissioned heap leach facility in the Project area. This volume equates to 11% of the total oxide waste rock produced at Q29.

BHS pit		
Existing dimensions	1.0 Ha	
Proposed dimensions	1.7 Ha	
Increased area of disturbance	0.7 Ha	
Life of mine	July-Oct 2031 (4 months) for 5 years)	
Ore extracted	0.01 Mt	
Waste oxide	0.4 Mt	100%
Waste Transition	0.0 Mt	0.00%
Waste fresh	0.0 Mt	0.00%

2.8.2.2 Zamu Pit

Zamu Pit is located at Q29 site and is an existing open cut oxide void approximately 0.8 ha. Zamu pit is situated at the south-eastern end of ML 29783. Mining will extend a total of 11.4 Ha which is an overall footprint increase of 10.6 Ha. Mining will occur over a period of 4 months per year from July-November for 5 years starting in 2025 to 2029.

Zamu pit produces 6.7 Mt (56%) of waste rock produced at Q29. This includes 4.1 Mt (61%) fresh waste rock, and 1.8 Mt (27%) oxide waste rock and 0.8 Mt (12%) transitional waste. A total of 4.39 Mt of waste from Zamu pit will be placed on the surface (just north of the Zamu pit) to create a new WRD (East Koolpin WRD) Section 2.6.2.1. The residual 2.50 Mt will remain within Zamu Pit for commencement of backfilling. Waste rock from the four consecutive pits including Taipan pit, South Koolpin, North Koolpin and BHS Pit will be backfilled into Zamu pit.

NAF oxide material will be used for mine closure and AMD controls, such as encapsulation of PAF material within East Koolpin WRD.

On completion of mining Zamu pit, the pit will be backfilled with waste material from mining of the remaining pits. Volumes and placement of waste material produced at Q29 is detailed below.

Zamu pit		
Existing dimensions	0.8 ha	
Proposed dimensions	11.4 ha	
Increased area of disturbance	10.6 ha	
Life of mine	July-Nov 2025 to 2029 (4 months for 5 years)	
Ore extracted	2.74 Mt	
Waste oxide	1.8 Mt	27%
Waste Transition	0.8 Mt	12%
Waste fresh	4.1 Mt	61%

2.8.2.3 North Koolpin Pit (Quest 29)

North Koolpin Pit is located at Q29 site and is an existing open cut oxide void approximately 1.75 ha. The pit is situated at the south end of ML 29783. Mining will extend a total of 4.7 Ha which is an overall footprint increase of 2.9 Ha. Mining will occur over a period of 12 months from July-2030 to June 2031.

North Koolpin pit produces 1.5Mt (13%) of total waste rock produced at Q29 of which of which 0.8 Mt (53%) consist of transitional waste rock, and 0.4 Mt (27%) consist of oxide waste and 0.3 Mt (20%) consisting of fresh waste.

NAF oxide material will be used for mine closure and AMD controls, such as encapsulation of PAF material within East Koolpin WRD.

Waste rock from North Koolpin pit will be backfilled into Zamu pit. Volumes and placement of waste material produced at Q29 is detailed below.

North Koolpin pit		
Existing dimensions	1.75 ha	
Proposed dimensions	4.7 ha	
Increased area of disturbance	2.9 ha	
Life of mine	July-2030 to June 2031 (12 months)	
Ore extracted	0.43 Mt	
Waste oxide	0.4 Mt	27%
Waste Transition	0.8 Mt	53%
Waste fresh	0.3 Mt	20%

2.8.2.4 South Koolpin Pit (Quest 29)

South Koolpin Pit is located at Q29 site and is an existing open cut oxide void approximately 3.3 ha. The pit is situated at the south end of ML 29783. Mining will extend a total of 6.4 Ha which is an overall footprint increase of 3.1 Ha. Mining will occur over a period of 12 months from July-2030 to June 2031.

South Koolpin pit produces 2.1 Mt (18%) of total waste rock produced at Q29 of which of which 1.3 Mt (62%) consist of oxide waste rock, and 0.5 Mt (24%) consist of transitional waste and 0.3 Mt (14%) consisting of fresh waste.

NAF oxide material will be used for mine closure and AMD controls, such as encapsulation of PAF material within East Koolpin WRD.

Waste rock from Southh Koolpin pit will be backfilled into Zamu pit. Volumes and placement of waste material produced at Q29 is detailed below.

South Koolpin pit		
Existing dimensions	3.3 ha	
Proposed dimensions	6.4 ha	
Increased area of disturbance	3.1 ha	
Life of mine	July-2030 to June 2031 (12 months)	
Ore extracted	0.52 Mt	
Waste oxide	1.3 Mt	62%
Waste Transition	0.5 Mt	24%
Waste fresh	0.3 Mt	14%

2.8.2.5 Taipan Pit (Quest 29)

Taipan Pit is located at Q29 site and is an existing open cut oxide void approximately 1.8 ha. The pit is the most south located pit of ML 29783. Mining will extend a total of 4.0 Ha which is an overall footprint increase of 2.2 Ha. Mining will occur over a period of 16 months from July-2030 to October 2031.

Taipan pit produces 1.3 Mt (11%) of total waste rock produced at Q29 of which of which 0.7 Mt (54%) consist of oxide waste rock, and 0.6 Mt (46%) consist of transitional waste with zero fresh waste produced.

NAF oxide material will be used for mine closure and AMD controls, such as encapsulation of PAF material within East Koolpin WRD.

Waste rock from Taipan pit will be backfilled into Zamu pit. Volumes and placement of waste material produced at Q29 is detailed below.

Taipan pit		
Existing dimensions	1.8 ha	
Proposed dimensions	4.0 ha	
Increased area of disturbance	2.2 ha	
Life of mine	July-2030 to Oct 2031 (16 months)	
Ore extracted	0.59 Mt	
Waste oxide	0.7 Mt	54%
Waste Transition	0.6 Mt	46%
Waste fresh	0.0 Mt	0%

Total waste rock weathered profiles expressed as a % of total waste for each pit is illustrated in Figure 12.

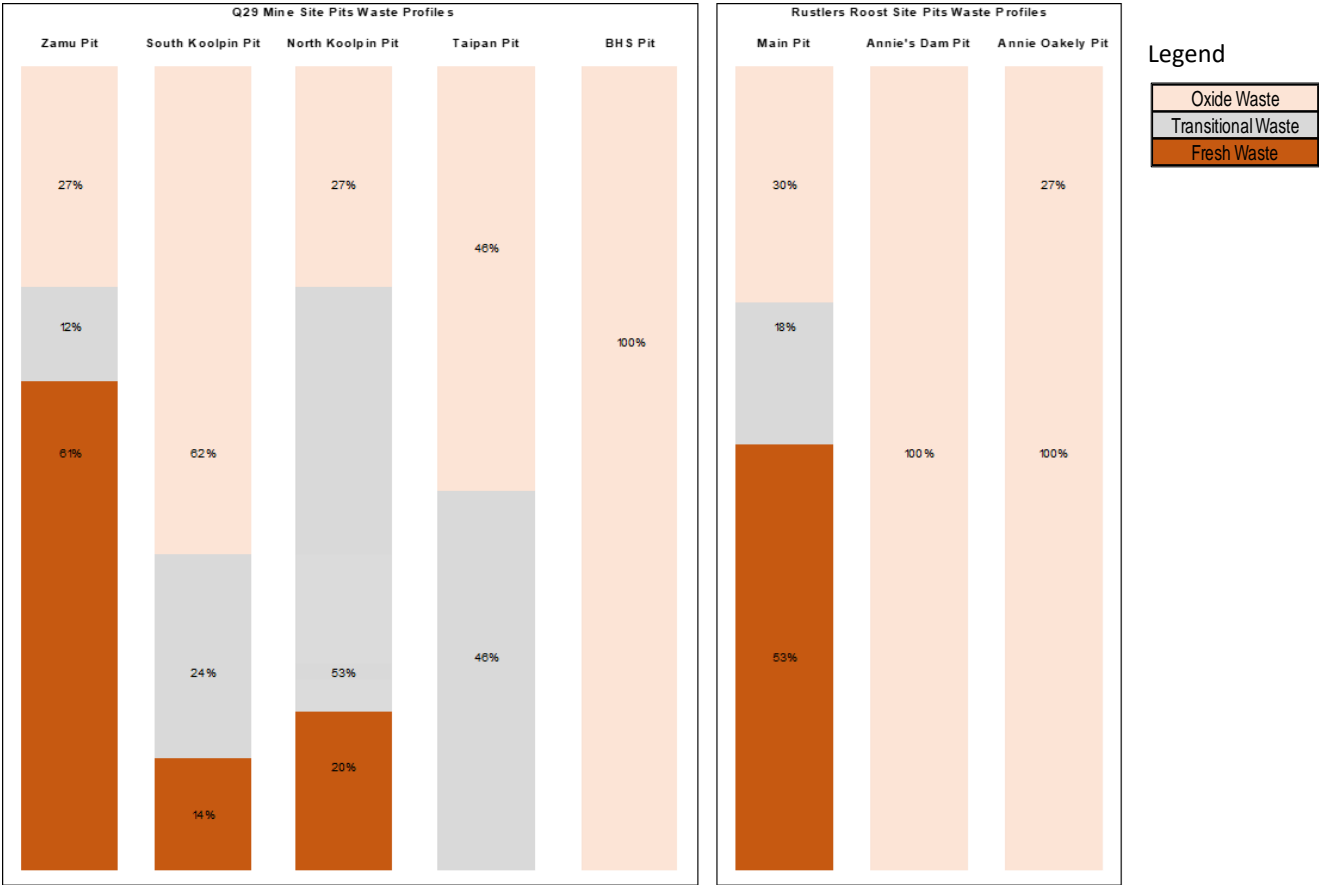


Figure 12 Project mined waste rock weathered profile volumes expressed as a percent of total pit waste

2.8.3 Pit dewatering

Dewatering of the pits will be undertaken through diesel powered in-pit sumps. Dewatering will occur as required because of direct precipitation from rain events and groundwater in-flow.

Pit dewatering from Q29 pits will involve water movements between pits during various stages of operation.

Pit dewatering from Rustlers Roost pit is approved under a WDL 247 issued by NT DEPWS on the 22 June 2021 which authorises for the discharge of wastewater from Rustlers Roost pit to Mount Bunday and Marrakai Creeks in the 2021 and 2022 wet season whilst the site is under care and maintenance. Once approval for operations is granted Rustlers Roost pit, Annie’s Dam pit and Annie Oakley pit dewatering will be to the tailings dam where it will be pumped back and reused in the Process plant. For any ongoing dewatering during operations requiring discharge to the environment will trigger an application to NT DEPWS for a separate WDL.

To reduce the site water storage and accommodate for stormwater containment during the rainy season, pit dewatering will be implemented at the start of mining (where water is present) and during mining using in-pit pumps. Dewatering will be implemented during mining as needed in response to direct precipitation events. This approach limits water contact with PAF material and reduces AMD generation potential, while also providing added storage for potential AMD

that may be generated during peak water periods. Pumped water will be reused in the mining process circuit or discharged to the surface water catchments under approved permits.

2.9 Domain 4 – Processing Infrastructure

Processing Plant and associated Infrastructure sub domains are located at Rustlers Roost and include:

Site: Rustlers Roost (ML 1083) **Sub domain/feature name:** CIL Process Plant, Conveyor and Crusher, Run of Mine Pad (ROM), Crib (mill), weigh bridge, Chemical stores.

2.9.1 CIL process plant and process water ponds

The processing facility will be located at the Rustler Roost site. The processing facility nominal throughput of 425 t per operating hour will amount to an annual production rate of 5 Mtpa a process recovery set at 85%.

Due to the high graphite content in some of the ore, the process requires crushing and milling, followed by a blanking stage to deactivate carbonaceous/graphite material, prior to the Resin in leach process to extract the gold. Cyanide is used in the leaching process for the gold extraction.

Tailings from the CIL circuit will be screened to recover Resin and then detoxification to remove residual cyanide then thickened at the processing facility prior to being pumped to the TSF for disposal.

The overall water demand for both sites is estimated to be approximately 6.5 GL year. Water supply is required for the following:

- Processing facility water requirements include reagent mixing, gravity concentrators, elution circuit, RO plant, vehicle wash-down, dust suppression and fire water.
- Raw Water: The raw water requirements for the processing facility is estimated to be 6.5 GL/yr. A raw water pond will be constructed at the processing facility for clean raw water supply. The raw water pond will be lined with and have an estimated capacity of 8,000 m³.
- Process Water: Two process water ponds will be constructed to supply process water as either clean water (cyanide free) or process water (cyanide traces). The clean process water pond will have a capacity of 26,000 m³ and will be lined. The process water pond will be lined and have a capacity of 6,000 m³.
- Potable Water: A camp water supply bore will be drilled and constructed within proximity to the accommodation village. The bore will supply fresh water and will be treated by reverse osmosis (RO) water treatment plant.
- Water will be required for dust suppression activities, estimated to be 500 m³/day. Annual water use required for dust suppressions has been calculated over a nine-month period at 0.13 GL, as very little dust suppression activities will be required during the high rainfall months of January to March.

2.9.1.1 Rustlers Roost water supply and system

Surface water catchment sources for Rustlers Roost includes the existing Annie's Dam, existing pit, raw water, process water, turkeys' nest and TSF decant pond catchments and stormwater runoff captured in the processing facility runoff pond. This water will supply the processing facility for raw water, process water and dust suppression activities.

Raw water supply will be sourced from surface water catchment sources including Annie's Dam, existing main pit, raw water, process water, turkeys' nest and TSF decant pond catchments, and stormwater runoff captured in the processing facility runoff pond. Groundwater may be sourced from a bore field to supply potable water (accommodation village, offices, ablutions, and safety shows), raw water, process water.

Water management systems at Rustlers Roost will comprise of an existing pit lake and dam, legacy heap leach ponds, raw water, process water, stormwater ponds and TSF decant water ponds.

Inflows include direct rainfall and catchment runoff and groundwater. Outflows include evaporation, seepage and pit overflows or dewatering. The below water management schematic) outlines the proposed water management system for Rustlers Roost during operations.

Water from the tailings dam will be recycled back to the mill using a decant turret system to extract the surface water without tailings and pump the water back to the process plant via tailings return pipeline. This will reduce the need for groundwater supply demands for operations. Potable water demand will continue to be sourced from groundwater.

2.9.1.2 Q29 Water supply and system

Surface water catchment sources for Q29 includes the five existing pits and heap leach ponds. Existing pit water will be used for dust suppression activities.

Current water management systems at Q29 comprise of the five existing pits and the heap leach ponds. Inflows include direct rainfall and catchment runoff and groundwater. Outflows include evaporation, seepage, and pit overflows / discharges. Active management of pit water during mining operations will involve the pumping of water from one pit into another in accordance with my scheduling. Water will continue to be pumped from the heap leach stormwater pond into BHS pit to prevent the stormwater pond overflowing until the heap leach ponds are rehabilitated.

2.9.2 Run of Mine (ROM)

The ROM will be built during the construction period. Non PAF oxide waste will be used to build the ROM. The ROM is an eastern extension of the process area. The landform will be construct to a nominal height of 11m and approximately 250 m by 360 m. The ROM will be battered down to 17° at the end of the mine life and topsoil spread over surface.

2.9.3 Chemical Stores

Chemical stores will include storage of the following chemical: Cyanide, Hydrochloric acid (HCL), Sodium Hydroxide (NaOH), Copper Sulphate CuSO_4 , Hydrogen Peroxide (H_2O_2), Blanking agent, Quicklime, Flocculent.

2.10 Domain 5 – Support Infrastructure

Mine support infrastructure sub domains are located at Rustlers Roost (ML 1083), Quest 29 (ML 29783) and (ML 29814) sites and include:

Site: Rustlers Roost (ML 1083) **Sub domain/feature name:** Mine Contractor Facility, Explosive Magazine, Mining area laydown/workshop/crib, Main offices/front gate/helipad (administration, management, safety, first aid, environment), Infrastructure (gas connections, power lines, pumps, pipes etc...), landfill, fences/gates.

Site: Q29 (ML 29783) **Sub domain/feature name:** Fuel storage and dispensing, Infrastructure (power lines, pumps, pipes etc...), Go line/crib, fences/gates.

Site: (ML 29814) **Sub domain/feature name:** Accommodation camp, Infrastructure (power lines, pumps, pipes etc...).

2.10.1.1 Explosive magazine

A small compound will be constructed to store explosives materials and components for blasting. Most of the explosives used at site will be trucked in daily from an external supplier located in Marrakai.

The magazines will hold packaged explosives and detonators. The magazine will be placed just south of the existing heap leach pad. This will give blast protection. PGL will apply for a magazine licence as required in accordance with NTG legislation.

The explosives compound will be approximately 27 m (w) x 86 m (l), within which there will be an explosives magazine, a detonator magazine, a 65,000 kg bulk emulsion tank and two cubed freight containers for storage of ammonium nitrate. The compound will be constructed to comply with Australian Standard AS2187 Explosives – Storage, transport, and use, which includes requirements for perimeter man-proof fencing and access restrictions, signage and surveillance monitoring, minimum separation distances between materials storages and construction of earth bunds around magazines. Pursuant to the NT Dangerous Goods act.

2.10.1.2 Landfill

The landfill will be constructed over 4 Ha to a depth of 5 metres and will be utilised throughout LOM. The landfill will be designed and constructed in accordance with the NT EPA Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory. Solid waste materials including non-putrescible commercial and industrial (C&I) waste, non-putrescible construction, and demolition (C&D) waste, green waste and limited hazardous waste in the form of contaminated soils will be placed in the landfill. Other hazardous wastes will not be landfilled onsite and will be taken from site by a licensed contractor to an authorised collection or licensed waste disposal facility.

2.10.1.3 Accommodation camp

The accommodation camp will be located on ML 29814 near the Arnhem Highway. This allows for more direct access to the primary external transportation route and enables connection to mains power, thus removing the requirement for diesel generators. The proposed accommodation camp layout area is provided in Figure 7.

2.10.1.4 Bulk fuel storage facility

A mobile doubled skin lined diesel tanks 2 x 68,000 litres will be kept at site. Dispensing will include 2 x bowser nozzles. The area will be dirt bunded.

Several other hazardous chemicals will be required during construction and operation of the Project. Hazardous material used in the processing facility and the estimated storage volumes are indicated in Table 14. The hazardous materials storage will be located within the designated processing facility area.

Table 14 Hazardous materials and storage volumes for processing activities

Hazardous Materials	Estimated Storage Volumes
Cyanide	165 m ³
Hydrochloric acid	70 m ³
Sodium hydroxide	30 m ³
Copper sulfate	10 m ³
Hydrogen peroxide	16.7 m ³
Blanking agent (diesel)	700 m ³
Quicklime	100 t
Flocculent	54.0 m ³
Activated carbon	Nil
Liquefied Petroleum Gas (LPG)	66 m ³
Smelting fluxes	4 t
Diesel fuel	68,000 L
ANFO	2,000 kg

2.11 Domain 6 – Haul Road and access roads

Site: Rustlers Roost (ML 1083) **Sub domain/feature name:** Haul Road and Access tracks on and off tenement

Site: Q29 (ML 29783) **Sub domain/feature name:** Haul Road and Access tracks on and off tenement

The processing plant at Rustlers Roost will receive ore via constructed haul roads for Annie's Pit, Annie Oakley pit and the main pit at Rustlers Roost (in total 3km x 20 metre width haul road) and from Quest 29 site pits (11km x 20 metre width haul road). Ore haulage from Quest 29 will enter Rustlers Roost and travel approximately 1.6 km metres along an internal haul road to the ROM Pad. Internal haul roads for heavy vehicles (HV) access will include between the pits and ROM pad, WRD's and workshop area.

The haul road alignment from Q29 to Rustlers Roost will follow the existing access track alignment which includes three drainage features. The old bridge and crossing near Rustlers Roost will be upgraded to the appropriate design criteria

to support ore haul trucks and other HV's. The bridge redesign and construction has been discussed and agreed with the consent of the leaseholder, to be available for mutual use.

On tenement, both sites have existing access tracks development and maintained as part of care and maintenance activities. These tracks will remain as light vehicle (LV) tracks created as part of operations, Off tenement, the existing access roads located between Quest 29 and Rustlers Roost (Haul Road alignment) and the accommodation camp area and Arnhem highway which will be used for LV access. The pastoral lease holder uses these tracks for pastoral activities.

Section 3 Closure Obligations and Commitments

The sources of existing closure obligations and commitments including a summary of percent completed is provided in Table 15.

Current legal obligations for rehabilitation and closure applicable to the Projects tenements have been identified and are provided in the Legal Obligations Register (Appendix C). The register outlines the rehabilitation and closure requirements in tenement conditions, Authorisations, MMPs, commitments, licences, permits and other documents/agreements.

The Project will take up the existing commitments and obligations for rehabilitation and closure, where relevant, and details of this is outlined in Section 9 of this MCP. The Legal Obligations Register will be regularly reviewed and updated to ensure that all closure and rehabilitation requirements are identified, assessed for ongoing applicability, and completed within appropriate timeframes.

Please note: Exploration activities currently underway on some of the Project's tenements are held under a separate Authorization (0979-01) and have commitments for rehabilitation and closure separate to this MCP. Further Quest 29 and Toms Gully Project Areas have other tenements held under their respective Care and maintenance authorizations which will also not form part of this Project. **The tenements which are relevant to this Project are in bold.**

Table 15 Summary of existing rehabilitation and closure obligations and commitments sources

Site	Source	Status	No. of Conditions	No. Completed	% Completed
Minerals Titles Act – Project related tenement conditions					
Rustlers Roost PA	Mineral Lease Conditions (ML 1083)	Granted: 1/01/2021 Expiry: 31/12/2045	0	NA	NA
Quest 29 PA	Mineral Lease Conditions (ML 29781, ML 29782, ML 29783 , ML 29785, ML 29786)	Granted: 06/02/2013 Expiry: 05/02/2023	0	NA	NA
Toms Gully PA	Mineral Lease Conditions (ML 29814 , ML 1058, ML 29812)	Granted: 06/02/2013 Expiry: 05/02/2023	0	NA	NA
Mining Management Act - Authorisations					
RUSTLERS ROOST	Authorisation 0738-01 (Variation 5)	Approved – 22/10/2020	0	NA	NA
Q29	Authorisation 0739-01 (Variation 3)	Approved – 08/03/2021	0	NA	NA
TGPA	Authorisation 0740-01 (Variation 4)	Approved –12/08/2020	0	NA	NA
Mining Management Act – Mining Management Plan					
RUSTLERS ROOST	PG RUSTLERS ROOST MMP 2018-2019 Care and Maintenance (DITT Doc ID MR2020/0297)	Approved – 22/10/2020	1	1	100%
	PG RUSTLERS ROOST MMP 2016-2017 Care and Maintenance (DITT Doc ID MR2018/0037)		19	5	26%
Q29	PG Q29 MMP 2019-2020 Care and Maintenance (DITT Doc ID MR 2020/0444)	Approved – 08/03/2021	1	1	100%
TGPA	PG Toms Gully MMP 2020 (<i>To be succeeded by MMP for the approved EIS underground mining operation</i>) (DITT Doc ID MR 2020/0353)	Approved - 12/08/2020	0	NA	NA
Mining Management Act - Mine Closure Plan					
RUSTLERS ROOST	Mining Closure Plan RUSTLERS ROOST 2020 (Version 2.0) (<i>To be succeeded by MCP for the approved EIS open cut redevelopment project</i>)	Acknowledgement - 2020	5	0	0%
Q29	Mining Closure Plan Q29 2019-2020 (Version 2.0) (<i>To be succeeded by MCP for the approved EIS open cut redevelopment project</i>)	Acknowledgement – 08/03/2021	7	0	0%
TGPA	Mining Closure Plan Toms Gully 2015	Acknowledgement - 2020	0	NA	NA
Aboriginal Sacred Sites Act – AAPA Authority Certificates					

Site	Source	Status	No. of Conditions	No. Completed	% Completed
RUSTLERS ROOST	AAPA Authority Certificate C93/153 Mining activities	Granted – 12/10/1993	0	NA	NA
Q29	AAPA Authority Certificate C98/147 Mining activities	Granted – December 1998	0	NA	NA
TGPA	AAPA Authority Certificate C2010/017 Mining activities	Granted – 15/01/2010	0	NA	NA
Formal NT and federal Environmental Assessment Reports					
RUSTLERS ROOST	<i>Environmental Assessment Act – Preliminary Environmental Report (Closure Commitments to be addressed where relevant in this MCP (following assessment and approval).</i>	Approved – 04/1997	13	2	15%
Q29	<i>Environmental Assessment Act - Preliminary Environmental Report (Closure Commitments to be addressed where relevant in this MCP (following assessment and approval).</i>	Approved - April 1999	14	5	36%
TGPA	<i>Environmental Assessment Act – Environmental Impact Statement.</i>	Approved 21/02/2020	0	NA	NA
Other – Agreements					
RUSTLERS ROOST	Agreement between Old Mount Bunday Pastoral Leaseholder and PGL applicable to rehabilitation and closure activities closure	Approved 22/06/2021	12	7	58%
Q29	No agreements applicable to rehabilitation and closure activities closure	NA	NA	NA	NA
TGPA	Agreement between Old Mount Bunday Pastoral Leaseholder and PGL for applicable to rehabilitation and closure activities closure	Signed – 02/2014	0	NA	NA

Section 4 Stakeholder Engagement

PGL is undertaking a comprehensive and an ongoing programme of stakeholder engagement for this Project to allow contribution to the closure planning process and to obtain agreement on the post mining land use. The following sections summarise consultation undertaken to date (2013-2021), the identified key stakeholders and future closure planning engagement.

Early stages of engagement with key stakeholders are critical to identifying an acceptable/agreed endpoint and pathways to achieve site closure and land relinquishment. PGL understands that expectations regarding the types and level of stakeholder engagement are not static and will shift according to the Project phase and the social, economic, and environmental conditions of the day.

PGL engaged the Darwin based CDM Smith Consultants as part of the EIS development to assist with identifying, engaging with key projects stakeholders and develop a Stakeholder Engagement Plan (SEP) for Rustler Roost and Quest 29 Project. The SEP will establish an overarching framework that identifies key stakeholders and the methodology for their engagement throughout the Project LOM to relinquishment.

As part of PGL's Closure planning, leading guiding principles have been developed or which the consultation principle states:

Key stakeholders are consulted regarding post-closure outcomes and activities are conducted to address stakeholder concerns as identified in the SEP'.

'Utilising the SEP outcomes and objectives will enable the delivery of achieving effective engagement throughout all Project stages LOM'.

A summary of the SEP key information including outcomes/objectives, key stakeholder groups, level of engagement, and the ongoing stakeholder programme in relation to closure planning is presented below. Further SEP details can be obtained from the EIS document.

Outcomes (CDM Smith , 2021)

Engagement for the Project is focused on achieving the following outcomes:

- All identified key stakeholders are appropriately informed of the Project;
- The Project environmental assessment is completed in a manner that is consistent with the EP Act;
- Stakeholders are provided with meaningful opportunities to participate in consultation for the Project.
- Traditional Owners feel as if they have been provided opportunities for meaningful engagement, that they have been listened to, and their culture and values respected; and
- The Project specific environmental risk assessment has been actively informed by the input and feedback received from stakeholders.

Objectives (CDM Smith , 2021)

The SEP aims to achieve outcomes by:

- Creating a structured process focused on;
 - Building trust and mutual understanding between PGL and Project stakeholders.
 - Addressing statutory stakeholder consultation requirements.
 - Meaningfully engaging with stakeholders, specifically with regards to the environmental assessment and approvals process.
- Providing opportunities for PGL to understand stakeholder values and expectations;
- Embedding the importance of using local contractors and employees as much as possible throughout the Project;
- Ensuring that Traditional Owners and Indigenous groups are engaged wherever possible;
- Securing stakeholder feedback that will be used as input for the environmental assessment process and to inform PGL's longer term activities and community involvement; and
- Aligning with PGL's Corporate approach to stakeholder engagement.

4.1 Key Stakeholder Groups

The groups and individual key stakeholders to the Project, as currently identified in the SEP, are listed in Table 16. Feedback with key items raised from public submissions from the Project referral documentation to the NT EPA is included in the SEP.

Stakeholder identification and analysis will continue throughout the life of the Project to ensure engagement continues to achieve the key consultation objectives of the Project, including those concerned with rehabilitation, closure, and relinquishment. This list is initial and as the Project develops, further key stakeholders may be introduced. The SEP is considered a 'live' document which will be reviewed and updated by PGL (CDM Smith , 2021) throughout LOM.

The key stakeholders to the Project are:

- Critical to the project and development process, such as decision -making authorities.
- Potentially directly impacted by the Project.
- Potentially indirectly impacted by the Project; and
- Not impacted by the Project but potentially interested in being kept informed of Project activities.

Table 16 Key Stakeholder Groups (CDM Smith , 2021)

Group	Stakeholders
Pastoral Stations/Lease Owners	<ul style="list-style-type: none"> • Old Mount Bunday Station • McKinlay River Station
Indigenous Stakeholders, Traditional Owners, or representative organisations	<ul style="list-style-type: none"> • Northern Land Council • Limilngan and Uqynmil Traditional Owners (Local Management Committees of the Mary River and Djukbinj National Parks)
Local and Regional Community	<ul style="list-style-type: none"> • Community members who reside or work in the Marrakai-Douglas Daly and greater Darwin area or surrounding region
Local and Regional Supplier and Business Organisations	<ul style="list-style-type: none"> • Marrakai-Douglas Daly-based suppliers • Darwin-based suppliers • Northern Territory Chamber of Commerce • Any companies who have registered their details in the ICN gateway
Local Government	<ul style="list-style-type: none"> • Unincorporated Marrakai-Douglas Daly (no dedicated city, shire, or council). • Local Government Association of the NT
Northern Territory Government Agencies	<ul style="list-style-type: none"> • Aboriginal Areas Protection Authority • Department of Environment, Parks and Water Security • Department of Health • Department of Industry, Tourism and Trade • Department of Territory Families, Housing and Communities • Department of Chief Minister and Cabinet • Northern Territory Police, Fire and Emergency Services
Territory and Federal Politicians	<p>State</p> <ul style="list-style-type: none"> • The Hon. Michael Patrick Francis Gunner MLA, Chief Minister • The Hon. Nicole Susan Manison MLA, Deputy Chief Minister • The Hon. Natasha Kate Fyles MLA, multiple ministerial titles • The Hon. Eva Dina Lawler MLA, multiple ministerial titles • The Hon. Luran Jane Moss MLA, multiple ministerial titles • The Hon. Selena Jane Malijarri Uibo MLA, multiple ministerial titles • The Hon. Paul Andrew Kirby MLA, multiple ministerial titles • The Hon. Kate Jane Worden MLA, multiple ministerial titles • The Hon. Chanston James Paech MLA, multiple ministerial titles <p>Federal</p> <ul style="list-style-type: none"> • The Hon. Warren Snowdon MP, Federal Member for Lingiari • The Hon. Sussan Ley MP, Federal Minister for the Environment
Federal Government	<ul style="list-style-type: none"> • Department of the Environment and Energy • Department of Defence (Mount Bunday Training Area)
Regional Agencies / Coordinating Bodies	<ul style="list-style-type: none"> • Regional Development Australia Northern Territory

Group	Stakeholders
Neighbouring Commercial Businesses and Local Operators	<ul style="list-style-type: none"> Allan King & Sons Construction Pty Ltd Boral Resources Limited Halkitis Bros Pty Limited Moussellis & Sons Pty Ltd Ostojic Group Pty Ltd Tomazos Group Pty Ltd Corroboree Park Inn Mary River Wilderness Retreat Bark Hut Inn Wildman Wilderness Lodge Point Stuart Wilderness Lodge
Interest Groups	<ul style="list-style-type: none"> Amateur Fishermen’s Association of NT (AFANT)
Public	<ul style="list-style-type: none"> General public

4.2 Level of Engagement


4.2.1 Engagement activities and tools

The SEP is aligned with the Project phases and has a multifaceted approach to ensure that engagement and communication with stakeholders is undertaken in an appropriate, accessible, and meaningful way.

The International Association for Public Participation (IAP2) principles that guide good community engagement, has been adopted by CDM Smith, as an approach for the Project is designed to inform, consult, and involve stakeholders Table 17.

Identifying potential or actual concerns and opportunities experienced by stakeholders during LOM are outlined in the SEP.

Table 17 IAP2 Levels of Engagement (Sourced: (CDM Smith , 2021)

	Level of Engagement	Stakeholder Level	Approach to the Community and Stakeholders
	Inform	1, 2 and 3	PGL will aim to keep stakeholders informed
	Consult	1, 2 and 3	PGL will keep stakeholders informed, listen to, and acknowledge concerns and aspirations, and provide feedback on how stakeholder input influenced the decision.
	Involve	1 and 2	PGL will work with stakeholders to ensure that their concerns and aspirations are directly reflected in the assessment completed and control measures employed and provide feedback on how stakeholder input influenced decision.
	Collaborate	1	PGL will look to stakeholders for advice and innovation in formulating solutions and incorporate their advice and recommendations into the decisions to the maximum extent possible.

Level of Engagement	Stakeholder Level	Approach to the Community and Stakeholders
Empower	1	PGL will implement relevant stakeholder decisions where appropriate and feasible.

The levels of engagement and communication as defined in the SEP include General, Targeted, Individualised, Regulatory engagement levels and the activities which may be used to engage dialogue concerning mine closure are described in Table 18.

Social media is an essential platform for all stages of engagement, and it may be preferred by some stakeholders, PGL will in the first instance undertaken all online engagement via the project website. Individual face to face engagement and /or phone/email particularly with Darwin based regulatory authorities, and the local community including Traditional owners, Pastoral Leases Owners and the Marakai Community is preferred and a reliable level of engagement base on prior engagement experience since 2013. The need to utilise other social media tools will be reviewed and assessed as the Project progresses. Following the initial stakeholder feedback of the MCP, confirmation will be provided on the proposed postmining land use, closure objectives and completion criteria.

Table 18 Engagement activities and tools (CDM Smith , 2021)

Group	IAP2 Stakeholder Level	Engagement Level	Potential Engagement activities¹
Pastoral Stations/Lease Owners	Level 1	Individualised	<ul style="list-style-type: none"> • One-on-one meetings • Ongoing communication via email, phone etc. • Statutory consultation period (General) • Website (General)
Indigenous Stakeholders, Traditional Owners, or representative organisations	Level 1	Individualised	<ul style="list-style-type: none"> • Ongoing communication via email, phone etc. • One-one-one meetings (where relevant) • Partnerships with employment agencies / contractors • Statutory consultation period (General) • Website (General) • Media releases and media appearances (General)
Interest Groups	Level 3	Individualised	<ul style="list-style-type: none"> • Ongoing communication via email, phone etc. • One-one-one meetings (where relevant) • Website (General)
Local Government	Level 1	Regulatory	<ul style="list-style-type: none"> • Communication via email, phone etc. (where enquiry received) • Statutory consultation period (General) • Website (General)

¹ Note – these are potential engagement activities and not all activities may be undertaken for each stakeholder group. For example, should communication via email be considered sufficient to convey project understand and obtain necessary feedback, a one-on-one meeting may not be warranted.

Group	IAP2 Stakeholder Level	Engagement Level	Potential Engagement activities ¹
Local and Regional Community	Level 2	General	<ul style="list-style-type: none"> • Communication via email, phone etc. (where enquiry received) • Statutory consultation period (General) • Website (General) • Media releases and media appearances (General)
Local and Regional Supplier and Business Organisations	Level 3	General	<ul style="list-style-type: none"> • Partnerships with employment agencies / contractors • Statutory consultation period (General) • Website (General) • Media releases and media appearances (General)
Neighbouring Commercial Business & Local Operations	Level 3	General	<ul style="list-style-type: none"> • Communication via email, phone etc. (where enquiry received) • One-one-one meetings (where relevant) • Partnerships with employment agencies / contractors • Ongoing email / phone communication
Territory and Federal Politicians	Level 3	General	<ul style="list-style-type: none"> • Communication via email, phone etc. (if required) • Statutory consultation period (General) • Website (General) • Media releases and media appearances (General)
The Public	Level 3	General	<ul style="list-style-type: none"> • Communication via email, phone etc. (where enquiry received) • One-one-one meetings (where relevant) • Ongoing email / phone communication
Northern Territory Government Agencies	Level 1	Regulatory	<ul style="list-style-type: none"> • One-on-one meetings • Technical meetings and briefings if required following review • Formal agency comments period • Ongoing email / phone communication • Website (General) • Media releases and media appearances (General)
Federal Government	Level 1	Regulatory	<ul style="list-style-type: none"> • Communication via email, phone etc. • Technical meetings and briefings (if required) • Website (General)

4.2.2 Monitoring and Evaluation

As part of implementing the SEP, a record of all stakeholder engagement throughout the Projects LOM will be maintained in a Stakeholder Engagement Register (SER) (Appendix A). The SEP will be regularly reviewed which will form part of the Projects Environmental Management System. PGL will ensure summary of this engagement in publicly available documentation and will also nominate a company representative to oversee the implementation, regular review, and continuous improvement of the SEP.

PGL aims to remain alert and sensitive to any changes in public perception of the Project and will continue to investigate, define, and discuss any issues with relevant stakeholders.

The SER will document all engagement, communications and action feedback, meetings and workshop minutes, stakeholder discussions and comments, so that PGL can accurately monitor and report on potential issues and risks and plan for further consultation. Some engagement and communication with stakeholders may be done in confidence, particularly with traditional owners, lease holders around land access negotiations, and will be identified as such in the SER.

PGL commenced engagement with the pastoral lease's holders (Old Mount Bunday Station and McKinlay River Station) with the purchase of the respective Mount Bunday tenements in 2013. The initial communications enabled their early involvement in the sites care and maintenance and exploration activities. This collaboration has been pivotal with the development and sustaining relationships PGL has now with both pastoral leaseholders and the regional community.

PGL conducted extensive consultation as part of the Toms Gully EIS process which included many of the same stakeholder groups during the formal stakeholder programme appreciates the importance of targeted engagement and this consultation approach has been considered as part of the SEP development considering both the context and the value of a targeted and pragmatic engagement programme. (CDM Smith , 2021).

4.3 Stakeholder Consultation Programme

Prior to the next revision of this Mine Closure Plan and to maintain an effective SEP and its relevance over the medium and long term, PGL will meet with key stakeholders following the initial feedback on the MCP to discuss and incorporate any feedback on the post-mining land use, closure objectives and completion criteria. This feedback will be included in the SEP action plan for implementation. To maintain an effective SEP and its relevance over the medium and long term, PGL will record information on the SEP during the Projects LOM and this engagement information will included follow further MCP iterations.

PGL aims to remain alert and sensitive to any changes in public perception of the Project and will continue to investigate, define, and discuss any issues with relevant stakeholders.

Stakeholder consultation phases and progress is summarised below and in Table 19.

2013 – 2021 Pre-EIS Site investigation and Survey Stage including care and maintenance and exploration activities

2021 - draft EIS Development Stage (including project planning and feasibility)

2021-2022 -Post draft EIS stage (Supplement Stage)

2022 - Notification of approval and conditions

2022 - Construction Stage

2022 - 2031 -Operational Stage

2031-2041 -Decommissioning and Closure/Post Closure

Table 19 Stakeholder Engagement Consultation Phases (CDM Smith , 2021)

Stage	Description	Who	Activities	Progress
Pre-EIS Site Investigation and Survey Stage	<ul style="list-style-type: none"> Initial regulatory engagement to outline the project and confirm necessary inclusions in the assessment; and Early engagement with pastoral leaseholders regarding proposal. 	<ul style="list-style-type: none"> Pastoral Stations/Lease Owners Northern Territory Government Agencies 	<ul style="list-style-type: none"> Communication via email, phone etc. One-on-one meetings 	Complete
Draft EIS Development Stage	<ul style="list-style-type: none"> Activities to improve general stakeholder awareness of the project and avenues for providing input. Targeted engagement and communications specific to stakeholder groups. Targeted engagement and communication activities designed to gain specific feedback to inform the Draft EIS. 	<ul style="list-style-type: none"> Pastoral Stations/Lease Owners Indigenous Stakeholder and Traditional Owners Northern Territory Government Agencies Local and Regional Community Territory and Federal Politicians Federal Government Neighbouring Commercial Businesses and Local Operators Interest group(s) (AFANT) 	<ul style="list-style-type: none"> Communication via email, phone etc. One-on-one meetings Technical meetings and briefings Website (General) Media releases (General) 	Complete
Post-Draft EIS Stage (Supplement Stage)	<ul style="list-style-type: none"> Update the Stakeholder Engagement Plan as necessary; and Undertake additional targeted consultation as necessary to address specific issues raised in comments on the Draft EIS. 	<ul style="list-style-type: none"> Pastoral Stations/Lease Owners Indigenous Stakeholder and Traditional Owners Northern Territory Government Agencies Local and Regional Community Territory and Federal Politicians Federal Government Neighbouring Commercial Businesses and Local Operators Interest group(s) (AFANT) 	<ul style="list-style-type: none"> Communication via email, phone etc. One-on-one meetings Technical meetings and briefings Website (General) 	Planned

Stage	Description	Who	Activities	Progress
Notification of Approval and Conditions	<ul style="list-style-type: none"> Update the Stakeholder Engagement Plan as necessary. Undertake activities to inform stakeholders of the approval and conditions; and Provide information to stakeholders on the next steps and project schedule. 	<ul style="list-style-type: none"> Pastoral Stations/Lease Owners Indigenous Stakeholder and Traditional Owners Northern Territory Government Agencies Local and Regional Community Territory and Federal Politicians Federal Government Neighbouring Commercial Businesses and Local Operators Interest group(s) (AFANT) Local and Regional Supplier and Business Organisations Public 	<ul style="list-style-type: none"> Communication via email, phone etc. Website (General) 	Planned
Construction Stage	<ul style="list-style-type: none"> Update the Stakeholder Engagement Plan as necessary; and Early notification to key potentially affected stakeholders (e.g., local community) of project construction commencement and actions being implemented to manage risks; and Undertake stakeholder and community engagement as required to satisfy approval conditions and achieve compliance with statutory obligations for construction. Provide general awareness of the avenues for stakeholder complaints. 	<ul style="list-style-type: none"> Pastoral Stations/Lease Owners Indigenous Stakeholder and Traditional Owners Northern Territory Government Agencies Local and Regional Community 	<ul style="list-style-type: none"> Communication via email, phone etc. One-on-one meetings Website (General) 	Planned

Stage	Description	Who	Activities	Progress
Operational Stage	<ul style="list-style-type: none"> Update the Stakeholder Engagement Plan as necessary; and Undertake stakeholder and community engagement as required to satisfy approval conditions and achieve compliance with statutory obligations for the operation. Undertake activities to maintain community and stakeholder awareness regarding avenues for project information and complaints. 	<ul style="list-style-type: none"> Pastoral Stations/Lease Owners Indigenous Stakeholder and Traditional Owners Northern Territory Government Agencies Local and Regional Community 	<ul style="list-style-type: none"> Communication via email, phone etc. One-on-one meetings Website (General) 	Planned
Decommissioning	<ul style="list-style-type: none"> Update the Stakeholder Engagement Plan as necessary; and Notification of closure of the facility to relevant stakeholders. Inform local and regional community of ongoing site management following closure. 	<ul style="list-style-type: none"> Pastoral Stations/Lease Owners Indigenous Stakeholder and Traditional Owners Northern Territory Government Agencies Local and Regional Community 	<ul style="list-style-type: none"> Communication via email, phone etc. One-on-one meetings Website (General) 	Planned

Section 5 Post Mining Land Use and Closure objectives

The guidelines for Preparing Mine Closure Plans requires for the determination of a post mining land use with consideration of the following points (DMIRS, 2020).

- ❖ Relevant to the environment in which the mine will operate or is operating ✓
- ❖ Achievable in the context of post-mining land capability ✓
- ❖ Acceptable to the key stakeholder ✓
- ❖ Ecologically sustainable in the context of the local and regional environment ✓

In determination of the post mining land use objectives and closure criteria, the above points were considered in line with the recognition of the existing land uses and previous disturbances.

Mining and cattle grazing are locally and regionally widespread including Adelaide River, Jabiru, and Pine Creek and further afield in the larger Darwin and Katherine regions.

The Project area and surrounding region and underlying tenure is for pastoral activities including the McKinlay River PL (PPL 1184), and Old Mount Bunday PL (PL 1163) stations. The immediate land surrounding the mines are solely used for beef cattle grazing on unimproved pasture. Mining in the Project area and region has also occurred over the last 80 - 100 years for extractives, hard rock mining (open cut and underground), and alluvial activities.

5.1 Post mining land use

This Projects post mining land use key objective is:

Develop a self-sustaining, stable, non-polluting environment with natural habitats compatible with pastoral use.

Achieving this post-mining land use will require that:

- Removal of all infrastructure unless appropriate stewardship can be established.
- All domains are made safe, geotechnically stable and non-polluting.
- Restriction of access to potentially unsafe areas with fencing and/or bunding and signage around constructed domains.
- Reinstatement of surface drainage patterns consistent with the regional drainage patterns.
- Revegetation of disturbed areas (Domains) including contouring, and drainage, ripping, seeding with suitable vegetation communities comprising local species which reflect the surrounding vegetation, topography, and surrounding land use.

The proposed end land use will require further discussion with key stakeholders as per the stakeholder Engagement Plan outlined in Section 4.

5.1.1.1 What will the end land use look like?

The open pits, waste rock dumps and tailings dam will remain as the dominant features at closure. Fencing will be placed around rehabilitated features to prevent cattle access until the sites have been revegetated, established, and been demonstrated through monitoring that the landforms are stable. Cattle grazing will recommence in areas not disturbed by Project activities. Open pits are likely to be accessed as a water source for livestock or irrigation use (if water quality permits). Further studies will need to be completed to determine pit water quality suitable for stock drinking. Ongoing closure planning and key stakeholder engagement will include identification of any mine infrastructure to remain post closure (i.e., fences, ponds, roads, buildings, camp area). Formal agreements with post-mining land users will also be established confirming that they assume on-going responsibility for any remaining infrastructure.

The future for the Project area and region is to continue pastoral activities, ensuring collaboration with the agricultural and mining industry to sustainable grazing and pasture management.

5.2 Project Closure Objectives

Closure objectives and closure criteria have been determined for the entire Project and for each domain.

Broad project closure objectives and closure criteria were determined (Table 20) for the entire Project and involve formalised ownership, responsibility, and ongoing management agreements at closure for the agreed post-mining land use. They set a framework for measuring and determining final closure for whole of Project and formulate detailed completion criteria for ongoing review.

Specific closure objectives and closure criteria were determined for each Domain (Table 21) and outline discrete geophysical and geochemical characteristics and infrastructure that require specific rehabilitation treatments, rehabilitation objectives, and closure criteria to achieve the final land use.

Closure objectives and closure criteria will be refined following ongoing stakeholder consultation throughout LOM and as more information is made available regarding the Project and its environment.

Table 20 Project closure objectives

Aspect	Broad Project Objectives
Health and Safety	Protect the health and safety of employees and community and leave the site free of hazards after closure.
Compliance	Rehabilitation and closure activities are compliant with applicable legislation, authorisations, licences, permits and commitments.
Consultation	Engage with and incorporate the concerns and interests of all relevant stakeholders into LOM closure planning.
Financial	Ensure adequate financial provision is in place for all closure liabilities which maximise benefits and minimise costs.

Aspect	Broad Project Objectives
Corporate Governance	Manage closure objectives through a structure of rules, practices and processes for effective planning and management outcomes. Relinquish the site with no outstanding legal or social liability.
Post-Mining Land Use	Formalised ownership, responsibility, and ongoing management agreements at closure for the agreed post-mining land use. To ensure all Project Domains are decommissioned and rehabilitated in an ecologically sustainable manner.
Contamination	Contaminated soil/waters treated, remediated and or disposed of appropriately throughout LOM and in accordance with applicable legislation and guidelines.
Landforms	Landforms are geotechnically safe, stable, non-polluting, erosion resistant functioning landform that does not present an unacceptable risk to environmental values and/or human receptors.
Rehabilitation	Rehabilitate disturbed areas to support a self-sustaining vegetation and habitats similar to surrounding areas and the agreed post-mining land use.
Fauna	Protect fauna through LOM and leave the site free of hazards after closure.
Waste	Implementation of the waste hierarchy throughout LOM and in accordance with applicable legislation and guidelines.
Surface Water	Surface drainage patterns are reinstated or managed where practicable to be consistent with the regional drainage function. Post-mining surface water quality does not adversely impact the surrounding catchments beneficial uses and land uses.
Groundwater	Groundwater hydrological processes and water quality are not adversely affected resulting in adverse impact to regional groundwater uses. Post-mining groundwater quality does not adversely impact the surrounding groundwater area beneficial uses.

5.3 Closure Domains

A domains-based closure planning method has been adopted for this Project.

Seven domains have been identified at this stage of the closure process and their footprints are illustrated in Figure 13, Figure 14, and Figure 15.

Domain 1 -Waste rock dumps, Domain 2 -Tailing’s storage facility, Domain 3 -Hard Rock open pits, Domain 4 – Processing Infrastructure, Domain 5 – Support Areas, Domain 6 - Haul Road and access roads, and Domain 7 - Existing mine disturbances.

5.4 Domain Closure Objectives

Closure objectives for each domain are summarised in Table 21

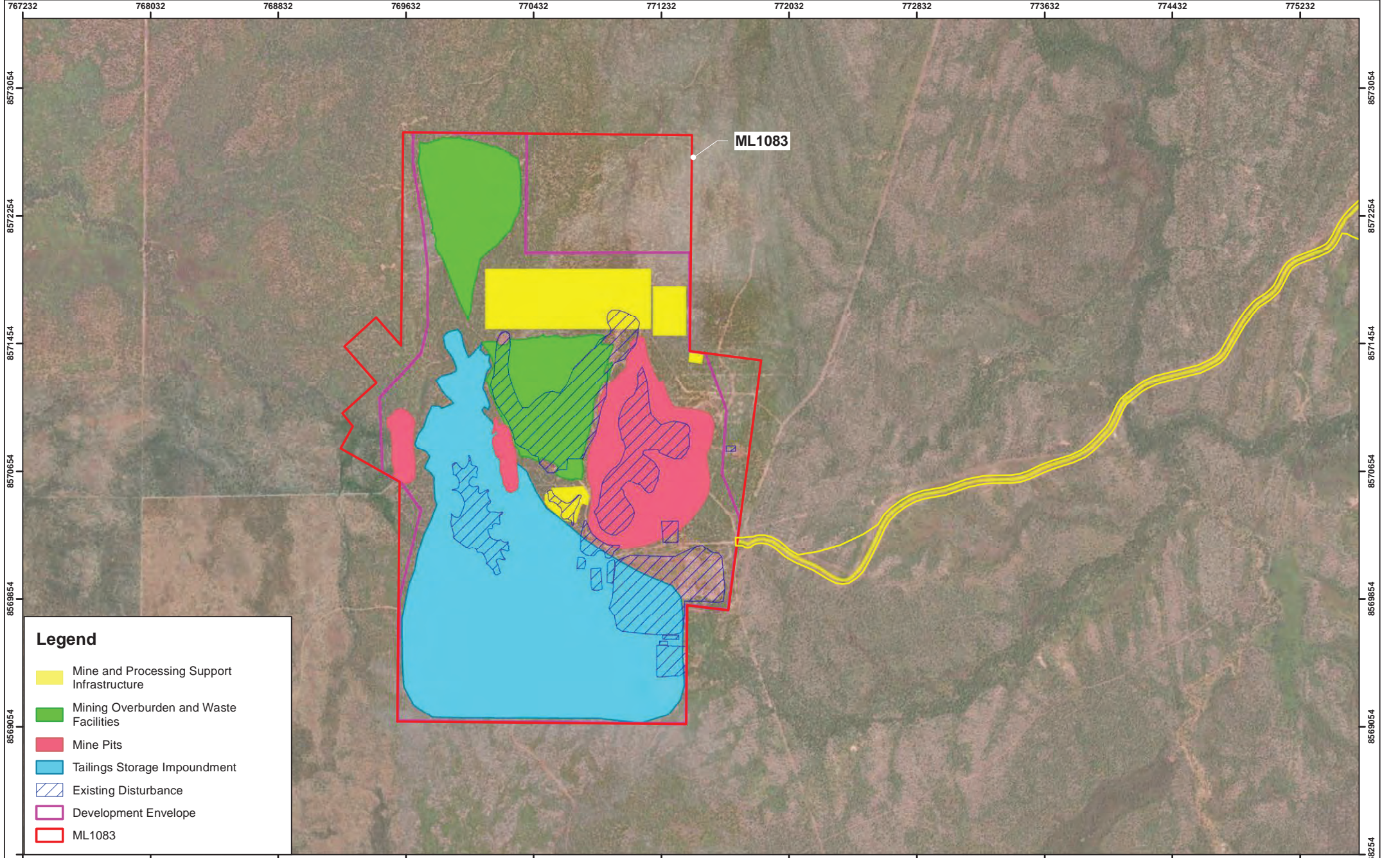
Table 21 Domain closure objectives

Element	Sub Domain(s)	Objectives
Domain 1 - Waste rock dumps		
Mining Overburden and Waste Facilities	South WRD	<ul style="list-style-type: none"> Final WRD designs and construction are structurally and geotechnically safe, stable, and non-polluting erosion resistant landforms. WRD's are contoured, vegetated, stable and functioning landforms reflecting a regional ecosystem/landscape and meet post-mining land use Surface water quality and seepage is not adversely affected resulting in adverse impact to terrestrial and aquatic ecosystems and land uses. Groundwater hydrological processes and water quality are not adversely affected resulting in adverse impact to regional groundwater uses.
	North WRD	
	Zamu WRD	
	North Koolpin WRD	
	South Koolpin WRD	
	Taipan WRD	
Domain 2 – Tailings Storage Facility		
Mining overburden and waste facilities	Tailing storage facility	<ul style="list-style-type: none"> Final TSF designs and construction are structurally and geotechnically safe, stable, non-polluting, erosion resistant, self-sustaining, and constructed to achieve maximum water shedding and limit infiltration. All TSF infrastructure (tailings and return pipelines, turrets) are removed. TSF cover and pipeline alignment is revegetated to a stable, resilient, and functioning landforms reflecting a regional ecosystem/landscape which meets an agreed post-mining land use. Surface water quality and seepage is not adversely affected resulting in adverse impact to terrestrial and aquatic ecosystems and land uses.

Element	Sub Domain(s)	Objectives
	Tailing line and recycled water return line	<ul style="list-style-type: none"> Groundwater hydrological processes and water quality are not adversely affected resulting in adverse impact to regional groundwater uses.
Domain 3a – Open Pit Voids		
Mined pits	Main pit	<ul style="list-style-type: none"> Final pit design is structurally and geotechnically safe, stable, and non-polluting, and entry is restricted.
	BHS pit	<ul style="list-style-type: none"> Post-mining groundwater hydrological processes and water quality are not adversely affected resulting in adverse impact to local and regional groundwater uses and ground water beneficial uses.
	North Koolpin pit	<ul style="list-style-type: none"> Pit lake water is of a quality that will not adversely affect local terrestrial and surface water beneficial uses.
	South Koolpin pit	
Domain 3b – Backfilled Pit Voids		
Mined pits	Annie Oakley pit	<ul style="list-style-type: none"> Backfilled final pit designs and construction are structurally and geotechnically safe, stable, non-polluting, erosion resistant, self-sustaining, and constructed to achieve maximum water shedding and limit infiltration. Post-mining groundwater water quality is not adversely affected whereby causing impact to the surrounding ground water and surface water beneficial uses. Ensure correct placement of NAF and PAF waste rock with pit shell to manage contact with atmospheric oxygen. Pit covers is vegetated to a stable, resilient, and functioning landforms reflecting a regional ecosystem/landscape which meets an agreed post-mining land use.
	Annie's Dam pit (backfilled with overburden and incorporated into TSF footprint)	
	Zamu pit (Backfilled with waste from other Q29 pits)	
	BHS oxide pit (backfilled with Q29 heap leach material)	
Domain 4 – Processing Infrastructure		
Processing Infrastructure	CIL Process plant area/crusher/chemical stores	<ul style="list-style-type: none"> All process infrastructure is removed (unless agreed to retain with key stakeholders). Waste and contamination removed/remediated, and landscape stable, non-polluting, erosion resistant, and self-sustaining.
	Water ponds	

Element	Sub Domain(s)	Objectives
	Crib (mill) Weigh bridge Run of mine pad (ROM)	<ul style="list-style-type: none"> • Mine infrastructure footprint is revegetated to a stable, resilient, and functioning landforms reflect the agreed post-mining land use.
Domain 5 – Supporting Areas		
Support Areas - Rustles Roost site	Mine contractor facility Explosive magazine Mining area laydown and workshop Bulk fuel storage area Infrastructure (gas connection, power lines, pumps, pipes etc...) Landfill Fences/gates/bridges/culvert crossings Administration office, front gate, helipad/ERT	<ul style="list-style-type: none"> • All support infrastructure is removed (unless agreed to retain with key stakeholders). • Contamination removed/remediated, and landscape stable, non-polluting, erosion resistant, and self-sustaining. • Mine infrastructure footprint is revegetated to a stable, resilient, and functioning landforms reflect the agreed post-mining land use.
Support Areas -Quest 29 site	Fences/gates/culvert crossings Go line/crib Infrastructure (power lines, pumps, pipes)	
Support Areas -Camp	Accommodation camp area Infrastructure (power lines, pumps, pipes) Fences/gates	
Domain 6 Haul Roads and Access Roads		
	Haul road	

Element	Sub Domain(s)	Objectives
Processing infrastructure and	Access roads	<ul style="list-style-type: none"> Haul roads and access roads removed (unless agreed to retain with key stakeholders), contamination remediated, stabilised and rehabilitated to reflect the agreed post-mining land use.
Domain 7 Existing mine disturbances		
Rustlers Roost site: Existing mine disturbances	Rustlers Roost heap leach pads x 2	<ul style="list-style-type: none"> Existing mine disturbances to be expanded and re-mined, or fully decommissioned, removed, contamination remediated and rehabilitated to reflect the agreed post-mining land use (unless agreed to retain with key stakeholders).
	Rustlers Roost heap leach ponds x 3	
	CIL/RIL tanks large steel tanks (2)	
	WRD (south)	
	Main pit	
	Footings (administration office, accommodation camp, Process plant, magazine, crusher area)	
	Waste rock area	
	Silt trap from ROM	
Quest 29 site ; Existing mine disturbances	Q29 Heap leach pad x 2 and ponds x 3	
	BHS open cut pit, Zamu oxide pit, North Koolpin pit, South Koolpin pit, Taipan oxide pit	
	Zamu oxide WRD, North Koolpin oxide WRD, South Koolpin oxide WRD, Taipan oxide WRD	
	CIL plant and footings	

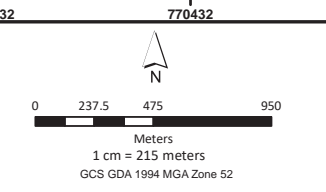


Legend

- Mine and Processing Support Infrastructure
- Mining Overburden and Waste Facilities
- Mine Pits
- Tailings Storage Impoundment
- Existing Disturbance
- Development Envelope
- ML1083

R	Details	Date
1	Final	09/09/21
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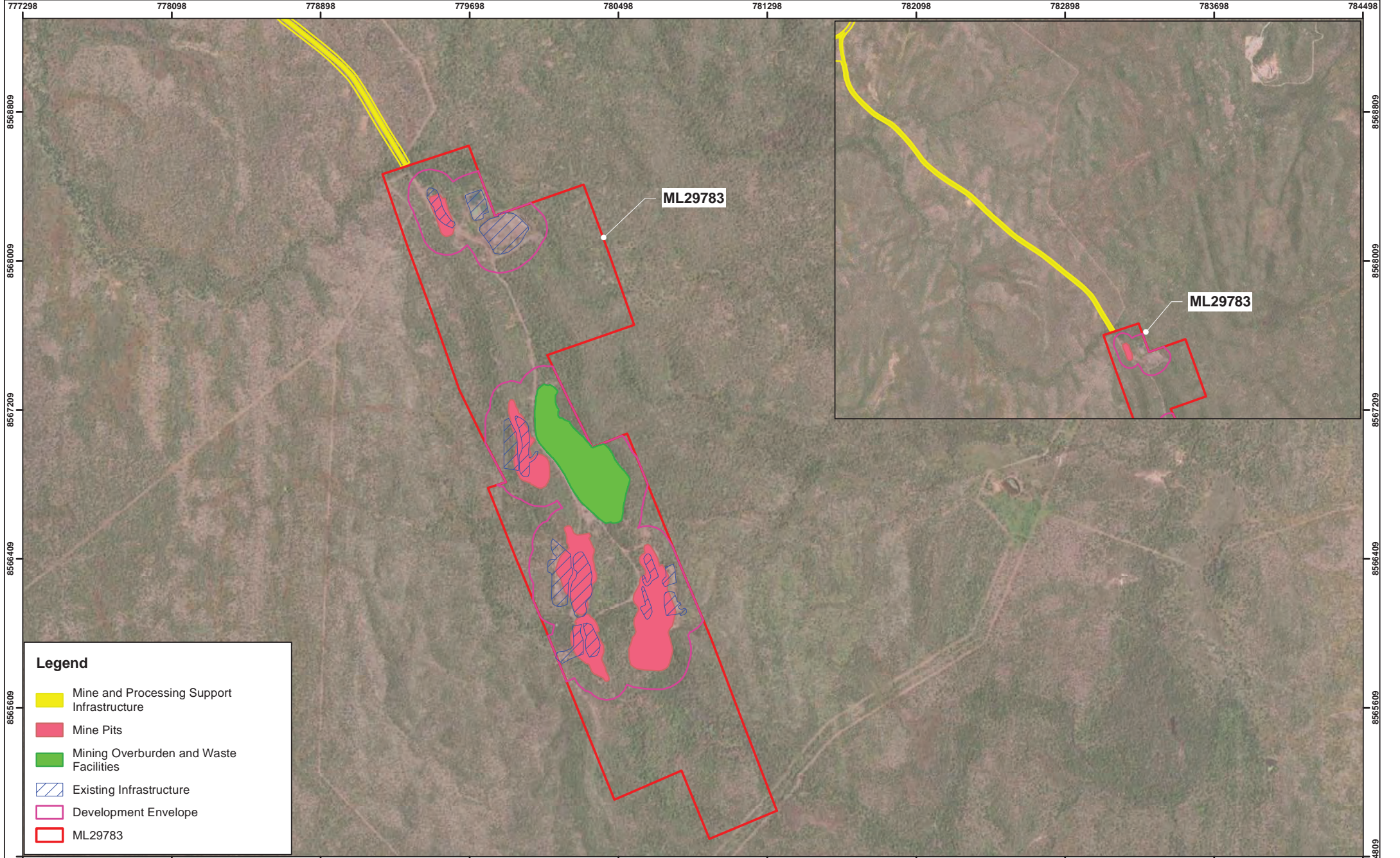
DATA SOURCE
 NT Government Open Source Data









FIGURE 13

**Closure Domains Overview A
 - Rustlers Roost**

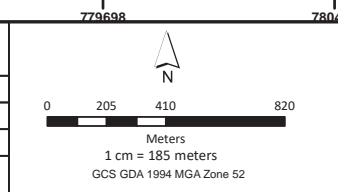
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- Legend**
-  Mine and Processing Support Infrastructure
 -  Mine Pits
 -  Mining Overburden and Waste Facilities
 -  Existing Infrastructure
 -  Development Envelope
 -  ML29783

R	Details	Date
1	Final	07/09/21
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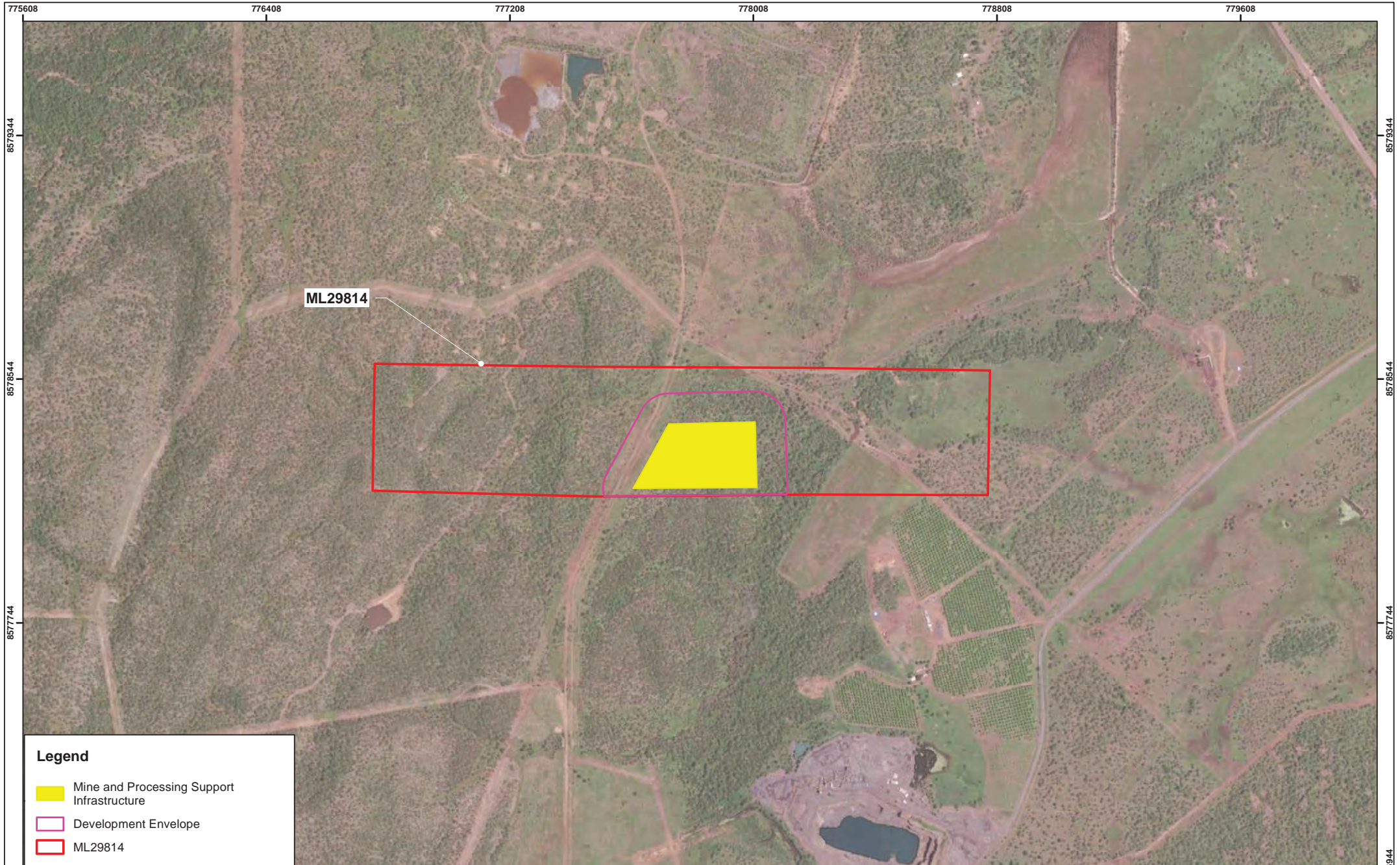
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Figure 14

Closure Domains Overview B – Quest 29

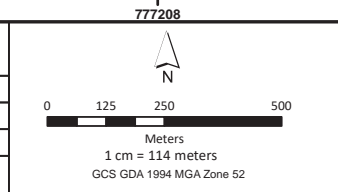
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- Legend**
- Mine and Processing Support Infrastructure
 - Development Envelope
 - ML29814

R	Details	Date	
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Figure 15

Closure Domains Overview C – Accommodation Camp

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Section 6 Closure outcomes and completion criteria

6.1 Completion Criteria

Completion criteria are used to demonstrate the success of rehabilitation and mine closure and to confirm that the closure outcomes have been met. These criteria are designed to allow effective reporting and auditing to define an endpoint for mine closure activities.

For each identified closure outcome, a set of closure indicators (qualitative), completion criteria (quantitative/measurable targets) and measurement tools for assessing performance have been developed. Completion criteria have been determined in accordance with the MCP Guidelines, following the S.M.A.R.T principle (ANZMEC/MCA 2000) and are:

- **Specific** enough to reflect a unique set of environmental, social, and economic circumstances.
- **Measurable** to demonstrate that rehabilitation is trending towards analogue indices.
- **Achievable** or realistic so that the criteria being measured are attainable.
- **Relevant** to the outcomes that are being measured and the risks being managed and flexible enough to adapt to changing circumstances without compromising outcomes; and
- **Time-bound** so that the criteria can be monitored over an appropriate time frame to ensure the results are robust for ultimate closure completion.
- The completion criteria for the Project have considered the following factors:
 - Public safety.
 - Regulatory requirements.
 - Expectations of stakeholders.
 - Geotechnical stability and the suitability of final landforms
 - Water quality and beneficial use; and
 - Post-closure land use objectives.

The proposed completion criteria in Table 22 will continue to be refined during future revisions of the MCP in consultation with stakeholders and will consider the ongoing performance and the findings of any technical assessments or audits. The agreed closure criteria will enable a quantitative assessment of the Project to indicate whether closure objectives have been or are likely to be achieved.

Table 22 Proposed project completion criteria

Factors	Closure Objective	Indicative Completion Criteria	Completion Criteria (Quantitative)	Measurement Tools
Health and Safety	Protect the health and safety of employees and community and leave the site free of hazards after closure.	Employee and public community safety is included in all closure planning, designs and closure management/monitoring programmes.	Zero lost-time injuries including high potential incidents throughout closure and post closure. 100% of all closure planning, designs and closure management/monitoring programmes include health and safety of all employees and public in the risks assessment process.	Health and Safety Register. Safety Inspections. Annual Rehabilitation/Compliance Audit. Annual Reporting via MMP.
Compliance	Rehabilitation and closure activities are compliant with applicable legislation, authorisations, agreements, licences, permits and commitments.	All applicable rehabilitation and closure obligations are met.	All requirements in the Legal Obligations Register are 100% completed.	Annual Rehabilitation/Compliance Audit. Annual Reporting via MMP.
Consultation	Engage with and incorporate the concerns and interests of all relevant stakeholders into LOM closure planning	All relevant and significant stakeholders identified, and all consultation obligations and commitments met.	Closure Outcomes and Completion Criteria and post-mining land use are agreed with stakeholders at least 6 months prior to commencing planned closure.	Stakeholder Register. Ongoing Stakeholder Consultation. Annual Rehabilitation/Compliance Audit.
Financial	Ensure adequate financial provision is in place for all closure liabilities which maximise benefits and minimise costs.	Closure financial provision addresses all current obligations and associated costs, including studies, monitoring, remediation, and applicable risk provisions.	Closure financial model reviewed annually, or as required as circumstances change, and all current obligations and associated costs at closure are $\pm 15\%$ within two years of closure.	Obligation's register. Closure task register. Closure cost/financial model. Competent person assurance review. External audit assurance.

Factors	Closure Objective	Indicative Completion Criteria	Completion Criteria (Quantitative)	Measurement Tools
Corporate Governance	Manage closure objectives through a structure of rules, practices and processes for effective planning and management outcomes. Relinquish the site with no outstanding legal or social liability.	All operational performance is met by effective corporate governance and leadership.	Corporate Governance is measured against PGLs guiding principles to direct the Project.	Obligation's register. Closure task register. Closure cost/financial model. Mine Management Plans. Annual Rehabilitation/Compliance Audit Record of Health and Safety incidents. Record of environmental incidents. Stakeholder engagement register.
			The Project is relinquished with no outstanding legal or social liability.	
Post-Mining Land Use	Formalised ownership, responsibility, and ongoing management agreements at closure for the agreed post-mining land use. To ensure all Project Domains are decommissioned and rehabilitated in an ecologically sustainable manner.	All key stakeholders consulted, and post-mining land use agreed and achieved.	Post-mining land use achieved in accordance with the MCP Closure Outcomes and Completion Criteria and to the written satisfaction of the post-mining landholder and DITT.	Annual Rehabilitation/Compliance Audit. DITT Certificate of Closure.
Contamination	Contaminated soil/waters treated, remediated and or disposed of appropriately throughout LOM and in accordance with applicable legislation and guidelines.	Confirmed contaminated sites are managed in accordance with the <i>Northern Territory Contaminated Land Guideline</i> .	100% of contaminated sites are removed, remediated, or encapsulated and do not pose a long-term risk.	Record of operational spill and clean-up. Contaminated site investigations and reports. Contaminated Site Assessment Preliminary Site Investigation (PSI) prior to planned closure.

Factors	Closure Objective	Indicative Completion Criteria	Completion Criteria (Quantitative)	Measurement Tools
Landforms	<p>Landforms are geotechnically safe, stable, non-polluting, erosion resistant functioning landform that does not present an unacceptable risk to environmental values and/or human receptors.</p> <p>Surface stability is consistent with the landform design and comparable to the local landscape and will remove the potential for long term, post closure impacts.</p>	Landform stability is consistent with design criteria and comparable to the local landscape and will remove the potential for long term, post closure impacts.	Detailed engineering design, specifications and 'as-constructed' drawings of landforms are 100% complied with.	<p>Landform Construction Audit.</p> <p>Records of material movement and disposal.</p> <p>Annual Rehabilitation/Compliance Audit.</p> <p>Closure Management Plan.</p> <p>Safety and environmental Inspections pre and post closure.</p> <p>Monitoring of re-vegetated areas to ensure environmental targets are met. (EFA)</p> <p>Stakeholder Engagement Plan.</p>
Rehabilitation)	Rehabilitate disturbed areas to support a self-sustaining vegetation and habitats similar to surrounding areas and the agreed post-mining land use.	<p>Weed species not impacting upon revegetation or the agreed post-mining land use.</p> <p>Groundcovers that are comprised of local provenance native species self-sustaining and similar in form and function to reference sites</p>	<p>Density of weed species is less than that of reference sites for ten consecutive post closure monitoring periods.</p> <p>No evidence of any new Weeds of National Significance or Declared Plants for five consecutive post closure monitoring periods.</p> <p>Groundcover is greater than or equal to the total percent groundcover of reference sites for ten consecutive post closure monitoring periods.</p> <p>Groundcover species richness is greater than or equal to 70% of the reference sites</p>	<p>Records of operational inspections and monitoring as per WRD Management Plan.</p> <p>Records of material characterisation, movement, and disposal.</p> <p>Safety and environmental Inspections pre and post closure.</p> <p>Annual Rehabilitation/Compliance Audit.</p> <p>Landscape/Vegetation Monitoring.</p> <p>Stakeholder Engagement Plan.</p> <p>Water Monitoring (in accordance with MMP).</p>

Factors	Closure Objective	Indicative Completion Criteria	Completion Criteria (Quantitative)	Measurement Tools
			for ten consecutive post closure monitoring periods.	
		Dominant shrub/tree species comprised of local provenance native species that are self-sustaining and similar in form and function to reference sites.	Dominant species (3) in the ecological dominant layer/emergent layer that defined the reference sites vegetation community are present as samplings and/or trees within ten years post closure monitoring periods.	
		Soil properties compatible with supporting vegetation to the agreed post mining land use.	Density of ground cover and dominant shrub/tree species is greater than or equal to 70% of the reference sites.	
		Cover materials capacity to retain water and nutrient resources is consistent with the target ecosystems of the local landscape.	Mean EFA stability, infiltration, and nutrient cycling rating of $\geq 50\%$ of the value of the analogue / reference site(s) over ten consecutive (for annual monitoring) or two consecutive (for biennial monitoring) post closure monitoring periods.	
Fauna	Protect fauna through LOM and leave the site free of hazards after closure.	No unauthorised infrastructure remaining on site and has been decommissioned in accordance with legal obligations and commitments.	No mine infrastructure remaining on site (unless formally agreed) with all disturbed areas scarified, seeded, and natural drainage patterns reinstated.	Annual Rehabilitation/Compliance Audit. Asset, hazardous materials, and contaminated sites register.
Waste	Implementation of the waste hierarchy throughout LOM and in accordance with applicable legislation and guidelines.	All waste streams assessed under waste hierarchy and treated in accordance with	100% of waste streams managed to prevent zero unmanaged waste remaining at closure.	Annual Rehabilitation/Compliance Audit.

Factors	Closure Objective	Indicative Completion Criteria	Completion Criteria (Quantitative)	Measurement Tools
		applicable legislation and guidelines.		
Surface Water	Surface drainage patterns are reinstated or managed where practicable to be consistent with the regional drainage function.	All surface water management infrastructure not required to remain post closure for long term stability are removed.	No evidence of significant erosion, settling or water ponding in rehabilitation areas for ten consecutive post closure monitoring periods. No visible increase in sediment or salinity in drainage channels downstream of the Rustlers Roost for ten consecutive post closure monitoring periods.	Annual Rehabilitation/Compliance Audit. Water Monitoring (in accordance with MMP).
	Post-mining surface water quality does not adversely impact the surrounding catchments beneficial uses and land uses.	Surface water quality generally reflects the background levels and water use by stakeholders is not compromised.	Passively discharged surface water will meet the applicable 95% species protection GVs or SSTV and SWGs for ten consecutive years post closure (outside of seasonal or natural fluctuations).	
Ground water	Groundwater hydrological processes and water quality are not adversely affected resulting in adverse impact to regional groundwater uses.	Groundwater extraction ceases at closure and all infrastructure not required to remain post closure for groundwater extraction is removed.	Post mining groundwater quality down groundwater gradient is within range of pre-mining groundwater quality.	Annual Rehabilitation/Compliance Audit. Water Monitoring (in accordance with MMP).
	Post-mining groundwater quality does not adversely impact the surrounding groundwater area beneficial uses.	Groundwater quality generally reflects the background levels and water use by stakeholders is not compromised	Groundwater and the pits will meet the applicable 80% ecosystem protection GVs, or SSTV and SWGs for ten consecutive years post closure (outside of seasonal or natural fluctuations).	

Table 23 Domain closure objectives and closure criteria

Closure Objective	Indicative Completion Criteria	Completion Criteria (Quantitative)	Measurement Tools
Domain 1 - waste rock dumps (WRD's)- North WRD, South WRD, East Koolpin WRD,			
Final WRD designs and construction are structurally and geotechnically safe, stable, non-polluting erosion resistant, self-sustaining, and constructed to achieve maximum water shedding and limit infiltration.	WRD's are built in accordance with the final landforms designs relevant to standards and guidelines. Any resultant sediment from erosion is contained in sediment traps and have no evidence of sediment discharge at surface water monitoring sites downstream of the WRD's.	Detailed landform design specifications identifying waste rock placement, surface run off, slope design parameters and erosion rates. - Landforms show no visual evidence of slumping or failure of constructed slopes or batters. - Landforms show evidence of successful revegetation. - Designs meet relevant DMIRS Guidelines (Waste Rock Dumps) and Australian Standards.	Landform Construction Audit. Records of material movement and disposal. Annual Rehabilitation/Compliance Audit. Closure Management Plan. Safety and environmental Inspections pre and post closure. Monitoring of re-vegetated areas to ensure environmental targets are met. (EFA) Stakeholder Engagement Plan.
	Following significant rainfall events, final WRD surfaces do not significantly erode following rainfall events greater than levels at analogue sites.	No gully formation >0.5m depth for ten consecutive post closure monitoring periods.	
	No acid metalliferous drainage seepage from WRD's.	Visual inspection, and soil analysis if required, of WRD's toe and surrounding soil condition for ten years post mining activities.	
WRD's are contoured, vegetated, stable and functioning landforms reflecting a regional ecosystem/landscape which meets an agreed post-mining land use.	Refer to broad closure objectives Section 5.2 for rehabilitation of all landforms.		
Surface water quality and seepage is not adversely affected resulting in adverse impact to terrestrial and aquatic ecosystems and land uses.	Surface and groundwater quality down gradient from the WRD's do not demonstrate variation beyond the range observed in baseline water quality.	Passively discharged surface water will meet the applicable 95% species protection GVs or SSTV and SWGs for ten consecutive years post	

Closure Objective	Indicative Completion Criteria	Completion Criteria (Quantitative)	Measurement Tools
		closure (outside of seasonal or natural fluctuations).	
Groundwater hydrological processes and water quality are not adversely affected resulting in adverse impact to regional groundwater uses.	Post mining groundwater quality is within range of pre-mining groundwater quality.	Site monitoring bores water quality meet the applicable 80% species protection GVs or SSTV and SWGs for ten consecutive years post closure (outside of seasonal or natural fluctuations).	
Domain 2 - Tailing storage facility (TSF)			
Final TSF designs and construction are structurally and geotechnically safe, stable, non-polluting, erosion resistant, self-sustaining, and constructed to achieve maximum water shedding and limit infiltration.	Rate, extent, and quality of seepage water from TSF expected to remain at or below acceptable threshold over long term. Rate and extent of slumping, slipping, or deflation on TSF to remain at or below acceptable threshold over long term.	Tailing's capping/cover: Coarse rockfill over tailings (nominal 0.5 thickness). Low permeability mine waste (nominal 0.3m thickness) Covered with topsoil (0.3 m), revegetation.	Records of operational inspections and monitoring as per TSF Management Plan. Final TSF closure report at cessation of operations. Geotechnical testing of tailings prior to capping and cover. Records of material characterisation, movement, and disposal.
TSF cover and pipeline alignment is revegetated to a stable, resilient, and functioning landforms reflecting a regional ecosystem/landscape which meets an agreed post-mining land use.	Refer to broad closure objectives Section 5.2 for rehabilitation of all landforms.		Site Inspection, audit by a suitably qualified and competent TSF consultant yearly during operations, during rehabilitation (capping and cover) and an engineering

Closure Objective	Indicative Completion Criteria	Completion Criteria (Quantitative)	Measurement Tools
All TSF infrastructure (tailings and return pipelines, turrets) are removed.	No unauthorised infrastructure remaining on site and has been decommissioned in accordance with legal obligations and commitments.	100% of TSF infrastructure to be removed dirt bunds pushed and all disturbed areas scarified, seeded, and natural drainage patterns reinstated.	status report at completion of mining activities. Safety and environmental Inspections pre and post closure. Annual Rehabilitation/Compliance Audit. Stakeholder Engagement Plan.
Surface water quality and seepage is not adversely affected resulting in adverse impact to terrestrial and aquatic ecosystems and land uses.	Surface and sub surface water quality down gradient from the TSF does not demonstrate variation beyond the range observed in baseline water quality.	Passively discharged surface water will meet the applicable 95% species protection GVs or SSTV and SWGs for ten consecutive years post closure (outside of seasonal or natural fluctuations).	Monitoring of re-vegetated areas to ensure environmental targets are met. (EFA) Closure Management Plan.
Groundwater hydrological processes and water quality are not adversely affected resulting in adverse impact to regional groundwater uses.	Post mining groundwater quality is within range of pre-mining groundwater quality.	TSF monitoring bores water quality meet the applicable 80% species protection GVs or SSTV and SWGs for ten consecutive years post closure (outside of seasonal or natural fluctuations).	
Domain 3a – Open pit voids (RUSTLERS ROOST SITE: Main pit QUEST 29 SITE: North Koolpin pit, South Koolpin pit, Taipan pit.			
Final pit design is structurally and geotechnically safe, stable, and non-polluting, and entry is restricted.	Concept level engineering of final pit design, which includes stable wall angles.	Detailed engineering design, specifications and 'as-constructed' drawings of pit and surrounds following final earthworks.	Audit of pit design to confirm compliance with design specifications, regulatory standards, and stakeholder input.
		Pit ramps are blocked by a bund/trench to deter access.	

Closure Objective	Indicative Completion Criteria	Completion Criteria (Quantitative)	Measurement Tools
		Pit abandonment bunds constructed in accordance with the guideline on ' Safety Bunds walls around abandoned open pit mines, (DoIR, 1997).	Records of operational inspections and monitoring as per open pit management Plan. Geotechnical audit of pit wall stability.
		Concept level engineering of final pit design, which includes stable wall angles.	Safety and environmental Inspections pre and post closure. Annual Rehabilitation/Compliance Audit.
Post-mining groundwater hydrological processes and water quality are not adversely affected resulting in adverse impact to local and regional groundwater uses and ground water beneficial uses.	Hydraulic connections with the pit do not significantly alter ground and/or surface water geochemistry or other environmental values. Hydraulic connections are estimated and validated by a water balance, modelling and/or monitoring.	Environmental monitoring results meet targets for the surrounding natural ecosystem.	Stakeholder Engagement Plan. Closure Management Plan.
	Post mining groundwater quality is within range is within range of pre-mining groundwater quality	Site monitoring bores water quality meet the applicable 80% species protection GVs or SSTV and SWGs for ten consecutive years post closure (outside of seasonal or natural fluctuations).	
	Groundwater levels post mining return to levels consistent with seasonal variations in groundwater pre-mining.	Site monitoring bores water levels meet return to within 10% of pre mining levels within 3 years post closure (outside of seasonal or natural fluctuations).	
	Access is restricted or suitable public risk management in place	Drawings and final specifications of pit and surrounds include safety requirements.	

Closure Objective	Indicative Completion Criteria	Completion Criteria (Quantitative)	Measurement Tools
Pit lake water is of a quality that will not adversely affect local terrestrial and surface water beneficial uses.	Pit water quality generally reflects the background levels.	Open pits will meet the applicable 80% ecosystem protection GVs, or SSTV and SWGs for ten consecutive years post closure (outside of seasonal or natural fluctuations).	
Domain 3b– backfilled pit voids (Zamu pit, Annie’s Dam pit, Annie Oakley pit, BHS pit)			
Backfilled final pit designs and construction are structurally and geotechnically safe, stable, non-polluting, erosion resistant, self-sustaining, and constructed to achieve maximum water shedding and limit infiltration.	Back filled pit waste rock placement is placed and compacted in accordance with the final designs relevant to standards and guidelines.	Detailed landform design specifications identifying waste rock placement, surface runoff, slope design parameters and erosion rates. - Landforms show no visual evidence of slumping or failure of constructed slopes or batters. - Landforms show evidence of successful revegetation.	Records of operational inspections and monitoring as per pit management plan. Records of material characterisation, movement, and disposal. Waste rock and AMD management plan Safety and environmental Inspections pre and post closure.
Post-mining groundwater water quality is not adversely affected whereby causing impact to the surrounding ground water and surface water beneficial uses.	Hydraulic connections with the back filled pit PAF waste rock do not significantly alter ground and/or surface water quality or other environmental values.	Environmental monitoring results meet targets for the surrounding natural ecosystem.	Annual Rehabilitation/Compliance Audit. Stakeholder Engagement Plan. Monitoring of re-vegetated areas to ensure environmental targets are met. (EFA) Closure Management Plan
Ensure correct placement of NAF and PAF waste rock with pit shell to manage contact with atmospheric oxygen.	All NAF and PAF waste rock are segregated and placed correctly during backfilling to minimise exposure of PAF	PAF waste rock to be placed and compacted in the groundwater saturated zone (lowest seasonal groundwater level) to remain submerged all-year round.	

Closure Objective	Indicative Completion Criteria	Completion Criteria (Quantitative)	Measurement Tools
	rock and contact with atmospheric oxygen.	NAF waste rock and clean fill to be placed above the groundwater saturation zone as the final landform capping and cover system.	
Pit covers is vegetated to a stable, resilient, and functioning landforms reflecting a regional ecosystem/landscape which meets an agreed post-mining land use.	Refer to broad closure objectives Section 5.2 for rehabilitation of all landforms.		
Domain 4 -Processing Infrastructure			
All processing infrastructure is removed (unless agreed to retain with key stakeholders).	No unauthorised infrastructure remaining on site and has been decommissioned in accordance with legal obligations and commitments.	100% of mine infrastructure removed from site (unless formally agreed) with all disturbed areas scarified, seeded, and natural drainage patterns reinstated.	Safety and Environmental Inspections pre and post closure. Annual Rehabilitation/Compliance Audit. Stakeholder Engagement Plan.
Waste and contamination removed/remediated, and landscape stable, non-polluting, erosion resistant, and self-sustaining.	All contaminated soil and infrastructure are remediated at site or removed to a licensed waste facility.	100% of mine infrastructure remaining on site (unless formally agreed) with all disturbed areas scarified, seeded, and natural drainage patterns reinstated.	Monitoring of re-vegetated areas to ensure environmental targets are met. (EFA) Closure Management Plan

Closure Objective	Indicative Completion Criteria	Completion Criteria (Quantitative)	Measurement Tools
Mine processing infrastructure footprint is revegetated to a stable, resilient, and functioning landforms reflect the agreed post-mining land use.	Refer to broad closure objectives Section 5.2 for rehabilitation of all landforms.		
Domain 5 – Support infrastructure			
All support infrastructure is removed (unless agreed to retain with key stakeholders).	No unauthorised infrastructure remaining on site and has been decommissioned in accordance with legal obligations and commitments.	100% of mine infrastructure remaining on site (unless formally agreed) with all disturbed areas scarified, seeded, and natural drainage patterns reinstated.	Safety and Environmental Inspections pre and post closure. Annual Rehabilitation/Compliance Audit. Stakeholder Engagement Plan.
Waste and contamination removed/remediated, and landscape stable, non-polluting, erosion resistant, and self-sustaining.	All contaminated soil and infrastructure are remediated at site or removed to a licensed waste facility.	100% of all contamination removed and areas scarified, seeded, and natural drainage patterns reinstated.	Monitoring of re-vegetated areas to ensure environmental targets are met. (EFA) Closure Management Plan
Mine support infrastructure footprint is revegetated to a stable, resilient, and functioning landforms reflect the agreed post-mining land use.	Refer to broad closure objectives Section 5.2 for rehabilitation of all landforms.		
Domain 6 -Haul Road and access roads			
Haul roads and access roads removed (unless agreed to retain with key stakeholders), contamination remediated, stable and disturbed areas rehabilitated to reflect the agreed post-mining land use.	Indicative: No haul roads or access tracks remaining on and off tenements unless agreed to retain with key stakeholders, closure topography is consistent with the baseline and/or regional landscape and drainage/flow paths are stable.	Completion (Quantitative): 100% haul roads and access tracks removed on and off tenements unless agreed to retain with key stakeholders, revegetated areas show evidence of successful revegetation.	Safety and Environmental Inspections pre and post closure. Annual Rehabilitation/Compliance Audit to include landform stability, surface drainage, erosion control features Stakeholder Engagement Plan.

Closure Objective	Indicative Completion Criteria	Completion Criteria (Quantitative)	Measurement Tools
			Monitoring of re-vegetated areas to ensure environmental targets are met. (EFA) Closure Management Plan
Domain 7 – Existing Mine Disturbances			
Existing mine disturbances to be expanded and re-mined, or fully decommissioned, removed, contamination remediated and rehabilitated to reflect the agreed post-mining land use (unless agreed to retain with key stakeholders).	Indicative: No unauthorised infrastructure remaining on site and has been decommissioned in accordance with legal obligations and commitments.	Completion (Quantitative): 100% of mine infrastructure removed from the site (unless formally agreed) with all disturbed areas scarified, seeded, and natural drainage patterns reinstated.	Landform Construction Audit. Records of material movement and disposal. Annual Rehabilitation/Compliance Audit.
	All contaminated soil and infrastructure are remediated at site or removed to a licensed waste facility.	100% of all contamination removed and areas scarified, seeded, and natural drainage patterns reinstated.	Safety and environmental Inspections pre and post closure. Stakeholder Engagement Plan.
	Landform stability is consistent with design criteria and comparable to the local landscape and will remove the potential for long term, post closure impacts.	Detailed engineering design, specifications and 'as-constructed' drawings of landforms are 100% complied with.	Monitoring of re-vegetated areas to ensure environmental targets are met. (EFA)

Section 7 Collection and analysis of closure data

Baseline environmental investigation and data provide an understanding of the pre-existing conditions of the sites and surrounding area which can inform closure objectives, closure criteria and monitoring indicators. The data has been influenced by the existing mining disturbances and current pastoral activities at Quest 29 and Rustlers Roost and is therefore not considered background from a regional context but does provide a baseline to build on and compare against information from the regional context. .

The following section describe the baseline environmental data for the Project.

7.1 Previously completed environmental investigations

PGL has completed environmental investigations previously undertaken as part of studies done during the sites care and maintenance activities and as a lead up to the EIS.

Investigation	Start Date	Author
Rustlers Roost Project – desktop and limited field geotechnical assessment	2019	CDM Smith Consultants
Rustlers Roost Project – desktop groundwater assessment	2019	CDM Smith Consultants
Rustlers Roost Project – Surface water assessment	2019	CDM Smith Consultants
Rustlers Roost Bore drilling statements	2020	H2O Drilling Contractors
Q29 and Rustlers Roost Slug Tests	2021	Groundwater Enterprises
Toms Gully, Rustlers Roost and Quest 29 Flora and fauna survey	2017	Low Ecological Services
Quest 29 Baseline Studies, Site Water Balance	2019	GHD Consultants
Q29 Bore drilling statements	2020	H2O Drilling Contractors
Q29 and Rustlers Roost Slug Tests	2021	Groundwater Enterprises
Invasive species mapping	2018	PGL

7.2 Environmental data

The following section provides a summary of the best available environmental data on aspects of the physical and biological environments, as well as of the heritage aspects of the proposed Project location.

7.3 Climate

The climate of the Darwin-Katherine region is broadly classified as tropical monsoonal. It is characterised by seasonal shifting of the prevailing winds and consequently marked changes of air mass properties. Two distinct seasons can be identified – the dry and wet season, with two subsidiary transitional periods between them. The dry season occurs from May to September and the transition period from dry to wet season occurs in October and November. The wet season occurs from December to March and the second transition period, from wet to dry season, occurs in April.

7.3.1 Climate zone

The Bureau of Meteorology (BoM) provide climate classification maps using three (3) methods of classifying the climate of Australia. These different classification schemes are based on temperature/humidity, vegetation (Köppen) and seasonal rainfall.

The temperature and humidity zones map (Figure 16) show the climate of Australia classified according to temperature and humidity properties across the country. This map is based on temperature and humidity data collected over the period 1961 to 1990. This method of classification identifies six (6) key zones across Australia, based on a set of definitions relating to summer and winter conditions. This map indicates that the Project area is within the hot humid summer climate zone.

The Köppen classification map (Figure 17) show six (6) major groups of climate zones across Australia based on 30 years of climatology (1961-1990). This method of classification is based on the concept that native vegetation is the best expression of climate in an area and the six (6) major classes are identified predominantly on native vegetation type Figure 17. This map indicates that the Project area is within the tropical classification zone.

The seasonal rainfall map (Figure 20) use the differences between summer and winter rainfall across Australia to identify six (6) major climate zones. Rainfall is also based around climate zones and is illustrated in Figure 19 and Figure 20. These maps use the median annual rainfall (based on the 100 year period from 1900 to 1999) and seasonal incidence (the ratio of the median rainfall over the period November to April to the period May to October) to identify these six (6) major zones. This map indicates that the Project area is within the summer dominant hot humid climate class with a marked wet summer and dry winter.

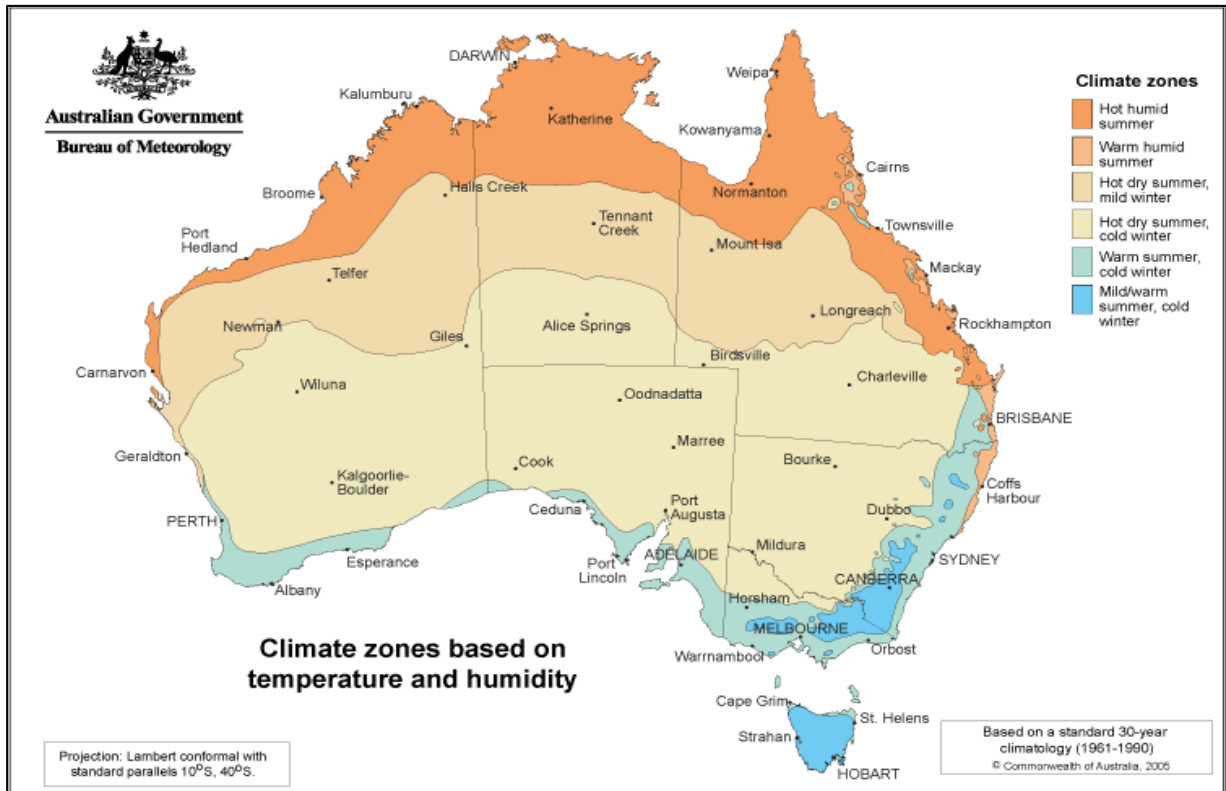


Figure 16 Australian Climate zones based on temperature and humidity (BoM,2005)

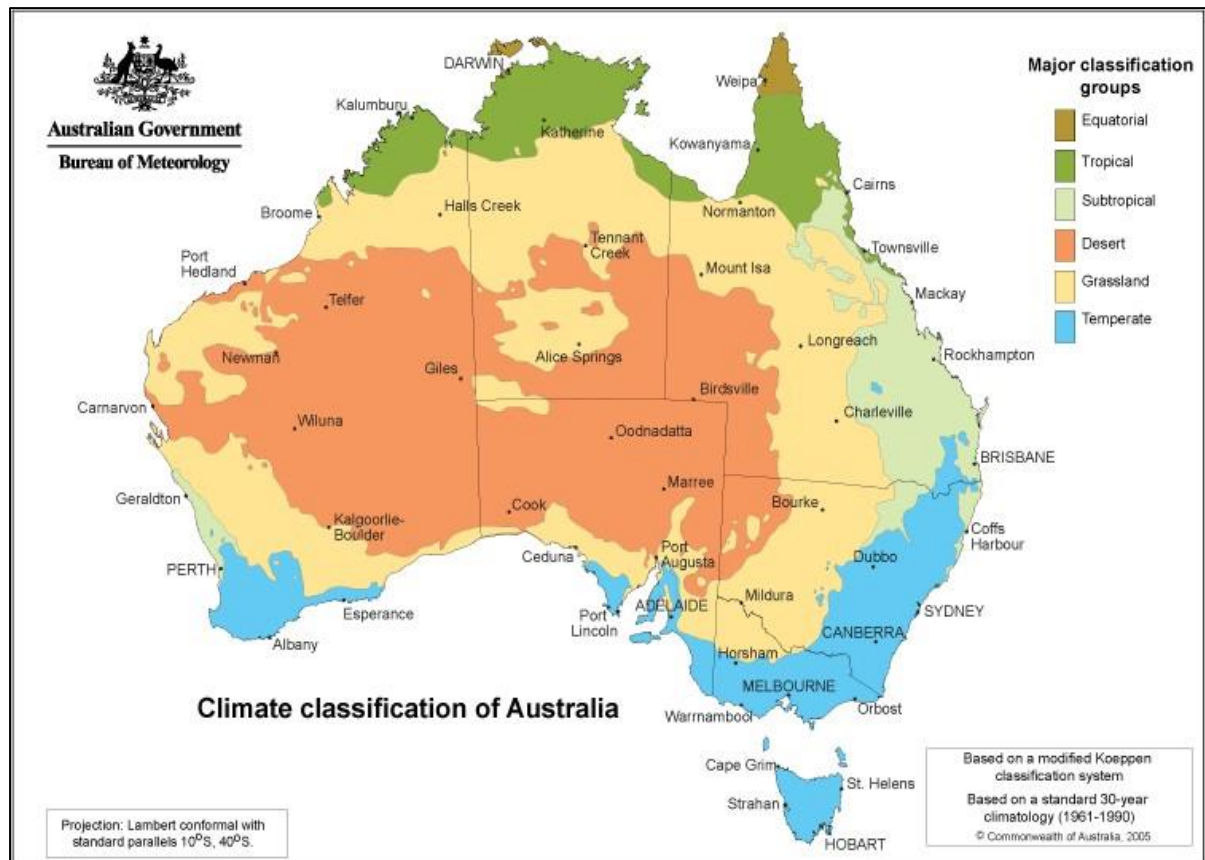


Figure 17 Australian climate zones based on vegetation (BOM, 2021)

7.3.2 Rainfall

The Middle Point Rangers weather station (#014090) summary rainfall data (1957-2019) is provided in Table 24 and Figure 18 and indicates the following key statistics regarding rainfall in the region:

- Mean annual rainfall is 1,433.5mm.
- Majority of rainfall is in summer (December to March).
- Mean monthly rainfall ranges from 0.7mm in July to 346.5mm in January.
- Highest monthly rainfall recorded was 942.1mm in January 2018.
- Highest daily rainfall recorded was 242.3mm in December 1965.
- Highest mean number of days of rain is 20.9 in January.
- Lowest mean number of days of rain is 0.3 in June.
- Mean number of days of rain ≥ 10 mm is 41.0; and
- Mean number of days of rain ≥ 25 mm is 17.3.

A review of the mean and highest rainfall trends indicates that there can be a large variation in rainfall received in the region.

Table 24 Middle Point Rangers weather station (#014090) monthly rainfall (1957-2019)

Month	Mean Rainfall	Highest Rainfall	Lowest Rainfall	Mean No. Days of Rain	Mean No. Days ≥ 10 mm	Mean No. Days ≥ 25 mm
Jan	346.5	942.1	40.8	20.9	9.6	4.4
Feb	279.9	638.8	78.0	20.3	7.9	3.4
Mar	249.2	552.9	0.0	17.8	7.2	3.3
Apr	88.7	488.2	0.8	7.9	2.6	0.9
May	23.9	298.4	0.0	2.6	0.6	0.3
Jun	1.4	30.0	0.0	0.3	0.0	0.0
Jul	0.7	22.4	0.0	0.4	0.0	0.0
Aug	2.2	38.5	0.0	0.5	0.1	0.0
Sep	12.9	67.8	0.0	2.0	0.4	0.1
Oct	57.3	162.6	0.0	6.1	1.9	0.7
Nov	130.0	300.8	29.0	12.3	4.2	1.4
Dec	227.8	484.3	19.0	17.5	6.5	2.8
Annual	1,433.5	2,198.3	874.9	108.6	41.0	17.3

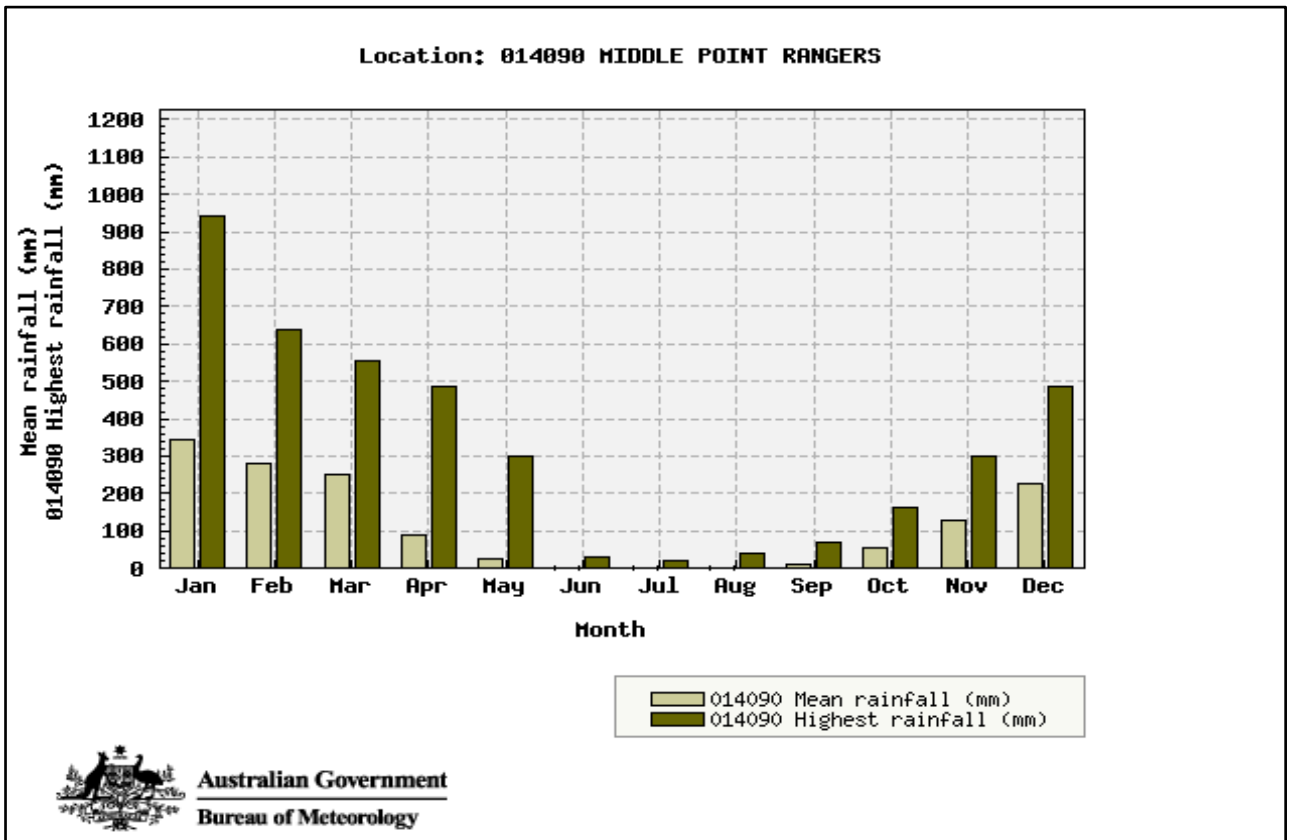


Figure 18 Middle Point Rangers weather station (#014090) mean and highest rainfall (BOM, 2021)



Figure 19 Australian climate zones based on rainfall (BOM, 2021)

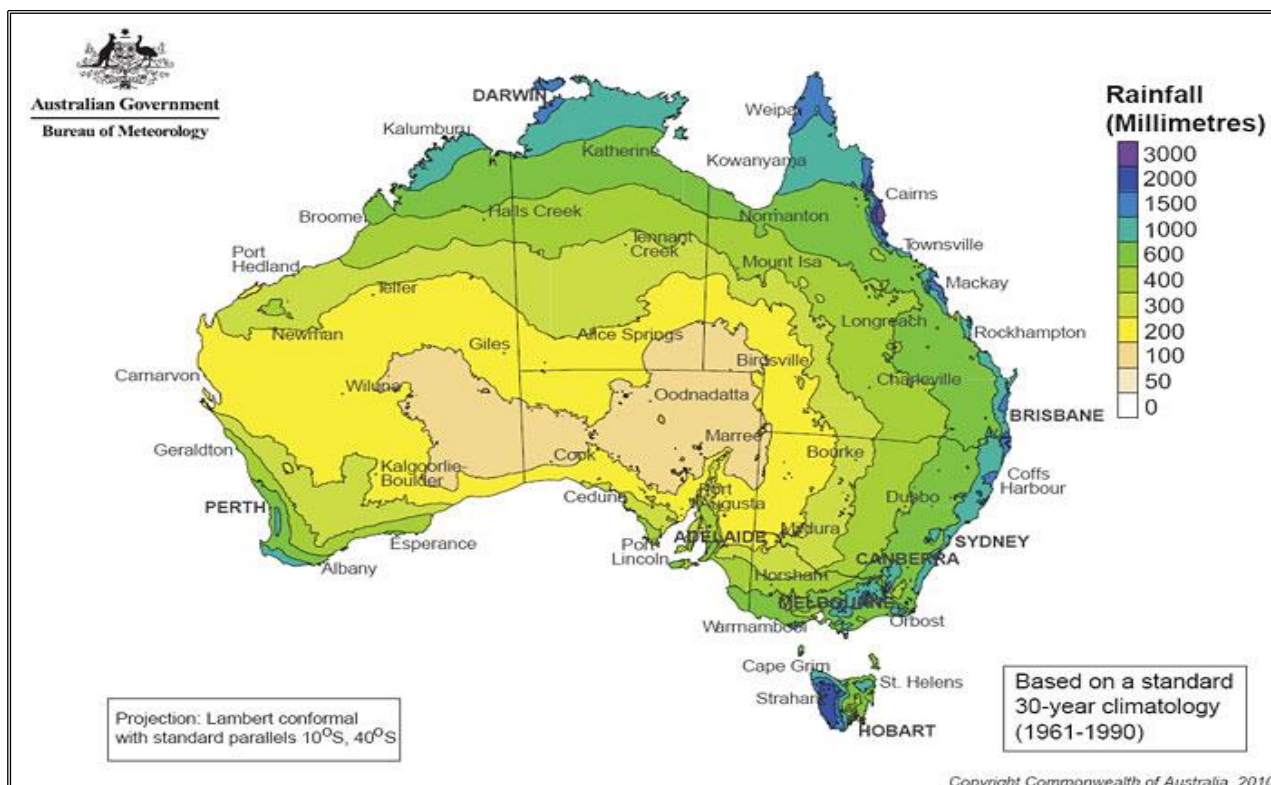


Figure 20 Australian rainfall 30-year climatology (1961-1990), (BOM, 2021)

7.3.3 Temperature

The closest long-term BoM weather station is the Middle Point Rangers Weather Station (#14090) located approximately 42km south of the Rustlers Roost. Summary temperature data (1965-1998) from this weather station is provided in Table 25 and Figure 21 and indicates the following key statistics regarding temperature in the region:

- Mean daily maximum temperatures range from 35.6°C in October to 31.3°C in June/July.
- Mean daily minimum temperatures range from 23.9°C in December/February to 14.9°C in July.
- Highest temperature recorded was 40.3°C in October 1990.
- Lowest temperature recorded was 4.6°C in July 1965.
- Mean number of days that temperature is $\geq 35^\circ\text{C}$ is 72.0 (mostly September to November); and
- Mean number of days that temperature is $\leq 2^\circ\text{C}$ is 0.0.

Variation in temperature is relatively moderate in the region and is consistent, particularly in the dry season.

Table 25 Middle Point Rangers weather station (#014090)monthly temperature (1965-1998) (BOM, 2021)

Month	Mean Daily Maximum	Mean Daily Minimum	Highest Daily Maximum	Lowest Daily Minimum	Mean No. Days Maximum \geq 35.0°C	Mean No. Days Minimum \leq 2.0°C
Jan	32.6	23.8	38.2	20.2	3.2	0.0
Feb	32.0	23.9	36.2	19.3	1.0	0.0
Mar	32.4	23.6	37.5	17.3	1.5	0.0
Apr	33.1	22.1	39.0	13.1	1.6	0.0
May	32.5	19.4	35.9	8.2	0.5	0.0
Jun	31.3	16.1	34.9	5.4	0	0.0
Jul	31.3	14.9	35.5	4.6	0.1	0.0
Aug	32.9	16.8	37.1	5.0	2.6	0.0
Sep	34.7	20.1	38.8	9.0	13.7	0.0
Oct	35.6	22.7	40.3	13.5	21.5	0.0
Nov	35.1	23.7	40.2	19.0	16.9	0.0
Dec	33.8	23.9	38.7	18.0	9.4	0.0
Annual	33.1	20.9	40.3	4.6	72.0	0.0

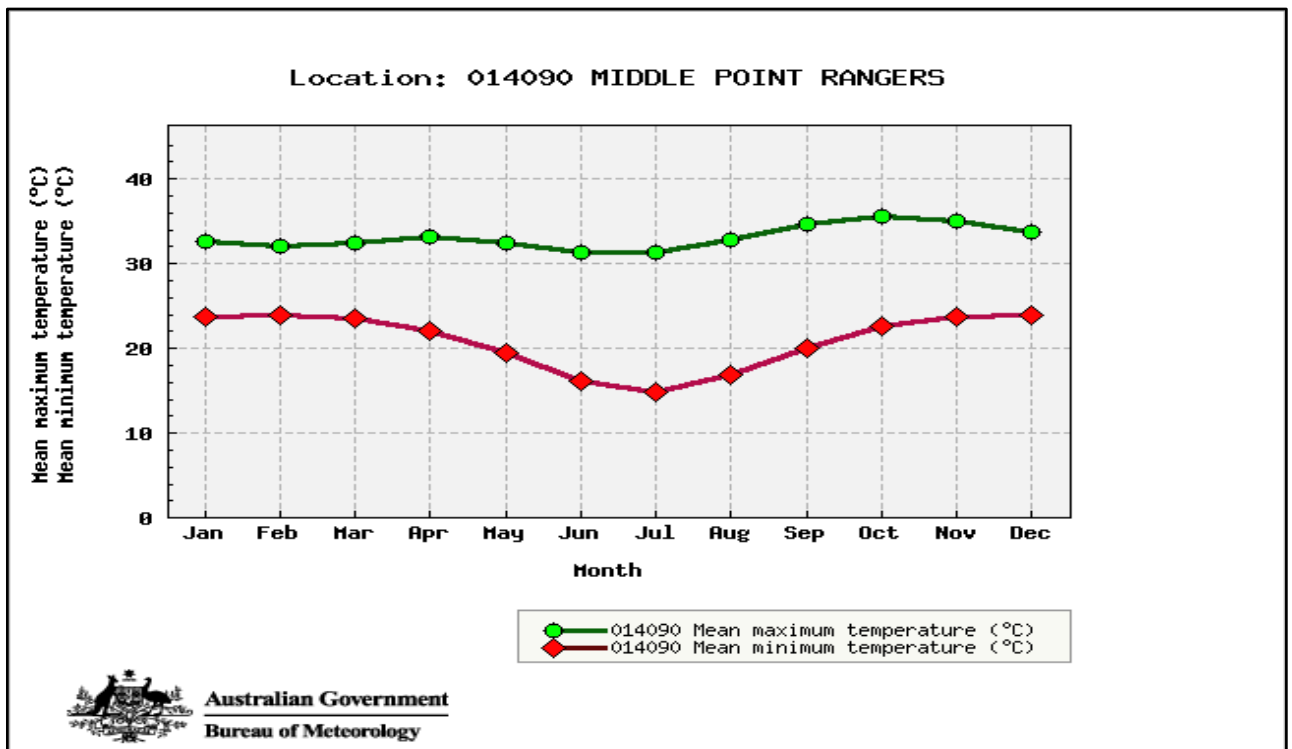


Figure 21 Middle Point Rangers weather station (#014090) mean maximum and minimum temperature (BOM, 2021)

7.3.4 Cyclones

There are on average 7.7 days per season when a cyclone exists in the northern region of Australia. The north-western Gulf of Carpentaria near Gove has the highest concentration of cyclone days. The Gulf of Carpentaria averages two cyclones a year, while the Arafura and Timor Seas average one a year.

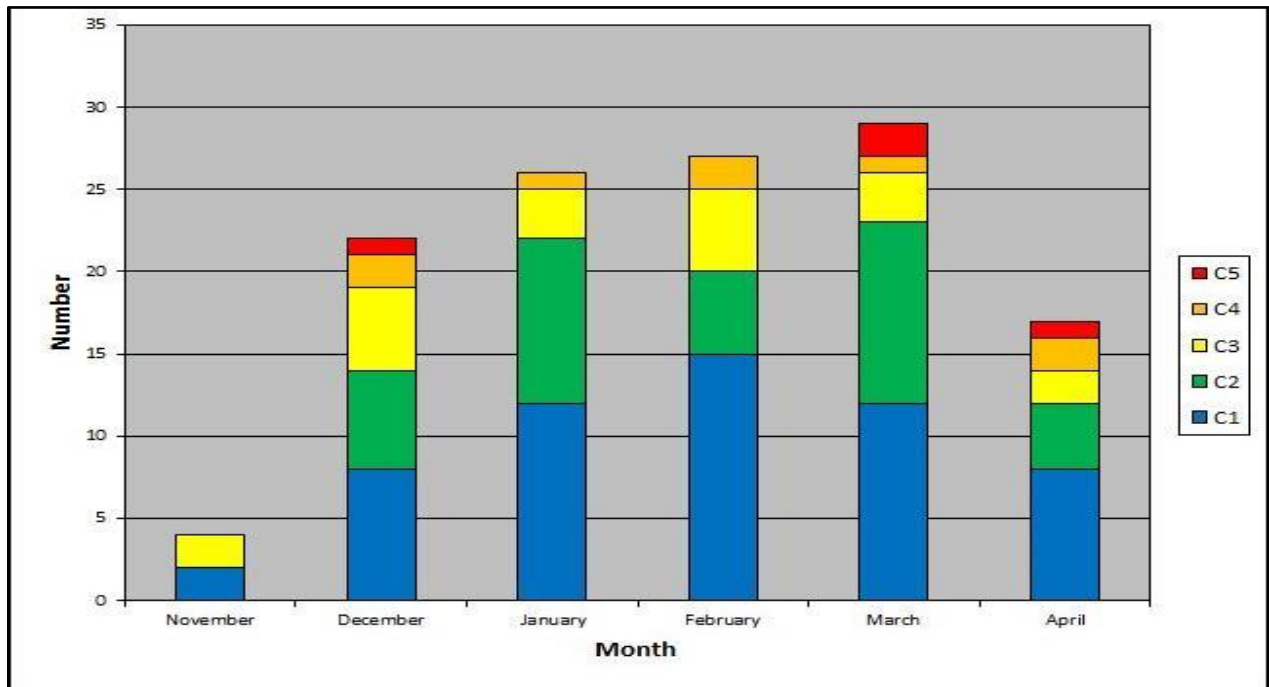


Figure 22 Tropical cyclones in the northern region of Australia (BOM, 2021)

Cyclones in the Gulf of Carpentaria move very erratically, whereas those in the Arafura and Timor Seas tend to follow more regular tracks to the southwest. Over half the cyclones generated in the Northern region, move either southwest or southeast into adjoining regions. Cyclone events and associated winds and rainfall may affect the Project area. Cyclones occur most frequently in the wet season months, particularly from December to March. Cyclone ratings (Category 1-Category 5) marked in colour with blue indicated as a category (C1) and red indicated as a category (C5), Figure 22.

7.3.4.1 Rainfall intensity frequency duration

Analyses of data from rainfall gauges and the use of statistical theory enables the estimation of the probability that a particular rainfall depth (mm) will be equalled or exceeded at a particular place, within a particular time interval (duration), and over any given period. This analysis is known as rainfall intensity-frequency-duration (IFD). The BoM website provides a Design Rainfall Data System (2016) which enables the estimation of the IFD at a specified location in Australia.

The probability of a particular rainfall depth for a specified duration being equalled or exceeded in any 1-year period can be expressed as a percentage (the Annual Exceedance Probability or AEP) or as "on the average once in every x year" (an Average Recurrence Interval, or ARI). The use of AEP to describe the chance of a rainfall event is preferred as

it conveys the probability for each year. The alternative, ARI, is a term which has been frequently used in the past but is easily misunderstood.

The IFD calculated for the Project area is provided in Table 26. An example interpretation of these results is that a rainfall amount of 92.5mm in 1 hour can be expected to be equalled or exceeded on average once every 100 years. In this case, the AEP is 1% and the ARI is 100 years. It is important to note that an ARI of 100 years does not mean that the event will only occur once every 100 years. Rather that for every year, there is a 1% chance (a 1 in 100 chance) that the event will be equalled or exceeded (once or more than once). The 1% AEP (100-year ARI flood) is frequently used as the defined flood event. The floodplain of a defined flood event should be used as the area over which controls on land use and development need to recognise the impacts of flooding.

Table 26 Project areas calculated rainfall intensity-frequency-duration (IFD)

Annual Exceedance Probability (AEP)						
Duration	50% ¹	20% ²	10%	5%	2%	1%
5 mins	12.0	14.9	16.7	18.2	20.1	21.3
30 mins	38.8	48.0	53.6	58.8	65.0	69.4
1 hour	51.7	64.2	71.9	78.8	86.9	92.5
2 hours	63.0	79.3	89.4	98.6	110	117
3 hours	68.5	87.2	99.2	110	124	134
6 hours	76.8	101	117	133	154	170
12 hours	86.7	117	140	163	195	222
24 hours	103	143	174	207	254	295
72 hours	154	217	265	317	387	443
ARI	1 in 1.44¹	1 in 4.48²	1 in 10	1 in 20	1 in 50	1 in 100

Note: ¹ 50% AEP IFD **does not** correspond to the 2-year ARI IFD. Rather it corresponds to the 1.44 ARI.

² 20% AEP IFD **does not** correspond to the 5-year ARI IFD. Rather it corresponds to the 4.48 ARI.

7.3.4.2 Evaporation

The Middle Point Rangers Weather Station (#014090) mean daily pan evaporation (1965-1998) ranges from 4.5 to 7.1mm, with an annual average of 5.5mm. This is the equivalent of around 2,000mm/year and exceeds the annual average rainfall (1,434mm). Evaporation is highest from August to November. This is consistent with the BoM map showing the average annual evaporation rates across Australia Figure 23, which indicates that the Project area is in the zone of around 2,000mm evaporation a year. It is important to recognise the value evaporation has with the overall water balance for the Project area in assisting in the management of excess water.

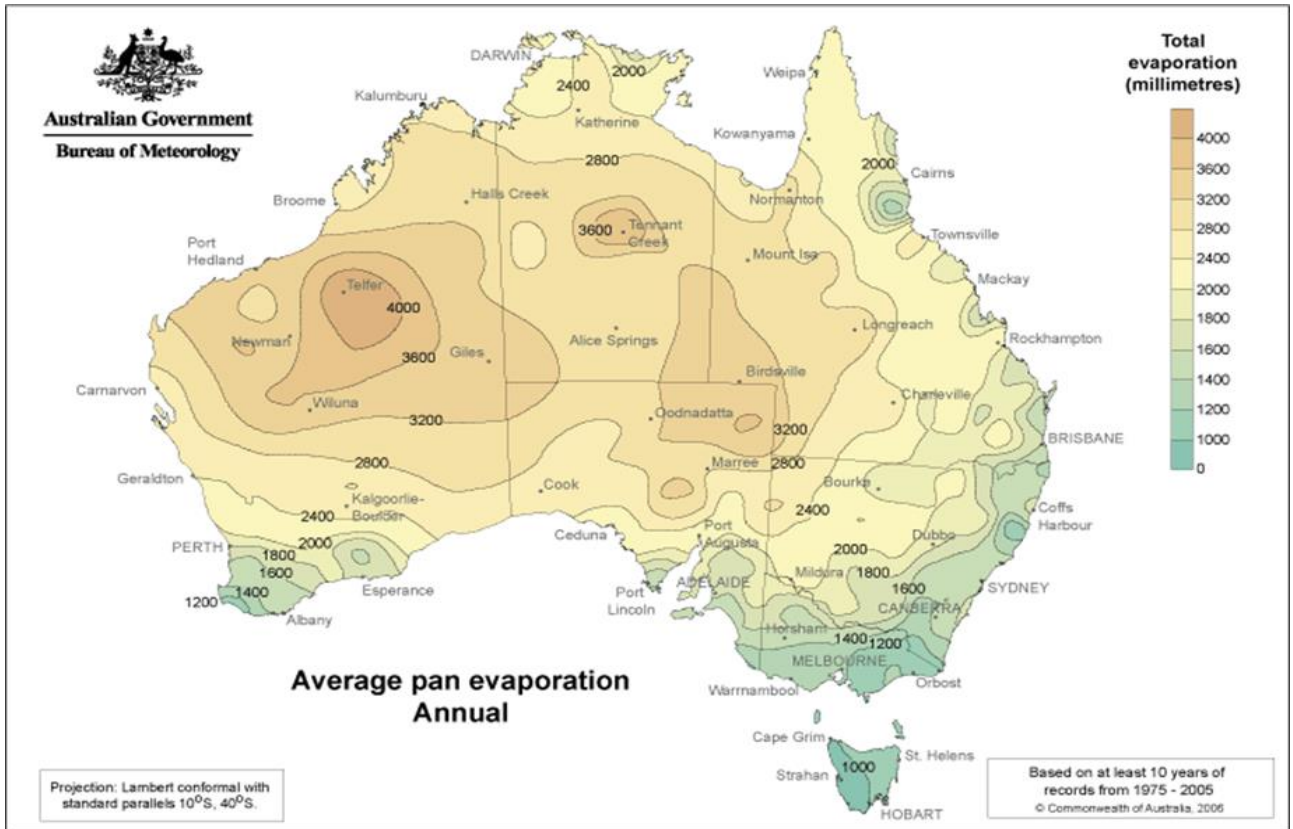


Figure 23 Australian annual average pan evaporation (BOM, 2021)

7.3.5 Wind speed and direction

Wind is one of the most highly variable meteorological elements, both in speed and direction. It is influenced by a wide range of factors, from large scale pressure patterns to the time of day and the nature of the surrounding terrain. Because the wind is highly variable it is often studied by means of frequency analyses, provided in the form of wind roses, rather than as simple averages.

Wind roses are available for the Middle Point Rangers Weather Station (#014090) based on data from 1965 to 1998. During the dry season (i.e., July), winds are expected to be predominantly south-easterly and during the transition from dry to wet season (i.e., October) winds are more variable and trending towards north-easterly, Figure 24. During the wet season (i.e., January) winds are more variable and trending towards west north-westerly and during the transition from wet to dry (i.e., April) winds are south-easterly, Figure 25.

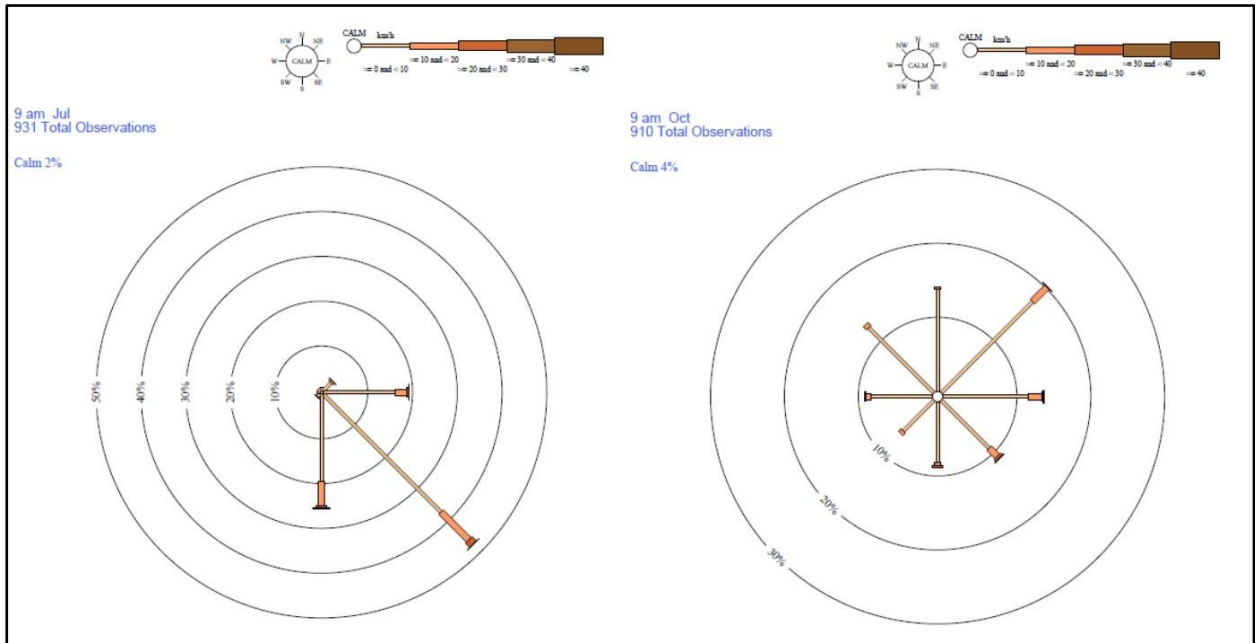


Figure 24 Middle Point Rangers weather station (#014090) wind roses (July-Oct, 9am), (BOM, 2021)

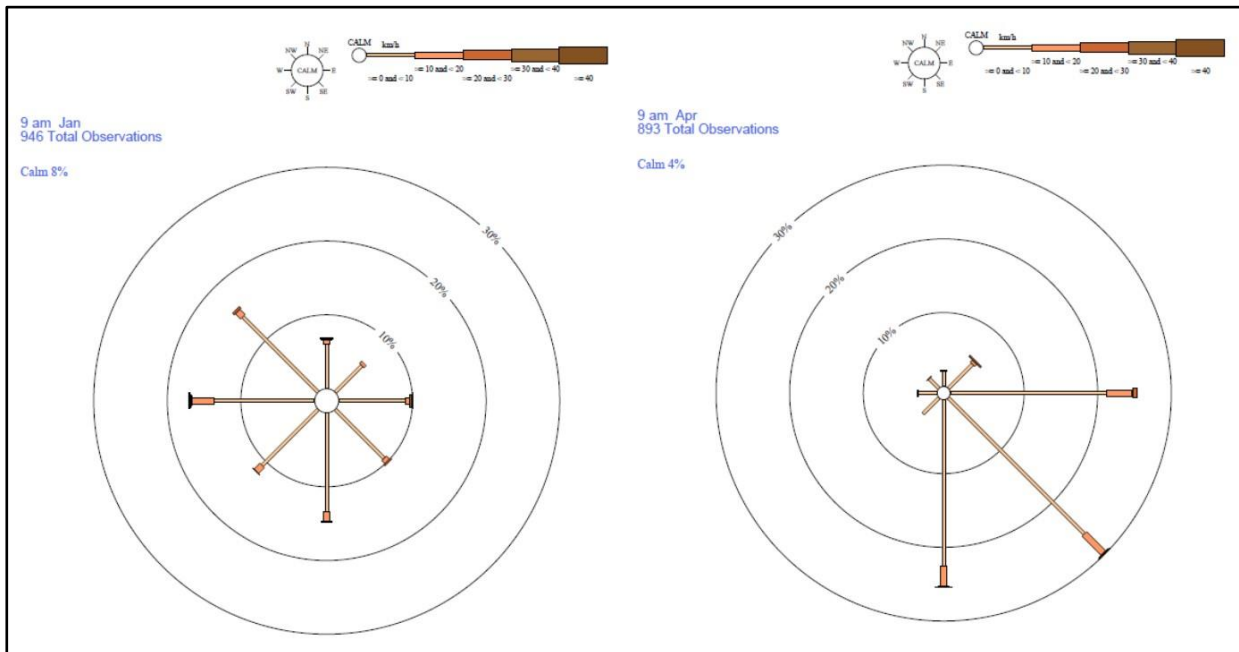


Figure 25 Middle Point Rangers weather station (#014090) wind roses (Jan-April, 9am), (BOM, 2021)

7.4 Landscape

The Project occurs in the Pine Creek (PCK) bioregion, as defined by the Commonwealth Department of the Environment and Energy (DotEE) Interim Biogeographic Regionalisation for Australia (IBRA) classification system (DotEE, 2012). The

region has one (1) major component the Pine Creek subregion (PCK01) which has an area of 28,520km². Land types of the Pine Creek bioregion are mainly hilly to rugged ridges with undulating plains.

The Rustlers Roost site is located on the slopes of a northerly trending ridge which has Mount Bunday as the main regional feature. It encompasses an area of low rolling hills with minimal soil development and level plateaus with deeper soils and outcropping laterite. The hills have moderate to gentle slopes and topography ranges between 40-100m AHD). Rustlers Roost is situated along a catchment divide, with the eastern portion of the site draining to the Mary River catchment via Mount Bunday Creek, and the western portion of the site draining into the Adelaide River via an unnamed tributary of the Marrakai Creek.

The Q29 site encompasses low rolling hills with deeper soils and outcropping laterite. The vegetation of these hills is low, open, and largely deciduous; and the dominants of the plateaus are taller and for the most part evergreen. Creek lines in the hills have a minimum of alluvium with the vegetation indistinguishable from the adjoining slopes; and the lowermost basins and creek lines have varying degrees of silty alluvium and support a distinctive tree and grass flora Land system and soil landscape zones.

Vegetation that occurs on Rustlers Roost and Q29 sites was recently re- surveyed and mapped by EcoZ Environmental Consultants (Ecoz, 2020(a)) at the advice of the Northern Territory Flora and Fauna Division DEPWS (formally DENR). The aim was to confirm areas unsurveyed by Low Ecological in 2017 utilising existing land unit mapping completed for the region by (Fett and Hall, 1983) followed up by mapping and field surveys to confirm the land units' descriptions.

Ten land units were recorded in the Rustlers Roost, Quest 29, accommodation camp and haul road route including descriptions of landforms, soil and vegetation descriptions are described in Table 27. Survey assessment and location of surveys points are outlined in Figure 26 and Figure 27. Outcome of the Ecoz survey confirmed that the Project area land units is mostly consistent with the existing mapped land units as described in the work done by Low Ecological Services in 2016 and 2017, In total, approximately 25% of the proposal area was disturbed and did not represent a natural land unit. (Ecoz, 2020(a))

Table 27 Rustlers Roost and Quest 29 site land units. Source: (Ecoz, 2020(a))

Project Area	Land Unit	Landform Class	Landform Description	Soil	Soil Description	Vegetation Description	Area
Quest 29	2a	Low hills	Rugged terrain associated with siltstones and greywacke of Burrells Creek formation and Upper Proterozoic dolomites and sandstones; relief 10-80m; slopes >10%; surface stone and outcrop extensive.	LK22 - Rudosols	Very shallow stony lithosols.	<i>Corymbia polysciada</i> , <i>Eucalyptus miniata</i> , <i>Corymbia dichromophloia</i> and <i>Erythrophleum chlorostachys</i> woodland/low open woodland with a <i>Chrysopogon fallax</i> , <i>Triodia bitextura</i> , <i>Heteropogon triticeus mixed spp.</i> tussock grass understorey.	260.25 ² [18.3 ha] ³
RustlersRoost, Accommodation Camp, Haul Road	2b	Rises	Low hills; ridges same lithologies as 2a; relief between 5-20m; slope gradients between 6-15%; extensive surface stone outcrop.	LK22 and Tb134 - Kandosols	Shallow stony and gravelly lithosols.	<i>Corymbia polysciada</i> , <i>Eucalyptus miniata</i> , <i>Corymbia dichromophloia</i> and <i>Erythrophleum chlorostachys</i> woodland/low open woodland with a <i>Chrysopogon fallax</i> , <i>Triodia bitextura</i> , <i>Heteropogon triticeus mixed spp.</i> tussock grass understorey.	800.66 ha ² [214.5 ha] ³

² Indicative area of land units

³ Area verified for NVIS Level V criteria (Ecoz 2020a)

Project Area	Land Unit	Landform Class	Landform Description	Soil	Soil Description	Vegetation Description	Area
Haul Road	3a	Rises	Low erosional rises, rounded crests and upper slopes <5%; 1-15m relief; occasional outcrop; 30-100% surface gravel.	LK22 and Tb134 - Kandosols	Gravelly yellow brown and yellow lithosols (Burrell 1 & 2) up to 1m deep overlying friable weathered siltstone and greywacke.	<i>Corymbia clavigera</i> , <i>Erythrophleum chlorostachys</i> , <i>Corymbia foelscheana</i> and <i>Calytrix spp.</i> low woodland; minor <i>Eucalyptus tectifca</i> and <i>Corymbia bleeseri</i> woodland; mixed spp. tussock grass understorey.	11.69 ha ² [13.9 ha] ³
RustlersRoost, Haul Road	3b	Low Rises	Erosional slopes, commonly below 3a, also below 2b and 2c; slopes <5%; 50-100% siltstone surface gravel.	Tb134 - Kandosols	Gravelly yellow brown and yellow lithosols (Burrell 1 & 2).	<i>Corymbia polysciada</i> , <i>Erythrophleum chlorostachys</i> , <i>Corymbia foelscheana</i> and <i>Calytrix spp.</i> low woodland. Minor <i>Eucalyptus miniata</i> , <i>Eucalyptus tectifca</i> and <i>Corymbia bleeseri</i> woodland.	5.16 ha ²
Accommodation Camp	4a	Low Rises	Colluvial slopes below 3a and 3b; occasionally below 2b in southern areas; slopes <5%; up to 500m wide; relief 10m.	Wd13 - Kandosols	Shallow to moderately deep yellow earths (Battern 1); indistinct mottling in B horizon; scattered low termitaria.	<i>Erythrophleum chlorostachys</i> , <i>Eucalyptus miniata</i> mixed species woodland with <i>Sorghum plumosum</i> , <i>Themeda triandra</i> , <i>Chrysopogon fallax</i> and <i>Heteropogon triticeus</i> tussock grass understorey.	7.07 ha ²
Quest 29	4b	Plains	Colluvial slopes below 3b and 4a above alluvial areas; slopes <2%; commonly 200m to 800m wide; relief <5m.	LK22 - Hydrosols	Moderately deep to deep yellow (Batten 1, Elliot 1 and 2); distinct mottling in sub-soil; minor debil debil; scattered large termitaria; waterlogged for short periods.	<i>Corymbia polycarpa</i> , <i>Corymbia grandifolia</i> , <i>Vitex glabrata</i> and <i>Lophostemon lactifluus</i> woodland with <i>Sorghum plumosum</i> , <i>Themeda triandra</i> , <i>Chrysopogon fallax</i> and <i>Eriachne burkittii</i> tussock grass understorey.	0.01 ha ²

Project Area	Land Unit	Landform Class	Landform Description	Soil	Soil Description	Vegetation Description	Area
Haul Road	5b	Alluvial Plains	Alluvial plains up to 3km wide; negligible slope.	Tb134 - Hydrosols	Mottled yellow duplex (solodic) soils (Bundey, Keppler 1); shallow, hardsetting and pulverulent A horizon over a dense, mottled B horizon; well developed debil debil.	<i>Corymbia polycarpa</i> , <i>Corymbia bella</i> and <i>Corymbia grandifolia</i> open woodland/woodland; minor <i>Melaleuca spp.</i> ; <i>Eriachne burkittii</i> , <i>Chrysopogon setifolius</i> , <i>Themeda triandra</i> mixed tussock grass understorey.	12.09 ha ²
Accommodation Camp, Haul Road	5c	Alluvial Plains	Alluvial plains up to 3km wide; negligible slope.	Tb134 and Wd13 - Hydrosols	Mottled yellow duplex (solodic) soils (Bundey, Keppler 1); shallow, hardsetting and pulverulent A horizon over a dense, mottled B horizon; well developed debil debil; minor grey non-cracking clays on Mary River floodplain.	<i>Eriachne burkittii</i> , <i>Chrysopogon setifolius</i> mixed spp. tussock grassland with sedges.	12.09 ha ²
Quest 29	6a	Creek channel	Rivers and major creeks with associated narrow levees; channels incised up to 6m.	LK22 - Hydrosols	Alluvial yellow and red earths on levees; deep, gradational-textured profiles.	<i>Corymbia bella</i> , <i>Corymbia polycarpa</i> , <i>Ficus racemosa</i> and occasional <i>Melaleuca leucadendra</i> , <i>Alstonia actinophylla</i> , <i>Barringtonia acutangula</i> and Banyan trees mid high woodland to open forest, over <i>Erythrophleum chlorostachys</i> , <i>Terminalia sp.</i> , and <i>Acacia auriculiformis</i> and occasional <i>Planchonia careya</i> open shrubland, over <i>Aristida sp.</i> , and <i>Hyptis</i> mid high open tussock grassland.	0.00 ha ² [9.9 ha] ³

Project Area	Land Unit	Landform Class	Landform Description	Soil	Soil Description	Vegetation Description	Area
Quest 29, RustlersRoost, Accommodation Camp, Haul Road	6a1	Drainage lines	Drainage lines in rugged terrain; narrow (<200m); normally incised to <2m.	LK22, Tb134 and Wd13 - Hydrosols	Yellow earths (Tortilla 2); moderately deep and usually sandy in upper reaches; weakly developed solodics (Bundey 1) in lower reaches towards major alluvials.	<i>Corymbia polycarpa</i> , <i>Corymbia grandifolia</i> , <i>Corymbia bella</i> , <i>Eucalyptus bigalerita</i> and <i>Melaleuca spp.</i> woodland/open forest with <i>Arundinella nepalensis</i> , <i>Eriachne burkittii</i> , <i>Mnesithea sp.</i> mixed species tussock grass understorey.	18.58 ha ² [9.1 ha] ³

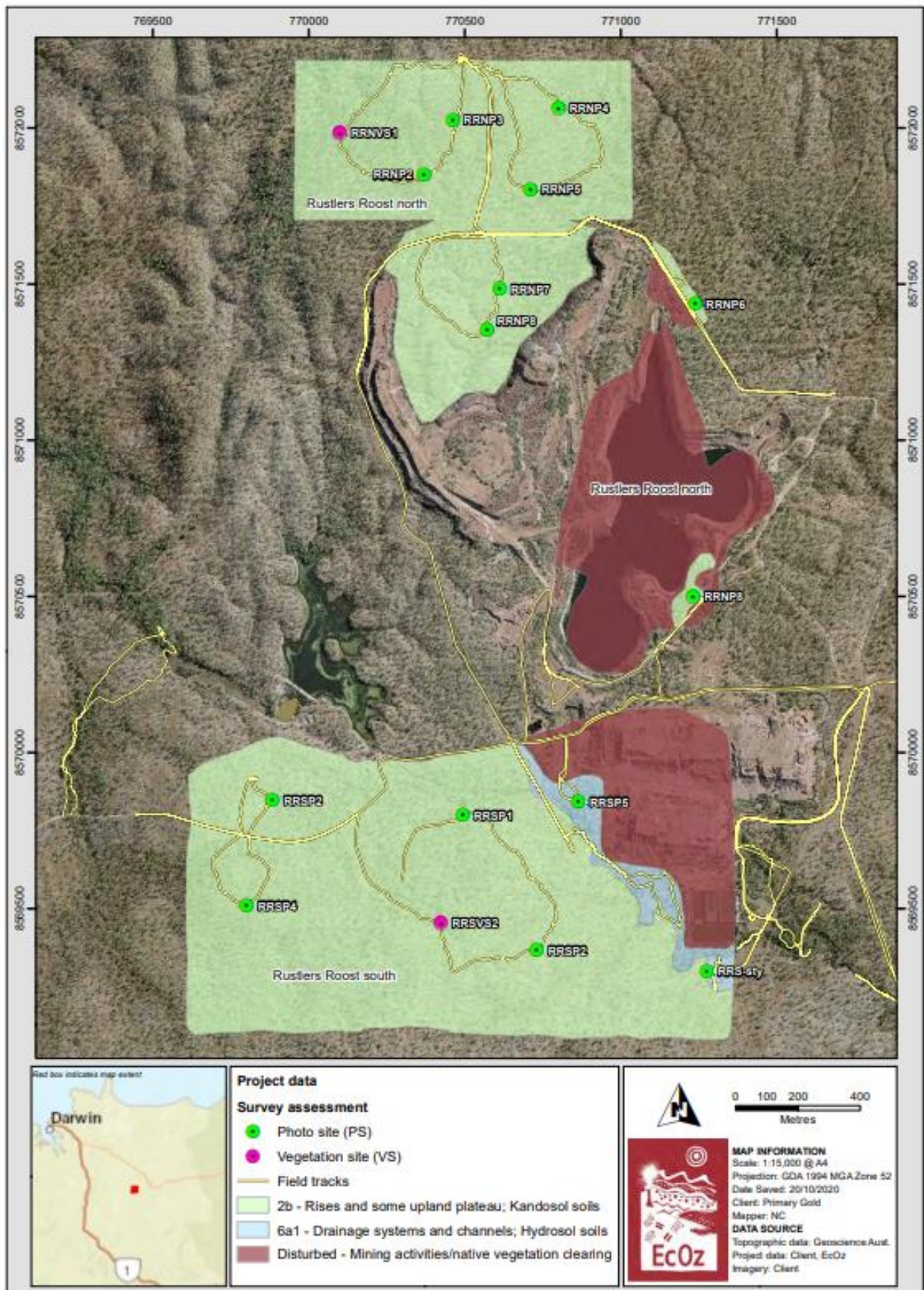


Figure 26 Rustlers Roost survey assessment land units and survey points

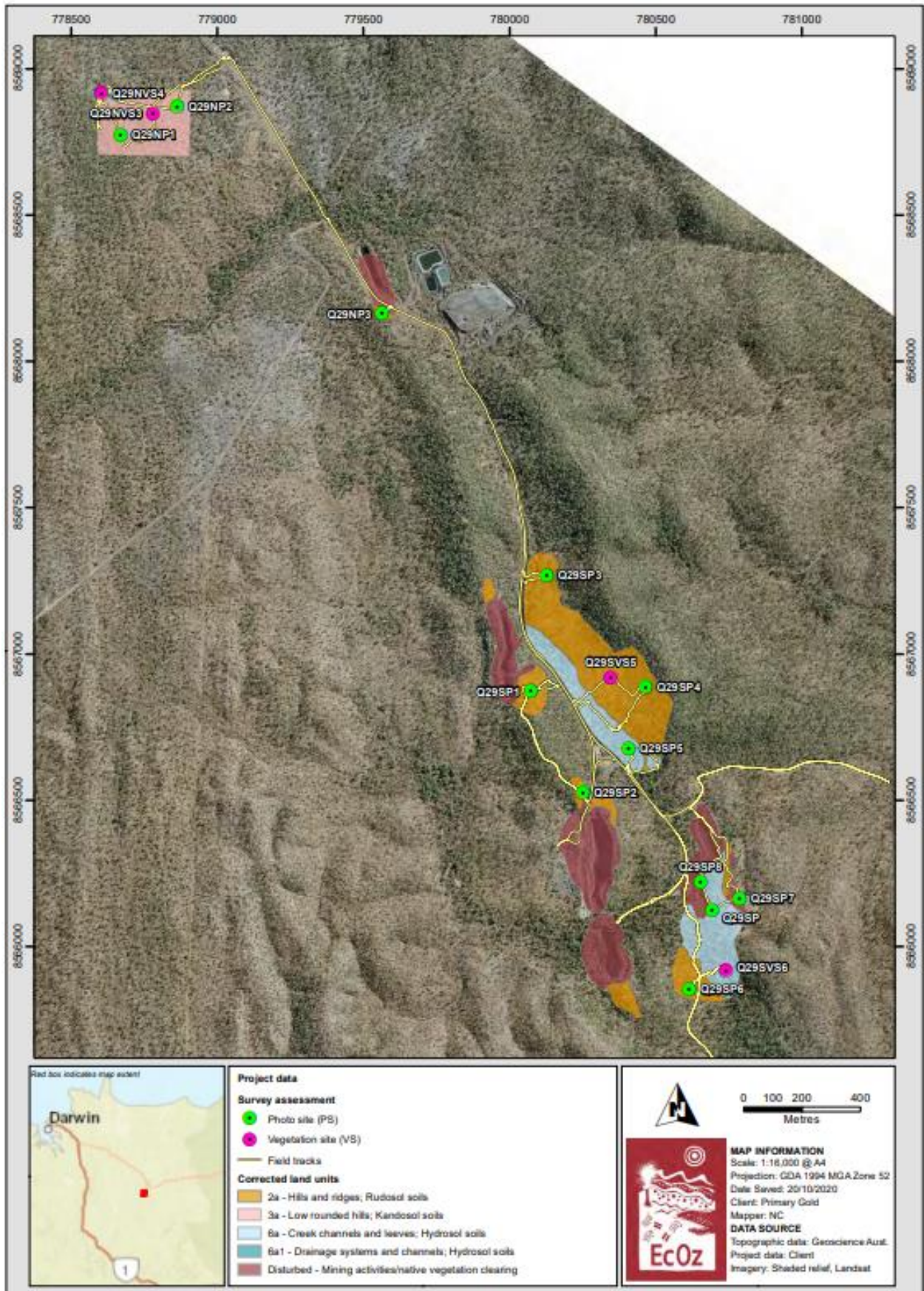


Figure 27 Quest 29 survey assessment land units and survey points

7.5 Geology

7.5.1 Regional geology

A description of Rustlers Roost and Quest 29 regional geology detailing the Pine Creek Inlier and the Stratigraphy and Lithological descriptions (Archaean to Early Proterozoic) are illustrated in Figure 30.

Pine creek inlier can be divided into five sub-regions: Litchfield Province, Rum Jungle region, Central region, South alligator valley and Alligator River.

The regional geology is further described by Land and Water Consulting of as part of the Geochemical assessment to support interpretation of the geochemical results detailed in section 7.10 of this MCP and includes.

‘Pine Creek is a metamorphosed and deformed Paleoproterozoic sequence of pelrites and psammities (silty and sandy sediments), with minor carbonate sediments and volcanics. Dolerite sills intruded into the region (Zamu Dolerite and equivalents) before the metamorphism and deformation (Ahmed 1998¹).

During the regional deformation and metamorphism, the lithologies were tightly folded and faulted, metamorphic grades range from sub-greenschist facies (Lichfield Province) to upper Amphibolite facies (western Lichfield Province to eastern Alligator River). A series of younger granites cut through the Proterozoic metamorphic sequence (Ahmed 1998⁴).

The mineral deposits are predominantly found within the central region where the granitoids dominate the geology.

The Pine Creek Inlier gold deposits have been into three groups; gold-quartz vein, stratiform gold lenses in iron rich sediments and stratabound zinc-lead-copper-gold-silver lenses (Ahmed et al., 1993⁵).

Locally the geology is described as highly weathered, thus the mining operations in the region have predominantly developed oxide ore. However, a substantial amount of transitional and sulphide mineralisation occurs beneath the oxide ore.’

7.5.1.1 Rustlers Roost site geology

Rustlers Roost site is located within the Pine Creek Orogen (PCO), a deformed and metamorphosed sedimentary basin up to 14km thick and covering an area of approximately 66,000km² and extending from Katherine in the south to Darwin

⁴ Ahmed M., 1998, Geology and Mineral Deposits of the Pine Creek Inlier and McArthur Basin, Northern Territory. AGSO Journal of Australian Geology and Geophysics, 17(3), 1-17.

⁵ Ahmed, M., Wygralak, A.S., Ferenczi, P.A. and Bajwah, Z.U. 1993, 1:250 000 Metallogenic Map Series, Pine Creek, Northern Territory Geological Survey, Explanatory Notes, SD52-8.

in the north. It hosts significant resources of gold, uranium, and platinum group elements, as well as substantial base metals, silver, iron, and tin-tantalum mineralisation, Figure 28.

The PCO comprises a series of late Archaean granite-gneiss basement domes overlain by fluvial to marine sedimentary sequences with the central region of the geosyncline. These are dominated by very low-grade metasediments and metavolcanics of the South Alligator and Finniss River groups.

Gold mineralisation within the PCO is preferentially developed within strata of the upper part of the Mount Partridge Group, the South Alligator Group, and lower parts of the Finniss River Group. The regional geology includes the Burrell Creek Formation of the Finniss River Group and Mt Bonnie Formation of the South Alligator Group, Figure 30.

Rustlers Roost deposit type is described as “post Archean lode Au (Cu-Pb-Zn)” (Geoscience Australia, 2012) and sits within sediments of the Wildman Siltstone (sandstone) and locally within Burrell Creek Formation which are a series of Proterozoic turbidite marine sediments.

The Rustlers Roost deposit is further described by Land and Water Consulting of as part of the Geochemical assessment to support interpretation of the geochemical results detailed in section 7.10 of this MCP and includes.

‘Rustlers Roost deposit also hosts mineralisation of the gold-quartz vein type. This fluid injection provided an overprint to the sedimentary geochemical signature. The quartz veins can be up to 2m thick and contain gold as free metal. The gold in the host sediments is present as sub-micron particles in arsenopyrite and pyrite, but also can occur as free gold (Ahmed, 1998).

The mudstones in the oxidised unit are characterised by hematisation forming a distinctive red colour (with some green banding). The carbonate and pyrite can be seen to have been replaced either by a void (the carbonate) or by limonite (the pyrite), this is documented as evidence of groundwater movement (Higham, 1989⁶) through this zone.

In the fresh zone the mudstones contain chlorite, dolomitic carbonate, carbonaceous material (possibly graphite), clastic quartz and accessory leucoxene. Chert nodules surrounded by pyrite are common in the chlorite rich layers, pyrite rich zones can often be seen 1mm to 1cm in thickness (Higham, 1989). The pyrite within these zones is disseminated throughout the layer, in both euhedral (up to 1mm in size) and framboidal (cluster) forms (Higham, 1989).

6 Higham, I.H., 1989. Annual Exploration Report for year four EL4773 and 4578, a report for Pegasus Gold Australia Limited by Eupene Exploration Enterprises Ltd, September 1989.

The chert is possibly formed from carbonate, these cherty units also contain pyrite, which can form up to 30% of the unit which can range in thickness from 5cm to 1m (Higham, 1989).

In general, for the region, it is documented that the gold-quartz veins formed at pressure-temperatures of approximately 1kbar and 300°C in low to moderate salinity CO₂-CH₄-H₂O-Na-Ca-Mg-Cl brines of a mixed metamorphic and magmatic source. It is likely that this mixing of the magmatic and metamorphic fluids caused the precipitation of the gold (Ahmed 1998).

There is a lack of correlation between gold mineralisation and any particular mineral assemblage. This is likely because of these multiple phases of fluid rock interaction.'

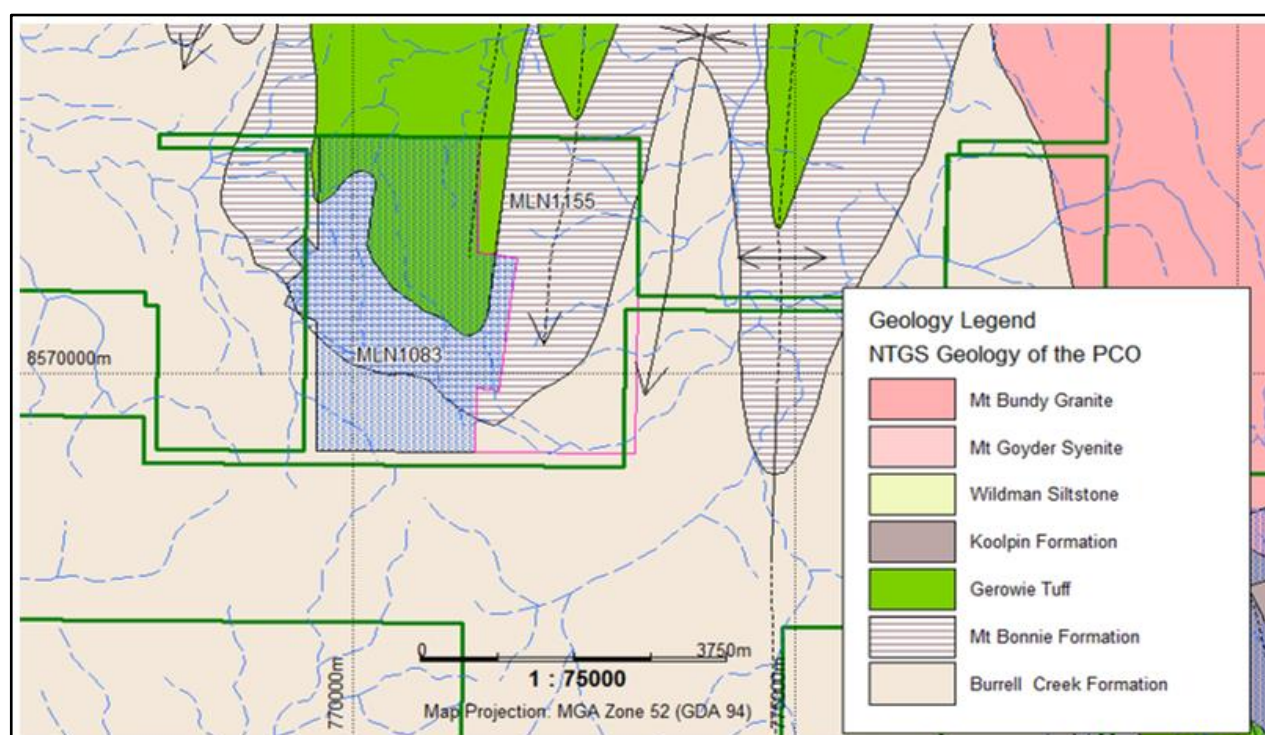


Figure 28 Geology of Rustlers Roost (ML 1083) site, (PGL, 2020)

7.5.1.2 Quest 29 site geology

Quest 29 site lies on the northern flank of the Pine Creek Inlier within a transgressive marine sequence dominated by folded shallow marine sediments of the Early Proterozoic South Alligator Group. In general, the Pine Creek Inlier consists of an extensive, but poorly exposed sequence of Early Proterozoic sediments of low to medium metamorphic grade, which were deposited in a shallow intra- cratonic geosyncline. The cratonic basement consists of Late Archaean granites. The sediments were intruded and overlain by late Early Proterozoic felsic volcanism and by later platform sequences of Middle Proterozoic age. The regional geology of the region is shown in Figure 30.

Quest 29 site geology, Figure 29, is underlain by shallow marine, iron rich and tuffaceous sediments of the South Alligator Group, which are open to tightly folded about gently south plunging axes. The group includes the Koolpin Formation, Gerowie Tuff, Mount Bonnie Formation, and the intrusive Zamu Dolerite. The Koolpin Formation consists of ferruginous siltstone and shale, with silicified hematite and chert breccias and minor silicified dolomite. The Gerowie

Tuff consists predominantly of thinly interbedded fine grain sediments, glassy crystal tuffs and tuffaceous cherts. Both the Koolpin Formation and Gerowie Tuff show extensive attenuation at fold hinges. The Koolpin Formation and Zamu Dolerite occupy the majority of Quest 29 site. Two main auriferous trends have been identified along approximately north-south oriented shear structures. The main prospects occur on shear zones within the Koolpin Formation and Zamu Dolerite. Gold mineralisation at Quest 29 is related to a structurally prepared environment. In the Koolpin Formation the gold is hosted by weakly sulphidic (pyrite-arsenopyrite) carbonaceous siltstone sequences with minor quantities of thin quartz veining. The dominant mineralised shear direction is 350-020 (i.e., parallel to fold axes) dipping 20-40 west. In the Zamu Dolerite the gold is hosted by sulphidic (pyrite-arsenopyrite) shears within the dolerite and along the western contact between the dolerite and host sediments. The dominant mineralised shear direction is 350-020 (i.e., parallel to fold axes) dipping 30-50 west within the dolerite and steeply east along the eastern contact. The sediments are moderately folded about south-southwest plunging fold axes which have near vertical axial planes. Fold axes plunge between 30 and 50 towards 170 to 200 . Folds are generally asymmetric with steeply dipping western limbs (40-65) and more moderately dipping eastern limbs (30-50).

The Q29 deposit is further described by Land and Water Consulting of as part of the Geochemical assessment to support interpretation of the geochemical results detailed in section 7.10 of this MCP and includes.

‘Gold (Au) mineralisation is associated with structural features in sulfidic carbonaceous siltstones of the Koolpin formation and highly sulfidic contact zones of the Zamu dolerite and host sediments.

Host sediment mineralogy consists of hydrothermal alteration minerals such as amphibole, chlorite, sericite, tremolite, zeolite and clays. Ore mineralogy consists of the sulphide minerals arsenopyrite, bornite, chalcopyrite, galena, pyrite and pyrrhotite (GHD 2015). ‘

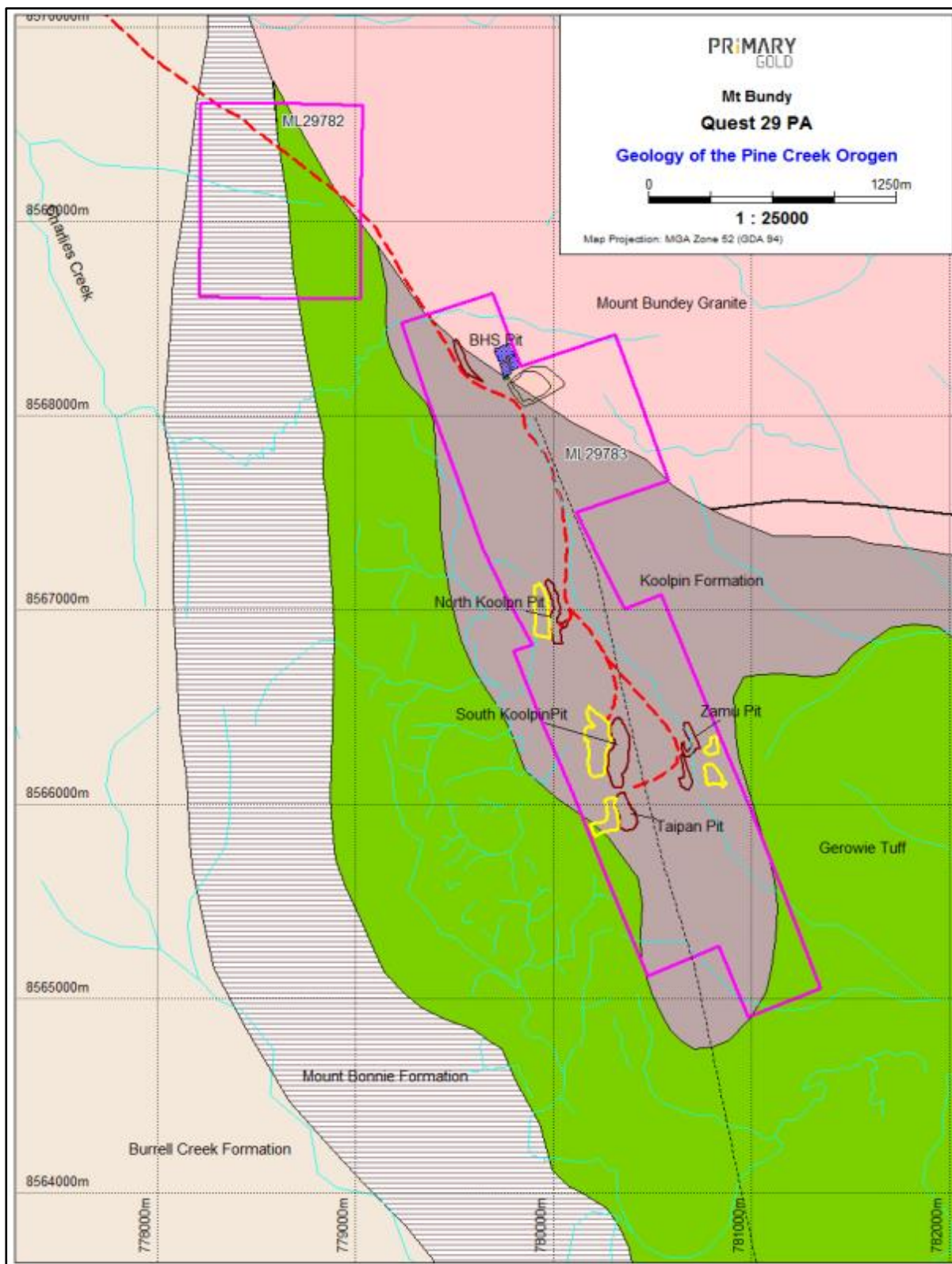


Figure 29 Geology of Quest 29 (ML 29783) site (PGL, 2019)

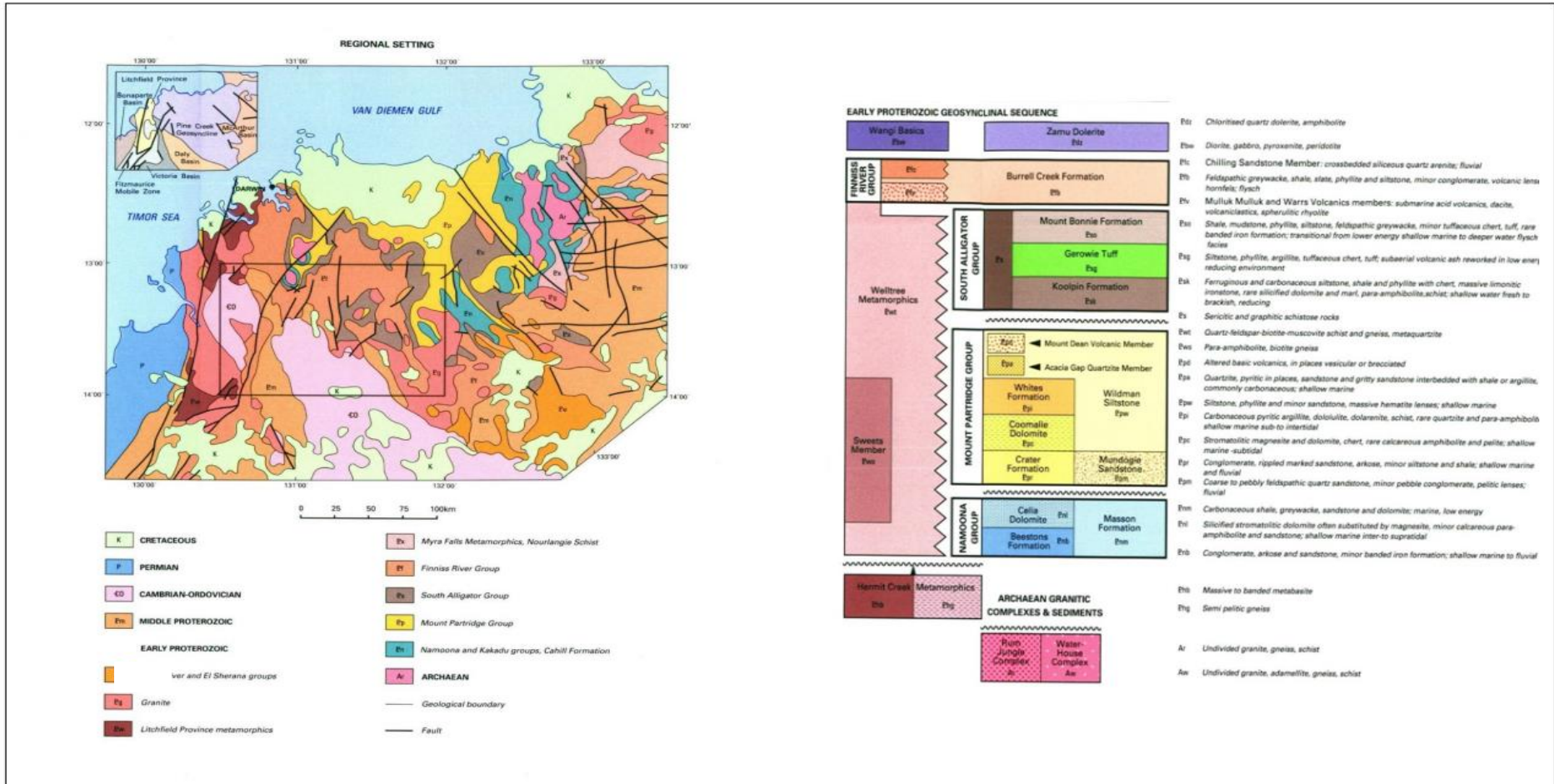


Figure 5-1 Regional Map of the Pine Creek Inlier

Figure 5-2 Archaean to Early Proterozoic Stratigraphy and Lithological Descriptions

R	Details	Date	©COPYRIGHT CDM SMITH This drawing is confidential and shall only be used for the purpose of this project.					DISCLAIMER CDM Smith has endeavored to ensure accuracy and completeness of the data. CDM Smith assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map. DATA SOURCE QLD Government Open Source Data	DESIGNER 	CLIENT 	FIGURE 5-1 and Figure 5-2
1	First Draft	29/07/21	DESIGNED	TK	CHECKED	TK					
			DRAWN	TK	CHECKED	TK					
			APPROVED	TK	DATE	29/07/21					
			Notes:								

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Figure 30 Rustlers Roost and Quest 29 regional geology context (CDM Smith, 2021a)

7.6 Hydrogeology

7.6.1 Regional and site hydrogeology

7.6.1.1 Rustlers Roost site hydrogeology

A hydrogeological baseline study was done as part of the 1994 PER. The study was undertaken by ESS, and the findings were outlined in the report "Preliminary Groundwater Investigation of the Proposed Rustlers Roost Gold Mine December 1993". Rustlers Roost groundwater environment was also assessed as part of the 1997 RMMPL Draft EIS. More recently, in 2019 PGL commissioned CDM Smith to undertake a desktop groundwater assessment of the Rustlers Roost.

The Rustlers Roost site is situated near the northern flank of the Pine Creek Inlier which is comprised of predominantly Proterozoic metasediments of the South Alligator Group. Aquifers are typically associated with increased structural deformation within the metasediments. The local aquifer system recharges by direct infiltration of rainfall and run-off through areas of aquifer outcrop or shallow sub crop and overlying cover materials.

The groundwater gradient is flat, sloping gradually at 0.2 to 0.3% toward the Mary River (approximately 20km) in the east. The groundwater level falls approximately 1.7m over 900m from west to east, (i.e., 0.2%) and 0.7 metres over 900m from the north to the south. The measured depths indicate that the level falls 2.3m over 600m from south of the lateritic plateau (0.3%) to the north. Based on field records, the standing water level (SWL) over the Rustlers Roost site is around 25 to 30m below surface. (EES, 1993)

The confined aquifer is extensive through secondary fracture permeability within the mudstone and greywacke matrix. The maximum depth of the aquifer is not known but was estimated at 30 to 80m. Using a transmissivity range of 80 to 100m²/day the hydraulic conductivity was assessed at 1 to 3.3m/day. (EES, 1993)

Anisotropy of the groundwater flow was expected in the north/south direction which is parallel to the main strike of the surrounding lithologies. The aquifer behaves in an infinite isotropic, confined, non-leaky artesian manner. Groundwater flow is affected on a local scale by wet season recharge (ESS, 1993). The local aquifer system recharges by direct infiltration of rainfall and run-off through areas of aquifer outcrop or shallow sub crop and overlying cover materials. These conditions typify the Rustlers Roost site. There are no reliable records available for the prediction of wet season recharge. (NUYTSIA, 1997)

7.6.1.2 Quest 29 site hydrogeology

Quest 29 hydrogeology and groundwater conditions is not well understood and PGL have acknowledged the hydrogeological knowledge gaps relating to existing groundwater conditions. Two existing bores (Q29MB01 and Q29MB02) located north and southwest of leach ponds have been monitored for physical and chemical and stand water levels since PGL purchase of the Quest 29 tenements in 2013. Both bores have no drilling or construction records. In October 2020, PGL had a further seven bores constructed including slug tests on ML 29783. Groundwater sampling commenced in Q4 of 2020 as part of the routine groundwater sampling programme. This data will be crucial to obtain

baseline groundwater quality information and groundwater heights prior to the approval and commencement of open cut operations in 2023.

7.6.2 Site surface water quality

7.6.2.1 Rustlers Roost groundwater quality

A Beneficial Use Declaration (BUD) for the Mary River groundwater catchment (including all groundwater within the boundary) has been set and the defined beneficial uses are environment, riparian, and agriculture. The objectives that apply are specified in the ANZG (2018) Guidelines. This BUD was gazetted on 13 February 2002 (Gazette G6). The Project area is located near the western boundary of the Mary River Groundwater BUD as shown in Figure 31.

The 1994 PER and 1997 EIS noted that the nearest identified groundwater user was the Mount Bunday Outstation (around 12km north-east). It was considered that impacts on the water quality of supply were unlikely as the bores at the Outstation are located across the regional strike and in a different drainage system.

Background Levels

Groundwater chemical behaviour is controlled by its constituents and is determined by the initial water source, the medium through which it travels as well as the quality and quantity of any infiltrating water. It is useful when undertaking groundwater investigations to initially identify any major controls on groundwater chemical behaviour (ESS, 1993).

Groundwater shows minimal dissolution of major ions from the bedrock and no detectable copper, lead, zinc, cadmium, chromium, arsenic, or mercury in the groundwater. Water quality throughout the lease is good with total dissolved solids (TDS) ranging from 10 to 50mg/L. All parameters are within the ANZECC agricultural water quality guidelines (Valdora, 1994).

The bicarbonate to chloride ratio indicates that the water is relatively young with a low buffering capacity and pH ranges from 4.9 to 5.5. The low to non-existent sulphate levels suggest that pyrite or other sulphides are absent or in minimal quantities in the oxidised and transitional weathering zones. The acidity is likely to be due to dissolved CO₂, particularly as bicarbonate is the dominant anion (Valdora, 1994).

Current Monitoring Program

The key objective of the Rustlers Roost groundwater monitoring program is to obtain quantitative information on the physical, chemical, and biological characteristics of groundwater. Water quality data is used to determine whether additional site water management strategies are required to ensure that the beneficial use of surrounding groundwater is protected.

The groundwater monitoring program is designed to assist in identifying changes over time and groundwater monitoring locations are described in Table 28 and shown in Figure 32.

Rustlers Roost groundwater conditions is not well understood and PGL have acknowledged the hydrogeological knowledge gaps relating to existing groundwater conditions. One bore located on ML 1083 (RRMB01) situated between

leach ponds and heap leach has been monitored for physical and chemical and stand water levels since PGL purchase of the Quest 29 tenements in 2013. This bore has no drilling or construction records. In October 2020, PGL had a further six bores constructed including slug tests on ML 1083. Groundwater sampling commenced in Q4 of 2020 as part of the routine groundwater sampling programme. This data will be crucial to obtain baseline groundwater quality information and groundwater heights prior to the approval and commencement of open cut operations in 2023. An outline of the groundwater programme, sampling parameters and frequency is outlined in Table 28 and Table 29.

Table 28 Rustlers Roost groundwater bore monitoring

Monitoring Site ID	Lat	Long	Monitoring Site Description	Analysis Type/Frequency					
				0	1	2	3	4	6
Groundwater bores									
RRMB01	-12.926872	131.500677	Down gradient of the heap leach pond	M	M	B	Q	B	B
RRMB02	-12.928138	131.501481	East of old leach ponds	M	M	B	Q	B	B
RRMB03	-12.931479	131.492211	South of site east of access road	M	M	B	Q	B	B
RRMB04	-12.923166	131.487615	South of Annie's Dam wall	M	M	B	Q	B	B
RRMB05	-12.918846	131.49531	West of main pit near access road	M	M	B	Q	B	B
RRMB06	-12.915522	131.502737	East of site along old haul road	M	M	B	Q	B	B
RRMB07	-12.908878	131.498342	North of WRD south	M	M	B	Q	B	B
RRMB08	-12.903331	131.492669	North of mine site	M	M	B	Q	B	B

Table 29 Rustlers Roost water monitoring parameters

Type	Analysis
Type 0	Standing water level (logger download)
Type 1	Field parameters (pH, EC, DO, redox, turbidity)
Type 2	Filtered and Total metals (Al, As, Cd, Co, Cr, Cu, Fe, Pb, Mn, Ni, U & Zn)
Type 3	Major cations (Ca, K, Na, Mg) Major anions (SO ₄) - filtered
Type 4	Titratable acidity, Alkalinity, Hardness (CaCO ₃) and Total suspended solids (TSS)
Type 6	Total nitrogen (TN), Total phosphorus (TP), Nitrate + Nitrite (NO ^x) and Ammonia (NH ³)
Frequency	
M	Monthly (when creeks are consistently flowing)
Q	Quarterly (Q1(Jan-March); Q2(April-June); Q3 (July-Sept); Q4 (Oct-Dec)
B	Biannual (first consistent flow-October/November and recessional flow April/May)

Guideline Values

There are no current GVs for groundwater ecosystem protection, however ANZECC 2000 provides values for livestock drinking water (SWGs). It is also appropriate to consider the connectivity between groundwater and surface water ecosystems and so groundwater data is compared to the applicable 80% ecosystem protection GVs and SWGs.

Groundwater Performance Against GVs

Following is an assessment of the available groundwater quality monitoring data (2016-2020) trends against the GVs. Given that there is limited data an assessment of long-term trends has not been undertaken.

RRMB01 – Downgradient of the Heap Leach Pads

Measured groundwater quality at RRMB01 indicates that the pH ranges from 5.9 to 6.2 which is less acidic than background values (4.9 to 5.5). The EC is low ranging between 110-140 μ S/cm. All total metal parameters are within the SWGs (and SSTV) which is consistent with the background data. Both Zinc and Nickel have recorded levels above the 80% GVs however additional data is required to determine whether this is a long-term trend or a sampling anomaly.

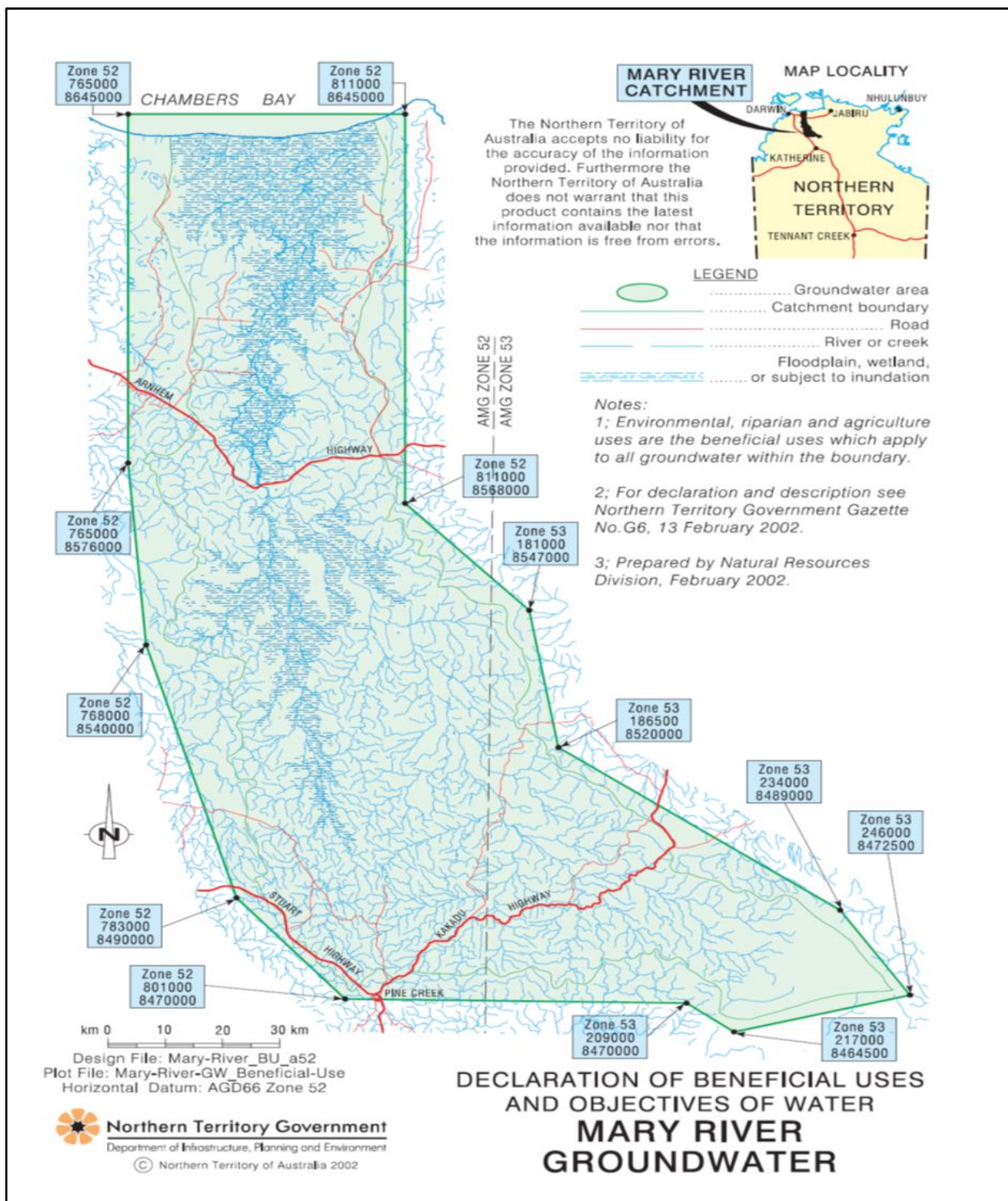


Figure 31 Mary River groundwater BUD area, (DEPWS, 2021)

7.6.2.2 Quest 29 site groundwater quality

The Q29 is located within the Pine Creek Orogen region and is directly situated over several geology units including the Koolpin Formation, Mount Bundey Granite, Gerowie Tuff, Mount Partridge Group and Zamu Dolerite. Groundwater is likely to occur in low to moderately permeable pervasive cooling and stress relief jointing, and fracturing within the

granite and metasediments (Sirocco, 1999; GHD 2019). Major faults to the north of Q29, at Toms Gully, can act as significant aquifers (i.e., Crabb Fault) or are clay filled and act as aquitards (i.e., Williams Fault) (GHD 2018).

The natural groundwater table for the Q29 has been intersected and influenced during previous mining and mineral exploration. The static natural groundwater table for the project area is generally between 5 – 25 mbgl. Groundwater usage in the area is focused on mine water management and restricted to stock watering (Sirocco, 1999).

Two monitoring bores remain of the original five drilled with both bores (MB01 and MB02) converted into monitoring bores. Q29MB01 is located to the north-west (i.e., downstream) of the Leach Pond, and Q29MB02 which is located between the BHS Pit, Heap Leach Pad, and the Leach Ponds.

An additional 22 bores are located within a 10 km radius of the Q29, which are mostly capped or backfilled historical bores. The surrounding groundwater infrastructure is focused on mining activities to the north of the site. Historically surrounding bores installed at depths ranging from 22.5 – 103.0 mbgl, with the exception one bore drilled in 1976, which extends to a depth of 181.6 mbgl. Bores which were tested, recorded standing water level in the range of 0 – 22 mbgl, at yields of between 1.0 - >10.0 L/s.

A Beneficial Use Declaration (BUD) for the Mary River groundwater catchment (including all groundwater within the boundary) has been set and the defined beneficial uses are environment, riparian, and agriculture. The objectives that apply are specified in the ANZECC Guidelines. This BUD was gazetted on 13 February 2002 (Gazette G6). Q29 lies within the Mary River Groundwater BUD as shown in Figure 31.

The 1994 PER and 1997 EIS noted that the nearest identified groundwater user was the Mount Bunday Outstation (around 12km north-east). It was considered that impacts on the water quality of supply were unlikely as the bores at the Outstation are located across the regional strike and in a different drainage system.

Background Levels

Q29 natural groundwater table has been intersected and influenced during previous mining and mineral exploration. The static natural groundwater table is generally between 5 – 25 metres below ground level (MBGL).

Background groundwater quality is based on the historic groundwater quality monitoring that has occurred since 2010 for Q29MB01 and 2011 for Q29MB02, and included the following analytes - pH, EC, TSS, major cations, major anions, filtered and total metals and in 2020 nutrients were included in the water monitoring programme.

In general, groundwater pH is neutral to slightly acidic (6.09 - 7.60) across both bores. Electrical conductivity ranged between 210 $\mu\text{S}/\text{cm}$ and 1213 $\mu\text{S}/\text{cm}$, with most EC values above the ANZECC 95% species protection guidance value of 250 $\mu\text{S}/\text{cm}$. No EC values exceeded the ANZECC/ARMCANZ (2000) stock drinking water guidance value of 3000 $\mu\text{S}/\text{cm}$. Like surface waters, groundwater has exhibited frequent exceedances of the ANZECC 95% species protection guidance values for arsenic and zinc. In addition, there have been numerous elevated concentrations of chromium in groundwater's across monitoring events. All measured metals concentrations are within the ANZECC stock drinking water guidelines.

Current Monitoring Program

The key objective of the Q29 groundwater monitoring program is to obtain quantitative information on the physical, chemical, and biological characteristics of groundwater. Water quality data is used to determine whether additional site water management strategies are required to ensure that the beneficial use of surrounding groundwater is protected. The groundwater monitoring program is designed to assist in identifying changes over time.

PGL installed seven monitoring bores (Q29MB03, Q29MB04, Q29MB05, Q29MB06, Q29MB07, Q29MB08, Q29MB09) on ML 29783 in October 2020 with three sampling events completed (November 2020, April 2021, and June-July 2021) with the next round due in September-October 2021. The bores were installed to obtain a detailed understanding of hydrogeological conditions and groundwater quality prior to the recommencement of gold mining activities at Q29, subject to formal approval.

This data will be crucial to obtain baseline groundwater quality information and groundwater heights prior to the approval and commencement of open cut operations in 2023. An outline of the groundwater programme, sampling parameters and frequency is outlined in Table 30 and Table 31 and bore locations is detailed in Figure 32.

Table 30 Q29 groundwater bore monitoring

Site	Lat	Long	Monitoring Site Description	Analysis Type/Frequency					
				0	1	2	3	4	6
Groundwater bores									
Q29MB01	-12.937218	131.577163	Observation bore, 50 m north of the SWQ Leach Pond	M	M	B	Q	B	B
Q29MB02	-12.939063	131.577740	Monitoring bore south-west of the Leach Ponds	M	M	B	Q	B	B
Q29MB03	-12.962357	131.587479	South of site along old exploration track	M	M	B	Q	B	B
Q29MB04	-12.957758	131.584854	East of South Koolpin pit	M	M	B	Q	B	B
Q29MB05	-12.954458	131.585539	Northwest of Zamu pit; east along access road	M	M	B	Q	B	B
Q29MB06	-12.952111	131.579905	Southwest of North Koolpin pit along exploration track	M	M	B	Q	B	B
Q29MB07	-12.949632	131.581604	East of North Koolpin pit; east of access road	M	M	B	Q	B	B
Q29MB08	-12.940064	131.581653	Southeast of heap leach pad	M	M	B	Q	B	B
Q29MB09	-12.936363	131.574723	North of site at entrance gate to site	M	M	B	Q	B	B

Table 31 Q29 groundwater monitoring parameters

Type	Analysis
Type 0	Standing water level (logger download)
Type 1	Field parameters (pH, EC, DO, redox, turbidity)
Type 2	Filtered and Total metals (Al, As, Cd, Co, Cr, Cu, Fe, Pb, Mn, Ni, U & Zn)
Type 3	Major cations (Ca, K, Na, Mg) Major anions (SO ₄) - filtered
Type 4	Titrateable acidity, Alkalinity, Hardness (CaCO ₃) and Total suspended solids (TSS)
Type 6	Total nitrogen (TN), Total phosphorus (TP), Nitrate + Nitrite (NO ^x) and Ammonia (NH ³)
Frequency	
M	Monthly (when creeks are consistently flowing)
Q	Quarterly (Q1(Jan-March); Q2(April-June); Q3 (July-Sept); Q4 (Oct-Dec)
B	Biannual (first consistent flow-October/November and recession flow April/May)

Guideline Values

There are no current GVs for groundwater ecosystem protection, however ANZECC 2000 provides values for livestock drinking water (SWGs). It is also appropriate to consider the connectivity between groundwater and surface water ecosystems and so groundwater data is compared to the applicable 80% ecosystem protection GVs and SWGs.

Groundwater Performance Against GVs

Following is an assessment of the available groundwater quality monitoring data from 2010-2021 trends against the GVs for monitoring bores Q29MB01 and Q29MB02. For the remaining seven new bores, groundwater quality monitoring data is from 2020-2021 trends against the GVs.

Q29MB01

Q29MB01 is named as an observation bore and is located 50m metres north of the SWQ leach pond. Measured groundwater quality taken from 2010-2021 data indicates that the pH ranges from 5.96 to 7.3. The EC is low ranging between 210-1128µS/cm. Turbidity ranged from 3-290 NTU. All total metal parameters are within the SWGs (and SSTV). With a hardness correction factor for metals, Copper recorded levels events above the 80% GVs, and Copper median values (2010-2020) were below 80% GVs .

Q29MB02

Q29MB02 is a monitoring bore and is located south-west of the leach ponds. Measured groundwater quality taken from 2011-2021 data indicates that the pH ranges from 5.54 to 7.5. The EC is low ranging between 210-337µS/cm. Turbidity ranged from 0.7-400 NTU. All total metal parameters are within the SWGs (and SSTV) and with a hardness correction factor for Zinc recorded levels events above the 80% GVs.

Q29MB03

Q29MB03 is a monitoring bore and is located south of ML 29783 along old exploration track. Measured groundwater quality taken from 2020-2021 data indicates that the pH ranges from 4.47 to 5.86. The EC is low ranging between 38.5-83.5 μ S/cm. Turbidity ranged from 0.98-5.4 NTU. All total metal parameters are within the SWGs (and SSTV). With a hardness correction factor for metals Copper and Zinc recorded levels events above the 80% GVs.

Q29MB04

Q29MB04 is a monitoring bore and is located East of South Koolpin pit. Measured groundwater quality taken from 2020-2021 data indicates that the pH ranges from 6.46 to 6.77. The EC is low ranging between 381-446 μ S/cm. Turbidity ranged from 0.39-12.3 NTU. All total metal parameters are within the SWGs (and SSTV). Arsenic, Copper (Hardness corrected) and Zinc (Hardness corrected) recorded levels events above the 80% GVs.

Q29MB05

Q29MB05 is a monitoring bore and is located northwest of Zamu pit, east along access road. Field records indicate SWL was at 0.47m form TOC in February 2021. The bore was overflowing at a rate of 30-40 l/min in March and April 2021.

Measured groundwater quality taken from 2020-2021 data indicates that the pH ranges from 6.39 to 6.89. The EC is low ranging between 406-463 μ S/cm. Turbidity ranged from 0.55-3.94 NTU. All total metal parameters are within the SWGs (and SSTV) and below 80% GVs.

Q29MB06

Q29MB06 is a monitoring bore and is located southwest of North Koolpin pit along exploration track.

Measured groundwater quality taken from 2020-2021 data indicates that the pH ranges from 4.73 to 6.2. The EC is low ranging between 166-212 μ S/cm. Turbidity ranged from 0.68-3.32 NTU. All total metal parameters are within the SWGs (and SSTV). Copper (Hardness corrected) recorded levels events above the 80% GVs.

Q29MB07

Q29MB07 is a monitoring bore and is located east of North Koolpin pit, east of access road.

Measured groundwater quality taken from 2020-2021 data indicates that the pH ranges from 6.4 to 6.5. The EC ranging between 371-437 μ S/cm. Turbidity ranged from 0.95-2.67 NTU. All total metal parameters are within the SWGs (and SSTV) and below 80% GVs.

Q29MB08

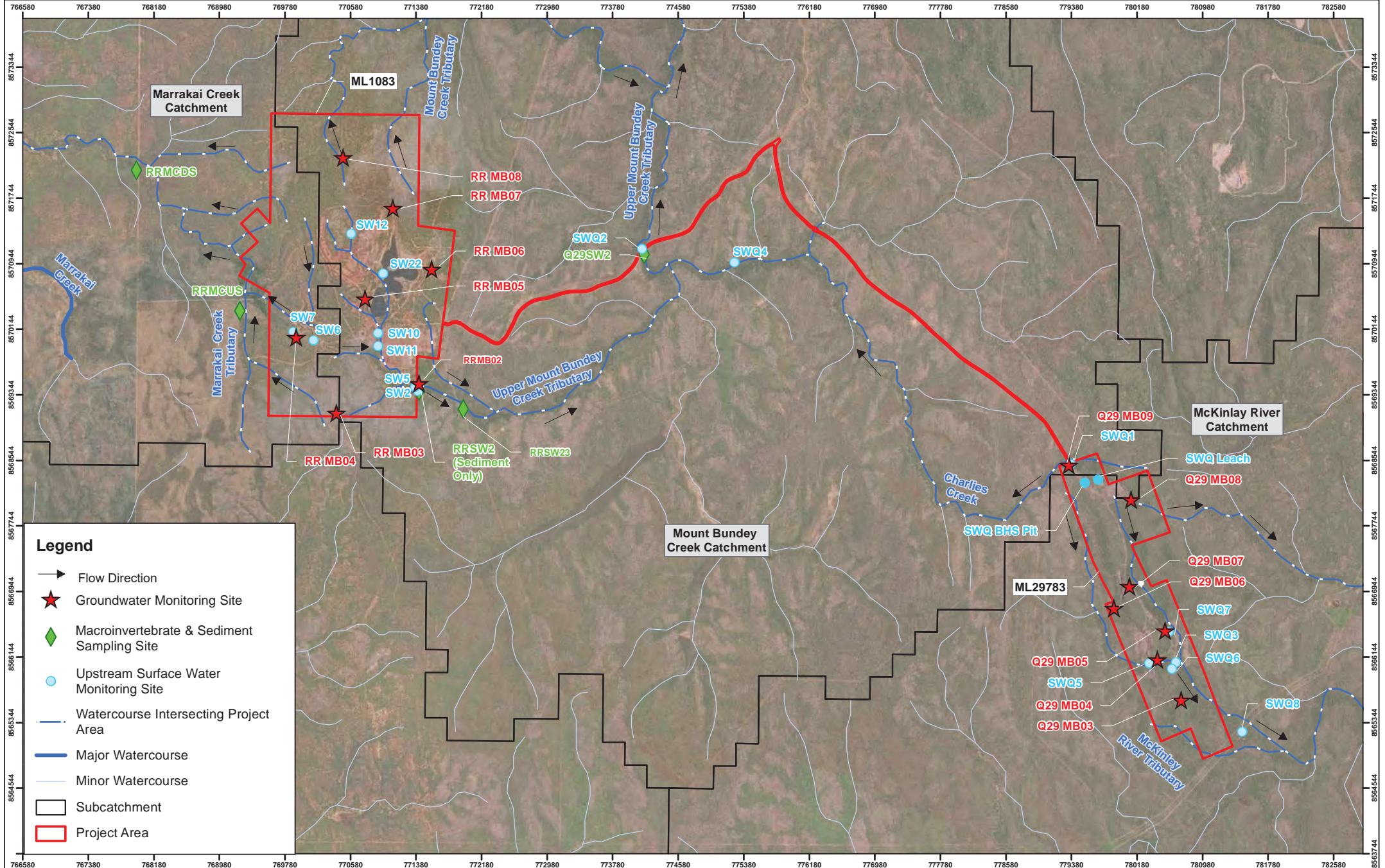
Q29MB08 is a monitoring bore and is located southeast of heap leach pad.

Measured groundwater quality taken from 2020-2021 data indicates that the pH ranges from 6.3 to 6.6. The EC ranging between 415-596 μ S/cm. Turbidity ranged from 1.09-2.46 NTU. All total metal parameters are within the SWGs (and SSTV) and below 80% GVs.

Q29MB09

Q29MB09 is a monitoring bore and is located north of site at entrance gate to site.

Measured groundwater quality taken from 2020-2021 data indicates that the pH ranges from 5.65 to 6.13. The EC ranging between 211-259 μ S/cm. Turbidity ranged from 0.35-11.1 NTU. All total metal parameters are within the SWGs (and SSTV). Zinc (Hardness corrected) recorded levels events above the 80% GVs.

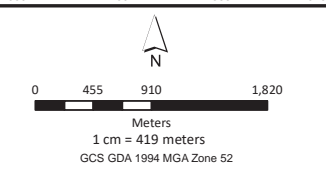


Legend

- Flow Direction
- ★ Groundwater Monitoring Site
- ◆ Macroinvertebrate & Sediment Sampling Site
- Upstream Surface Water Monitoring Site
- Watercourse Intersecting Project Area
- Major Watercourse
- Minor Watercourse
- Subcatchment
- ▭ Project Area

R	Details	Date
1	Final	26/08/21
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FIGURE 32

Proposed Ongoing Monitoring Sites – Upstream

DRG Ref: 1001087-EIS-07-7.31

7.7 Hydrology

7.7.1 Regional and site hydrology

A description of the Project area hydrology is distributed across two maps. The north area map details the camp location, major and minor drainage, sub catchment, pastoral lease boundary and the Mary River coastal floodplain which is an area of conservation significance and registered in the directory of important wetlands. Figure 36. The south area map details Rustlers Roost and Quest 29 sites including the existing mine disturbance footprints, major and minor drainage, sub catchment boundaries and pastoral lease boundaries and shown in Figure 37.

7.7.2 Rustlers Roost site hydrology

Rustlers Roost tenement (ML 1083) lies within the Adelaide and Mary River catchments. The western third of ML 1083 forms the headwaters of Marrakai Creek which flows into the Adelaide River (i.e., Annie's Dam). The remainder of the lease (historical mining area) is situated in the head waters of Mount Bunday Creek which has a catchment of around 150km².

Mount Bunday Creek changes its flow direction and eventually drains via Hardies Creek into the Mary River which is located approximately 20km east of the Rustlers Roost. Mount Bunday Creek is an ephemeral creek with limited flow and isolated pools during the dry season. The Creek typically flows during the wet season and only flows strongly for around 3-4 weeks a year.

Mount Bunday Creek water usage is probably limited to stock drinking water (during the wet season) and the support of the ephemeral aquatic flora, fauna. The nearest permanent billabong thought capable of providing suitable year-round habitation for aquatic fauna is located some 12km downstream of the Rustlers Roost site (AGC, 1994a).

The local catchment is comprised of a series of ridges and dissected hills which are drained by small steep rivulets. These small valley systems converge into a single creek channel in the south-east of the rustlers Roost site. Most of the catchment contains outcropping rock and the mining area has a small external catchment area of around 2.2km².

Runoff from the catchment is expected to occur rapidly following rainfall events and recession of storm events is also expected to be rapid. Rustlers Roost site is unlikely to be affected by riverine flooding (i.e., flooding generated from further upstream). The dominant flooding mechanism is expected to be the rapid generation of overland flow in response to local catchment rainfall. A flood model has been developed for the project and details included in the projects EIS. To illustrate inflows and outflows, a Site Water Balance model schematic is shown in Figure 33.

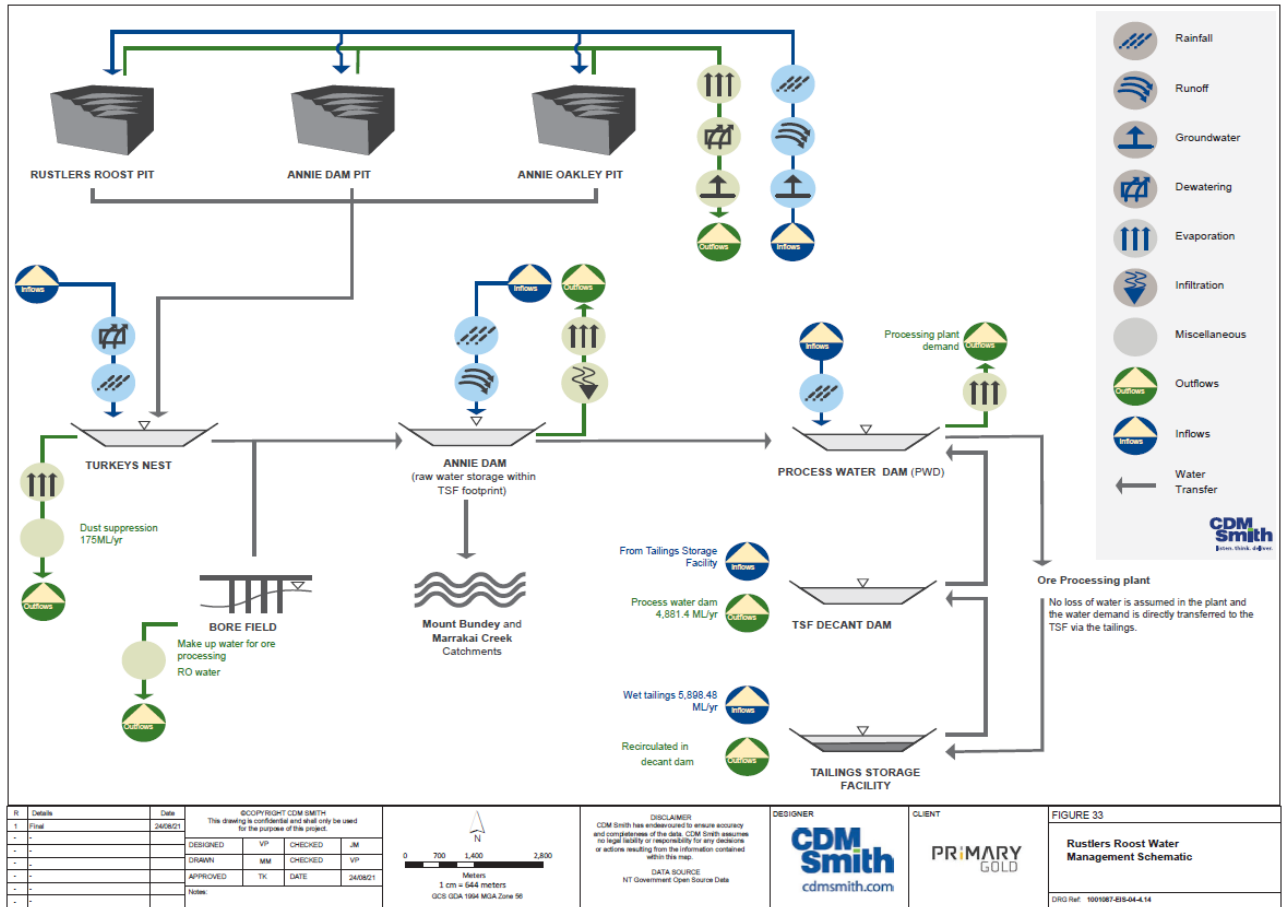


Figure 33 Rustlers Roost site water balance model schematic

7.7.2.1 Quest 29 site hydrology

The local catchment area for Q29 comprises a series of small ridges and dissected hills, which are drained by small unnamed steep ephemeral streams. Stream flows only occur during the wet season months from October to May. These small valley systems converge into a single creek channel near the southeast corner of the mineral claims and form part of the lower catchment for the McKinley River, which in turn feeds into the Mary River. The area surrounding the Q29 dump leach infrastructure drains north into Charlies Creek, which in turn flows into Mt Bundy Creek upstream of the Rustlers Roost Mine. In 2011 surface drains were constructed to divert surface water away from draining onto the heap leach pads, this material is diverted away from the heap leach material to nearby creek lines, restricting the exposure of the leach pad material to surface water. However, there is some surface water that drains into the heap leach pad area and is subsequently captured by the leach ponds and associated surge pond. To mitigate overflow of the leach ponds a pump is installed for the duration of the wet season which will pump into the BHS Pit if required to prevent the ponds from overflowing. First flows in streams of Northern Australia are characterised by high levels of soluble and physical constituents (i.e., turbidity, suspended matter) due to the “flushing” effect of first rains on the catchment following the dry season. Water quality typically improves throughout the wet season, with the highest water quality encountered during the peak events late in the wet season. Tropical catchment areas tend to produce flows around 10

– 30% of the incident rainfall monthly, depending upon climatic condition and the nature of stream channels and catchments.

GHD Consultants prepared a desktop site water balance for Quest 29 site in April 2019 for the existing my disturbances. This site water balance is a basic framework for PGL to gain a clearer understanding of catchment flows. The model will be reviewed and refined as field data and further information becomes available and for the Project EIS.

Table 32 details surface water storage areas (pits), heap leach area and ponds located on Quest 29 ML 29783.

Each of the sub catchments spatial extent developed as part of the site water balance model is detailed in Figure 35. ML 29783 is the only tenement held under Q29 authorisation containing bonded mined domain features (i.e., pits/ponds, WRD’s) and therefore this is the only site water balance for Quest 29 site. To illustrate inflows and outflows, a Site Water Balance model schematic is show in Figure 34.

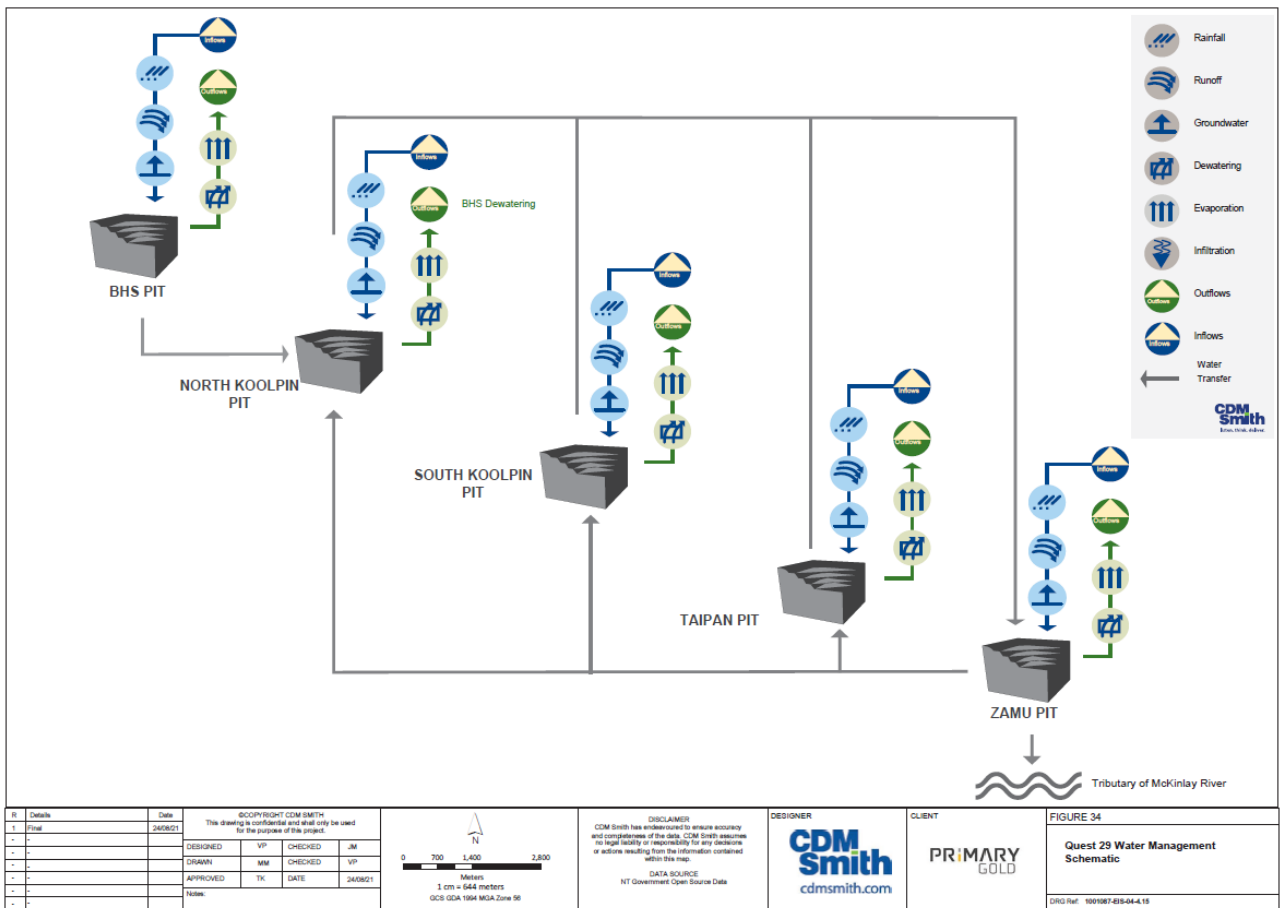


Figure 34 Quest 29 site water balance model schematic

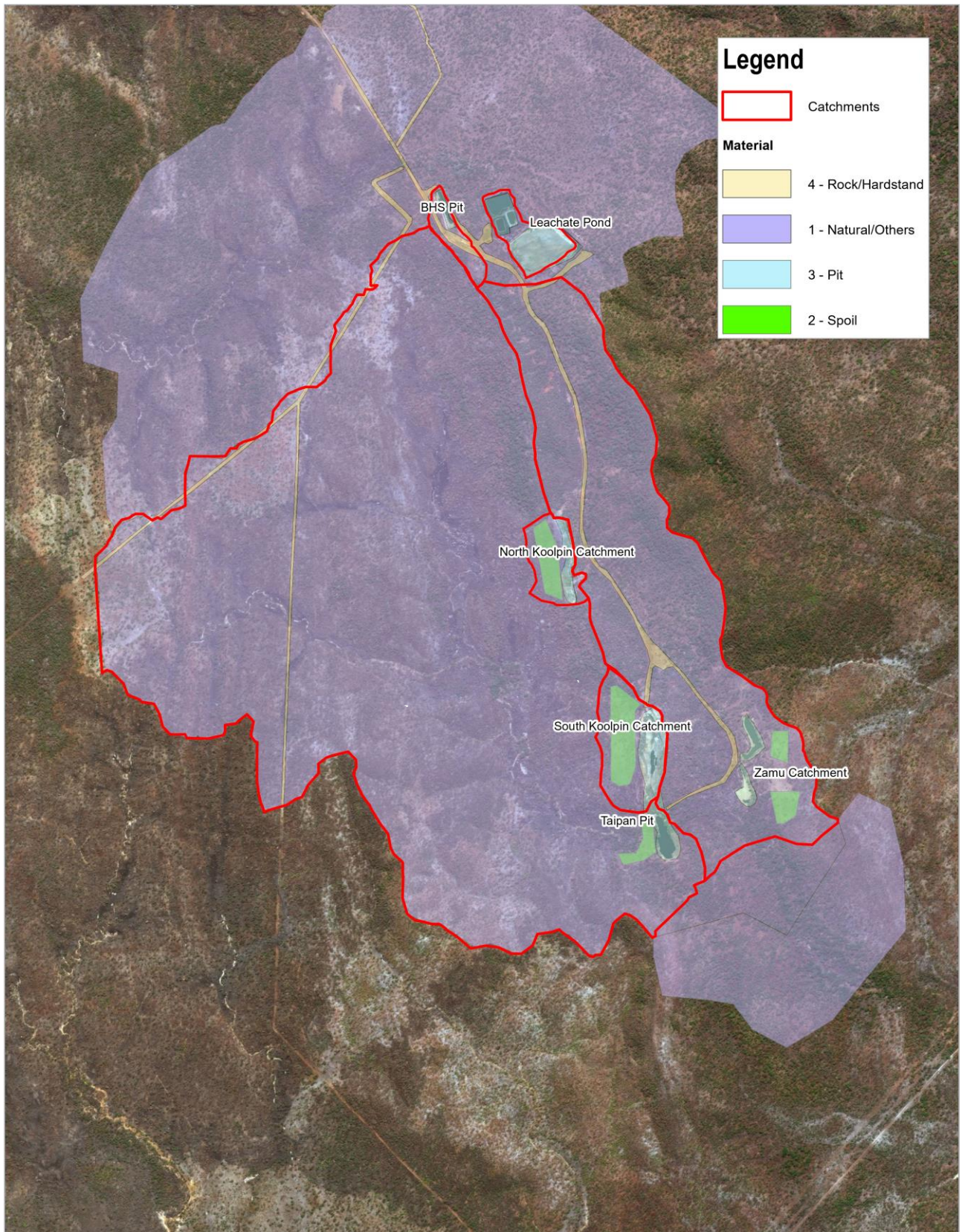


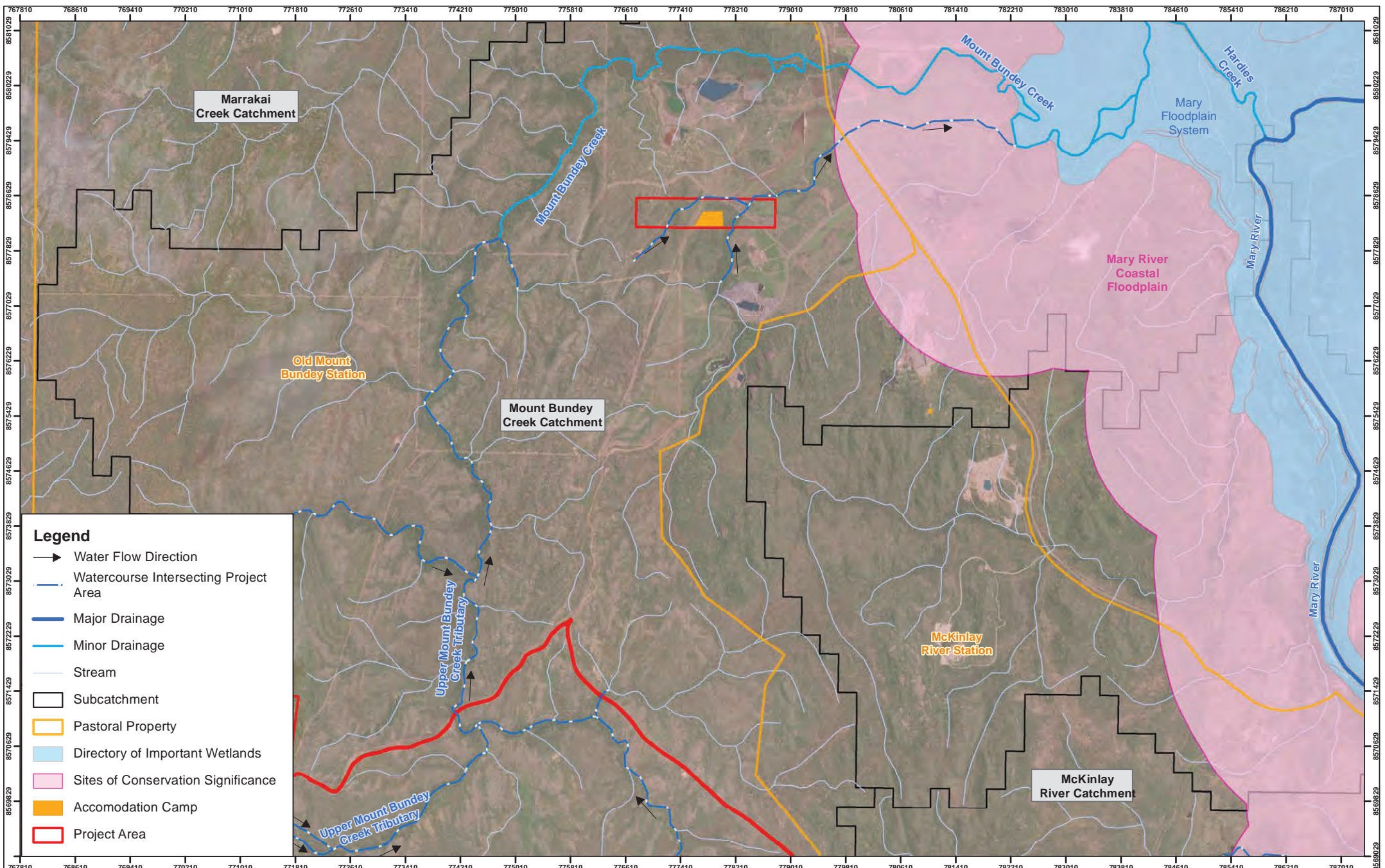
Figure 35 Quest 29 site sub catchments, (GHD Consultants, 2019)

Each sub catchment area includes the water management features, WRD and land use distributions are documented as a % of total area and are summarised in Table 32.

Table 32 Quest 29 site sub catchment areas with existing mine disturbances, (GHD Consultants, 2019)

Sub catchment	Water management feature			Hardstand ² (%)	WRD ² (%)	Undisturbed ² (%)
	Pit (%)	Max volume ¹ (ML)	Catchment Area ² (ha)			
North Koolpin	North Koolpin Pit (21%)	125	5.5	0%	North Koolpin WRD (35%)	44%
South Koolpin	South Koolpin Pit (29%)	84	10.4	0%	West Koolpin WRD (31%)	40%
Taipan Pit	Taipan Hill pit (0.3%)	40	324	0.2%	Taipan WRD (0.5%)	98%
Zamu Catchment	Zamu Pit (1%)	51	97	4%	Zamu WRD (2%)	93%
BHS	BHS Pit (14%)	18.2	2.9	23%	0	63%
Leachate ponds	Heap Leach ponds (27%)	25.1	5.4	0%	Heap Leach Pad (49%)	23%

¹(G Farnell/C Hastie, 2020) ²(GHD Consultants, 2019)



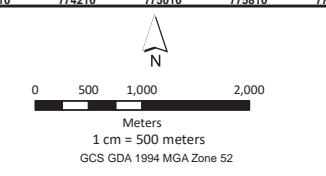
- Legend**
- ➔ Water Flow Direction
 - Watercourse Intersecting Project Area
 - Major Drainage
 - Minor Drainage
 - Stream
 - ▭ Subcatchment
 - ▭ Pastoral Property
 - ▭ Directory of Important Wetlands
 - ▭ Sites of Conservation Significance
 - ▭ Accomodation Camp
 - ▭ Project Area

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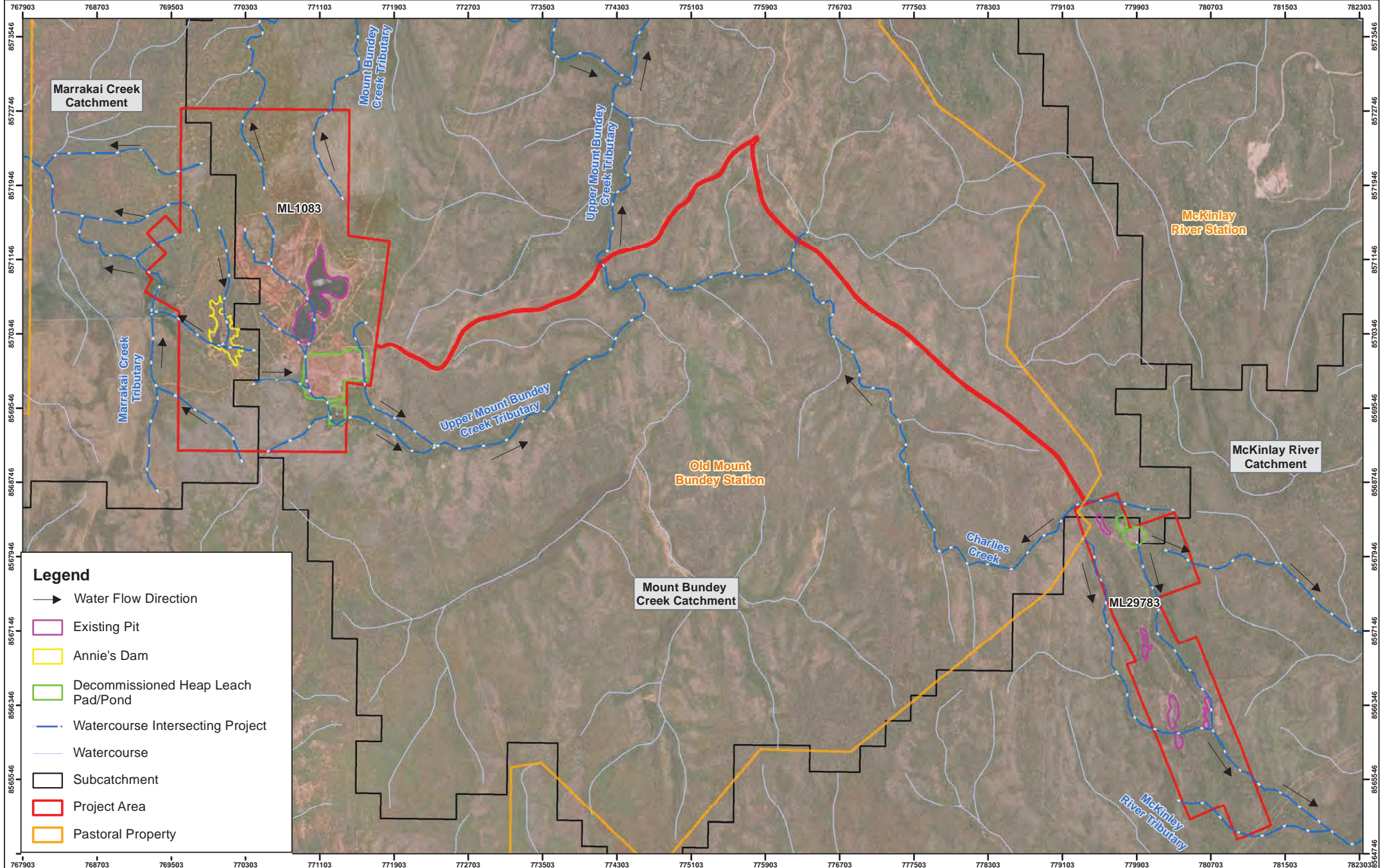
DATA SOURCE
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FIGURE 36

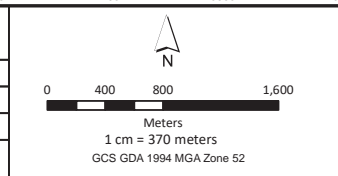
Map of Project Area Hydrology (North)

DRG Ref: 1001087-EIS-05-5.5



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FIGURE 37

Map of Project Area Hydrology (South)

DRG Ref: 1001087-EIS-05-5.6

7.7.3 Site surface water quality

7.7.3.1 Rustlers Roost site surface water quality

An important part of water quality management is to identify how the community values and uses a water resource. Beneficial uses describe how a water resource benefits the community. Throughout the NT, beneficial uses or values have been set for major aquifers and river catchments. There are seven categories used to describe values for surface water and groundwater and these values are used to set water quality targets. The same water quality is not required for all types of water use.

Beneficial Use Declarations (BUDs) assist in the development of water management plans. The plans may result in an aim to improve the current water conditions, achieve different water quality in parts of a catchment or recognise that a water resource cannot achieve a certain quality in the short term. A BUD is also used to inform a Waste Discharge Licence (WDL); they establish the objectives or guidelines for a water resource to protect against unwanted water quality impacts.

A BUD for the Mary River surface water catchment (including all tributaries, lakes, lagoons, swamps, and marshes) has been set and the defined beneficial uses are environment, riparian and cultural. The objectives that apply are specified in the Guidelines for Fresh and Marine Waters (ANZECC Guidelines). This BUD was gazetted on 13 February 2002 (Gazette G6) and is shown in Figure 38. The Mary River Surface Water BUD transects Rustlers Roost and includes the historical mine area but not Annie's Dam.

There is also a BUD for the Mount Bunday Creek as shown in Figure 39 which is located around 6km north-east of the Rustlers Roost site tenement. Beneficial uses are stock water supply for the defined part of the waterway and aquatic ecosystem protection for the remainder. This BUD was gazetted on 11 June.

Background Levels

The 1994 AGC Rustlers Roost Gold Project Hydrological and Water Balance Study was prepared as part of the PER and included an assessment of surface water quality at the Rustlers Roost site. It was noted that the available water quality data indicated that runoff is highly variable with dissolved and suspended solids, sulphate, and some metals (notably aluminium, iron and manganese) varying over several orders of magnitude; however, other trace elements and metals are generally low. As with most surface drainages in the region, pH is slightly acidic to near neutral (AGC, 1994a).

Current Monitoring Programme

The key objective of the Rustlers Roost site surface water monitoring program is to obtain quantitative information on the physical, chemical, and biological characteristics of surface water. Water quality data is used to determine whether additional site water management strategies are required to ensure that the beneficial use of surrounding surface water is protected.

The monitoring program forms part of the EMS to ensure that there are appropriate action and reporting protocols.

In late 2016 PGL improved the accuracy and integrity of its surface water monitoring by ensuring that samples are collected in line with company procedures and industry best practice, utilising a reputable laboratory that is NATA

accredited and applying appropriate QA/QC practices. Based on this, only data from 2016 onwards (other than reported historical data) has been considered in the MCP as this is the most robust and still includes any seasonal variations.

The Rustlers Roost site surface water monitoring program is designed to assist in identifying changes over time and is described in Table 33 and shown in Figure 32. Analytes and sampling frequencies for the surface water monitoring program are provided in Table 34.

Table 33 Rustlers Roost surface water monitoring programme

Monitoring Site ID	Lat	Long	Monitoring Site Description	Analysis Type/frequency					
				0	1	2	3	4	6
Surface Water creeks and drainage features				Frequency					
SW2	771428	8569426	Downstream of stormwater pond	-	M	B	Q	B	B
SW6	770130	8570006	Spillway of Annie's Dam	-	M	B	Q	B	B
SW7	769723	8570262	Downstream of Annie's Dam spillway	-	M	B	Q	B	B
SW10	770919	8570094	ROM drainage (before influence of heap leach)	-	M	B	Q	B	B
SW11	770920	8569935	Downstream of SW10 in heap leach pad drain (at culvert)	-	M	B	Q	B	B
SW12	770590	8571310	Northern drainage of WRD	-	M	B	Q	B	B
SW23	771900	8569190	Downstream of stormwater pond	-	M	B	Q	B	B
SWQ2	774154	8571092	Mount Bunday Creek crossing on the Rustlers Roost site access road (downstream) -reported in Quest 29 MMP	-	M	B	Q	B	B
Pits and Ponds									
SW5	771365	8569398	Storm water pond	-	M	B	Q	B	B
SW22	770933	8570702	Rustlers Roost main pit	-	M	B	Q	B	B

Table 34 Rustlers Roost site surface water monitoring parameters

Type	Analysis
Type 0	Standing water level
Type 1	Field parameters (pH, EC, DO, redox, turbidity)
Type 2	Filtered and Total metals (Al, As, Cd, Co, Cr, Cu, Fe, Pb, Mn, Ni, U & Zn)
Type 3	Major cations (Ca, K, Na, Mg) Major anions (SO ₄) - filtered
Type 4	Titrateable acidity, Alkalinity, Hardness (CaCO ₃) and Total suspended solids (TSS)
Type 6	Total nitrogen (TN), Total phosphorus (TP), Nitrate + Nitrite (NO ^x) and Ammonia (NH ³)
Frequency	
M	Monthly (when creeks are consistently flowing)
Q	Quarterly (Q1(Jan-March); Q2(April-June); Q3 (July-Sept); Q4 (Oct-Dec)
B	Biannual (first consistent flow-October/November and recessional flow April/May)

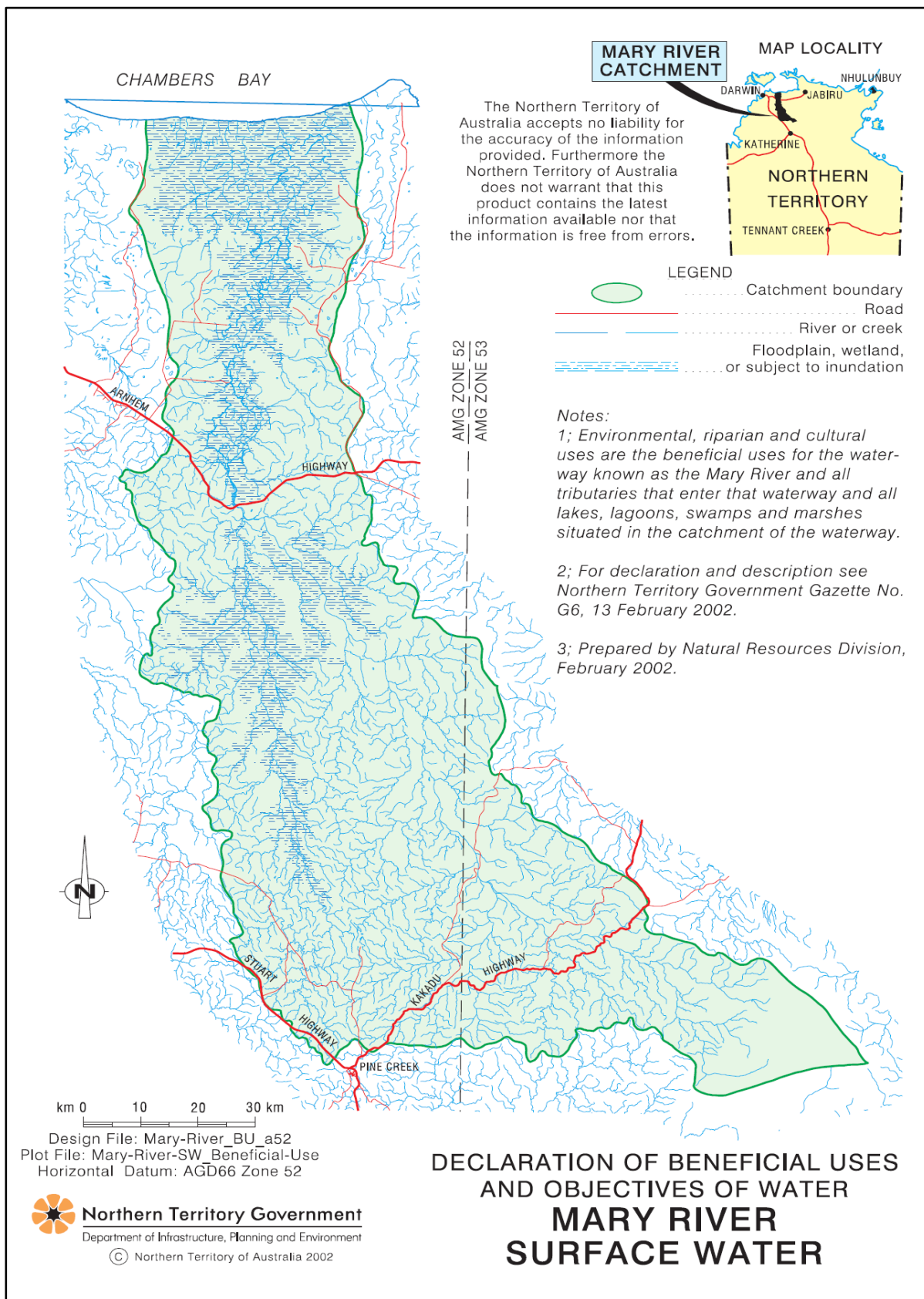


Figure 38 Mary River surface water BUD area, (DEPWS, 2021)

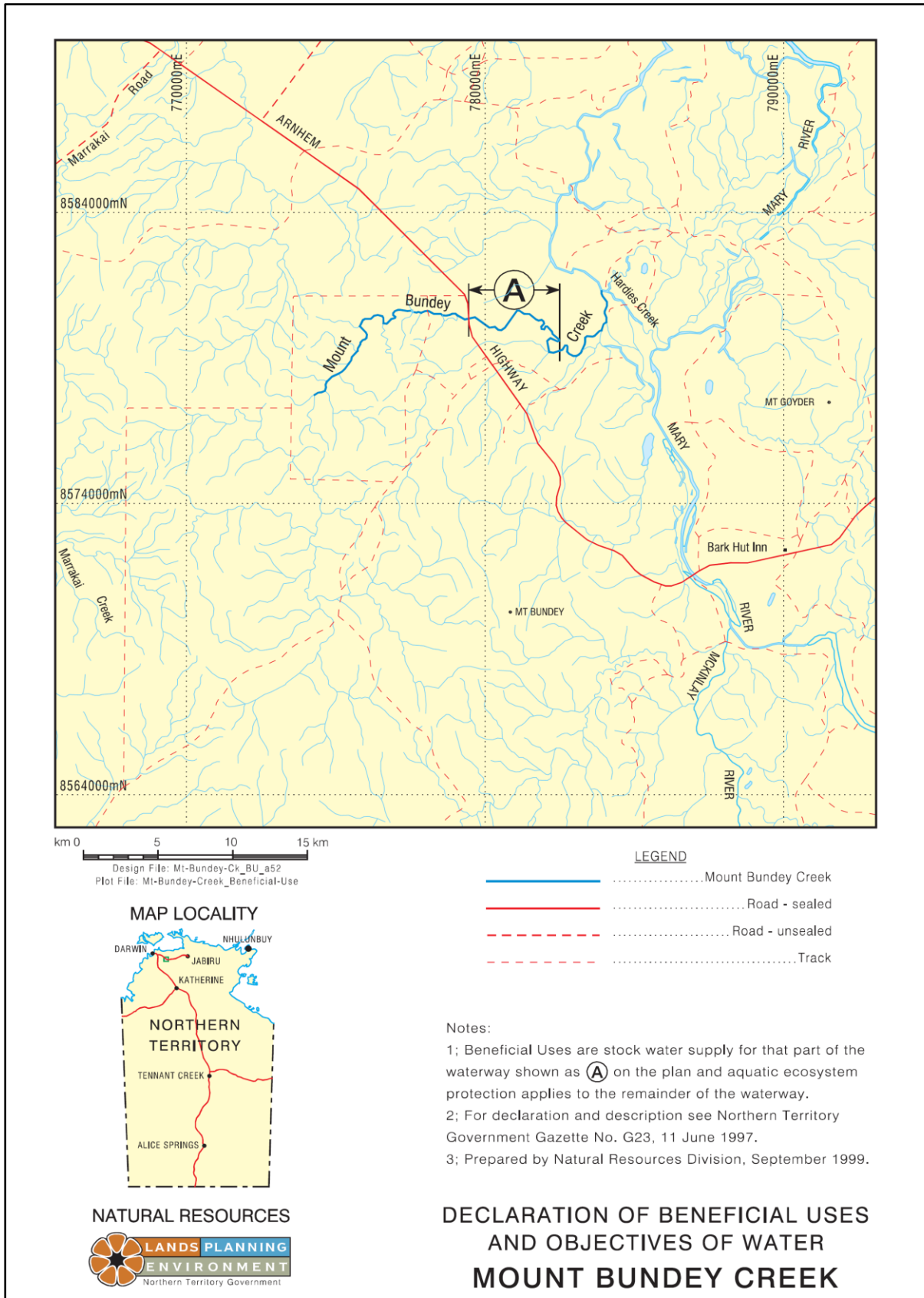


Figure 39 Mount Bunday creek surface water BUD area, (DEPWS, 2021)

Surface Water Guideline Values

The following information is based on the existing site disturbances, and it is acknowledged further monitoring sites and analytes are likely to be applied to the existing surface water monitoring programme.

Rustlers Roost water quality guideline values (GVs) have been developed based on the ANZECC Guidelines and the 2018 CSIRO Review of Site-Specific Trigger Values (SSTV) for the Toms Gully Project Area. Noting that it is proposed to discharge treated water into the Mount Bunday Creek from the TGPA. The Mount Bunday catchment is classified as 'tropical lowland rivers and streams and aquatic ecosystem protection is the dominant environmental value.

The Mount Bunday catchment ecosystem condition is a highly disturbed environment. Modification of water quality is due to the long history of anthropogenic activities and typical tropical ecosystem characteristics, such as the wet-dry climate. The ANZECC 2000 Guidelines set varying GV levels of ecosystem protection derived from local reference data that should aim to:

- Maintain the existing ecosystem condition; and/or
- Enhance the modified ecosystem (by targeting the most appropriate condition level).

The 80% species protection GV has historically been applied for highly disturbed systems. However, PGL strive for continuous improvement and aim for the Rustlers Roost site passively discharged water quality to meet the 95% species protection GV (outside of seasonal or natural fluctuations). Given the post mining pastoral land use, livestock drinking water guidelines (SWG) for cattle are also applicable.

ANZECC 2000 enables the consideration of the natural background concentrations of metals when setting GV. If background concentrations cannot be measured at the site, measurement at an equivalent high-quality reference site that closely matches the geology, natural water quality etc is suggested. If the background concentration has been clearly established and it exceeds the GV, the 80th percentile of the background concentration can be accepted as the alternative and is called a SSTV.

In 2018, PGL engaged CSIRO to undertake a Review of SSTVs for the TGPA for the proposed active discharge into the Mount Bunday Creek. This review was an update of similar work undertaken by GHD in 2015. Wet season monitoring data from the reference site SWTG1A indicates that both iron and aluminium have high natural background concentrations and SSTVs for these metals have been calculated based on the 80th percentile.

While ANZECC 2000 states that the GV "are not meant to be applied directly to recycled water quality, contaminant levels in discharges from industry, mixing zones, or stormwater quality". PGL compares all surface water monitoring sites to the applicable SSTVs, 80%, 90% and 95% ecosystem protection GV and SWG (Table 35). This provides a good understanding of the site surface water quality, seasonal variations and enables an assessment of potential environmental impacts in the event of discharge.

Surface Water Performance Against GVs

Following is an assessment for each monitoring locations Table 35 and parameter Table 36 of the available surface water quality monitoring data (2016-2021) against the GVs. Given that there is limited data an assessment of long-term trends has not been undertaken.

Table 35 Rustlers Roost site surface water monitoring site summary

Site	Total Samples	Parameters Analysed	% Of Sample Analysis Meeting Guideline Values				
			SSTV	80%GV	90%GV	95%GV	SWG
SW2	5	124	98	96	93	90	100
SW5	7	175	100	95	95	94	100
SW6	4	100	100	94	92	92	100
SW7	10	250	100	96	96	96	100
SW10	3	75	99	95	93	93	100
SW11	6	150	98	96	95	94	99
SW12	3	75	100	88	88	88	100
SW22	7	175	100	98	98	98	100
SWQ2	7	174	99	96	96	94	99

Table 36 Rustlers Roost surface water monitoring parameter summary

Parameter	Total Samples	% Of Sample Analysis Meeting Guideline Values				
		SSTV	80%GV	90%GV	95%GV	SWG
pH	52		87			
EC	52		71			100
Turbidity	51		47			
Calcium	52					100
Sulphate	52					100
Aluminium	52	94				98
Arsenic	52		100	100	90	100
Cadmium	52		100	100	100	100
Chromium	52		100	100	96	100
Cobalt	52					100
Copper	52		92	81	79	100
Iron	52	90				
Lead	52		100	100	100	100
Manganese	52		100	100	100	
Nickel	52		90	88	88	98
Uranium	52					100
Zinc	52		96	92	87	100

SW2 – Downstream of the Storm Water Pond

Monitoring site SW2 is in a creek line downstream of the Leach Ponds. The water quality at the site is influenced by the Heap Leach Pads and the Leach/Storm Water Ponds (if they overflow). The Heap Leach Pads and Leach/Storm Water Ponds require rehabilitation.

Measured water quality at SW2 indicates that the pH ranges from 6.4 to 7.4 and the EC is low, between 38-120 μ S/cm. Turbidity ranges from 11-40 NTU and is higher than the ANZECC Guidelines during the early wet season which is likely to be the effects of the seasonal “first flush” run-off. All total metal parameters are within the SWGs and SSTV.

Sampling indicates that some dissolved metals have on occasions been recorded above the ecosystem protection GVs or SSTV. Arsenic was above the 95% GVs in 2019 (and 2016), however recent sampling indicates levels are within the GVs. Chromium was above the 95% GV in 2016, however levels are now within the GVs. Copper remains higher than the 90% and 95% GVs. Nickel was above the GVs in 2016 and 2017, however recent sampling indicates levels are within the GVs. Zinc was above the 90% and 95% GVs in 2020 (and 2017) and Aluminium was above the SSTV in 2020 (and 2016). Additional data is required to determine whether these are seasonal effects or a sampling spike.

SW5 – Storm Water Pond

Monitoring site SW5 is the Storm Water Pond and monitoring results are influenced by the seasonal filling and drying cycle of the pond (evapo-concentration). Following the rehabilitation of the Leach/Storm Water Ponds this monitoring site will become redundant.

Measured water quality at SW5 indicates that the pH ranges from 6.3 to 7.8 and the EC is between 13-300 μ S/cm. Turbidity ranges from 7-720 NTU, the 720 appears to be an anomaly given that more recent samples range between 7-24 NTU.

All total metal parameters are within the SWGs and SSTV. Sampling indicates that some dissolved metals have on occasions been recorded above the ecosystem protection GVs. Arsenic was above the 95% GVs in 2019 (and 2016). Additional data is required to determine whether this is a seasonal effect or a sampling spike. Copper and Zinc were above the GVs in 2019, however sampling after these events indicate levels are within the GVs.

SW6 – Spillway of Annie’s Dam

Monitoring site SW6 is at the spillway of Annie’s Dam which is the pre-existing freshwater pastoral catchment dam. This dam does not form part of the Rustlers Roost site, however, may be influenced by site run-off. The dam will remain at closure for ongoing use by the pastoralist.

Measured water quality at SW6 indicates that the pH ranges from 5.6 to 6 and the EC is low, between 10-25 μ S/cm. Turbidity ranges from 3.9-30 NTU. All total metal parameters are within the SWGs and SSTV.

Dissolved metal parameters are effectively within the ecosystem protection GVs and SSTV. While some single results for Copper and Nickel were higher than the GVs, sampling after these events indicate levels are within the GVs.

SW7 – Downstream of Annie’s Dam Spillway

Monitoring site SW7 is downstream of the Annie's Dam Spillway. This site was added to the surface water monitoring program in March 2016 to monitor offsite drainage from the Rustlers Roost site reporting to the Adelaide River Catchment.

Measured water quality at SW7 indicates that the pH ranges from 4.3 to 6.3. It is noted that the 4.3 was recorded in 2016 and more recent data indicates a pH range of 6.1 to 6.3. The EC is low, between 11-49 μ S/cm. Turbidity ranges from 2.2-28 NTU, with more recent data indicating a range of 2.4 to 5.5 which is within the GVs.

All total metal parameters are within the SWGs and SSTV. All dissolved metal parameters are within the ecosystem protection GVs and SSTV. One recorded value for Nickel in 2017 was above the GVs however more recent data indicates that this is now within the GVs.

SW10 – ROM Drainage (before influence from Heap Leach)

Monitoring site SW10 measures drainage from the rehabilitated Run-of-Mine (ROM) Pad prior to any influence from the Heap Leach Pads. Limited data is available as the site is high in the catchment is often dry at sampling times.

Measured water quality at SW10 indicates that the pH ranges from 6.1 to 7.1 and the EC is low, between 8-55 μ S/cm. Turbidity ranges from 44-860 NTU, however the 860 appears to be an anomaly given that more recent samples range between 44-73 NTU.

All total metal parameters are within the SWGs. Iron was higher than the SSTV in 2016, at 4.9mg/L which appears to be an anomaly given that more recent data ranges from 0.83-0.3mg/L. Dissolved metal parameters are effectively within the ecosystem protection GVs. While a single result for copper (in 2017) was higher than the GVs, sampling after this event indicates that this is now within the GVs.

SW11 – Downstream of SW10 in Heap Leach Pad Drain (at culvert)

Monitoring site SW11 measures drainage from the Heap Leach Pads and is downstream of SW10. This site was added to the surface water monitoring program in October 2016 as SW10 is often dry. The Heap Leach Pads require rehabilitation.

Measured water quality at SW11 indicates that the pH ranges from 6.2 to 7.3 and the EC is low, between 21-82 μ S/cm. Turbidity ranges from 2.8-610 NTU, however more recent samples range between 2.8-11 NTU.

All total metal parameters are within the SWGs other than Nickel. In 2012, Nickel was 1.2mg/L which appears to be an anomaly given that more recent data is 0.001mg/L. Iron was higher than the SSTV on two occasions (2016 and 2017), more recent additional data is below the SSTV.

Sampling indicates that some dissolved metals have on occasions been recorded above the ecosystem protection GVs or SSTV. While some single results in 2016 for Arsenic, Chromium and Nickel were higher than the GVs, sampling after these events indicate levels within the GVs. Copper was above the 90% and 95% GVs in 2019 (and 2016). Additional data is required to determine whether this is a seasonal effect or a sampling spike. Aluminium was 0.51mg/L in 2016 which is higher than the SSTV, this appears to be an anomaly given that more recent data ranges from 0.01-0.08mg/L.

SW12 – Northern Drainage of South WRD

Monitoring site SW12 measures drainage from the northern side of the WRD. While water naturally drains to the south in this area, the construction of the WRD prevents this and water pools in this location. This site was added to the surface water monitoring program in October 2016 however it most often dry. The WRD requires rehabilitation.

Measured water quality at SW12 indicates that the pH ranges from 5.4 to 6.1 and the EC is low, between 10-14 μ S/cm. Turbidity ranges from 24-47 NTU. All total metal parameters are within the SWGs and SSTV. Dissolved metal parameters are effectively within the ecosystem protection GVs and SSTV. While a single result for Nickel (in 2017) was higher than the GVs, additional data is required to determine whether this is a sampling spike or ongoing influence.

SW22 – Rustlers Roost Pit

Monitoring site SW22 measures the surface water quality of the Rustlers Roost Pit. Water stored in the pit is likely a combination of stormwater runoff, incident rainfall and (possibly) groundwater. The pit void acts as a terminal sink for a large portion of the catchment, including the WRD and previous mine infrastructure area.

Measured water quality at SW22 indicates that the pH ranges from 6.2 to 7.1 and the EC is low, between 21-27 μ S/cm. Turbidity ranges from 0.7-9.6 NTU. All total metal parameters are within the SWGs and SSTV. Dissolved metal parameters are within the ecosystem protection GVs and SSTV other than Zinc. Zinc was above the 90% and 95% GVs in 2019 and additional data is required to determine whether this is a sampling spike or ongoing influence.

SWQ2 – Mount Bunday Creek Crossing on the Rustlers Roost site Access Road (Downstream)

Monitoring site SWQ2 measures the offsite drainage from the Rustlers Roost site (and Quest 29 site) reporting to the Mary River Catchment. The site is located at the Mount Bunday Creek crossing on Rustlers Roost access road, downstream of the Rustlers Roost site.

Measured water quality at SWQ2 indicates that the pH ranges from 6.3 to 7.3 and the EC is low, between 16-43 μ S/cm. Turbidity ranges from 9.1-1,500 NTU, the 1,500 appears to be an anomaly given that more recent samples range between 9.1-62 NTU.

Total metal parameters are within the SWGs other than Aluminium. In 2016, Aluminium was 6.9mg/L which appears to be an anomaly given that more recent data ranges from 0.31-0.84mg/L. Iron was higher than the SSTV on two occasions (2016 and 2020) and additional data is required to determine whether this is an ongoing influence or sampling spikes.

All dissolved metal parameters are effectively within the ecosystem protection GVs and SSTV. While a single result for copper (in 2016) and two (2) results for Zinc (in 2016 and 2017) were higher than the GVs, sampling after these events indicate that these are now within the GVs.

7.7.3.2 Quest 29 site surface water quality

Q29 surface water discharge flows through various drains and ephemeral creeks from both the northern and southern catchments and ultimately enter the Mary River system. Q29 is one of many mines situated in the Mary River catchment along with quarries, pastoral properties and horticultural activities and recreational areas. Mary River National Park is also situated in its catchment area downstream of Q29.

Q29 surface waters discharge ultimately into the Mary River system which have Northern Territory declared beneficial uses identified for the ephemeral watercourses and rivers entering the Mary River system Figure 38. They include:

Environment – water to keep the health of aquatic ecosystems including riparian zones.

Agricultural – irrigation water for primary production; and

Cultural – water to meet aesthetic recreational and cultural needs.

Surface Water Guideline Values

For PGL to meet the declared Beneficial Uses criteria the following guideline values (GV) have been chosen and considered acceptable criteria to measure surface and ground water quality discharging from site.

- ANZECC (2000) water quality guidelines (ANZECC 95% s.p) – classified as a ‘slightly to moderately disturbed system’ 95% species protection (s.p.) in surface freshwater for metals, physical parameters, and nutrients.
- Toms Gully Mine Site determined 80 Percentile (Toms Gully SSTV) - based on calculated site water quality data and GV for slightly disturbed ecosystems in Tropical Australia (low land Rivers) by GHD in 2015.
- ANZECC/ARMCANZ (2000) stock water drinking guidelines to compare against total metal values in groundwater.

Current water monitoring programme

Q29 surface water monitoring programme includes ten sites across the project area.

Seven sites are situated within ML 29783 tenement boundary (SWQ03 - Zamu Pit, SWQ05 -Taipan Pit, SWQ06, SWQ07, SWQ08, SWQ leach pond, and SWQ BHS Pit), two are located to the north-west (SWQ02, SWQ04) and one located to the south-east (SWQ01) outside ML 29783 tenement boundary.

Surface water retained/partially retained within Q29 in pits, bunds and ponds include:

SWQ03 – Zamu Pit water. (Partially contained).

SWQ05 – Taipan bund water.(partially contained).

SWQ BHS Pit – is the open cut pit which receives pumped water from the heap leach pond; (contained); and

SWQ Leach – lower leach pond water. (Contained and pumped).

SWQ07 -draining in the southern catchment and directly upstream of Zamu Pit; and

SWQ06 – drainage line located between Taipan and Zamu Pits which receives surface flows from the pit’s catchments.

Surface water discharge points capture water that drains from the Q29 tenement boundary from the northern and southern catchment include:

SWQ01 – ML 29783 tenement boundary northern catchment surface water discharge point which is directly downstream of the BHS Pit, Heap Leach and Leach Ponds.

SWQ08 - ML 29783 tenement boundary southern catchment surface water discharge point which is directly downstream of Taipan and Zamu Pits.

Downstream locations that capture water in the northern catchment before and after the influence of Rustlers Roost

SWQ04 – Located on Charles Creek, prior to the junction of waters from Rustlers Roost mine site.

SWQ02 – Located on Charles Creek after the junction of waters from Rustlers Roost mine site.

The frequency of surface water monitoring is total dependant on surface water flows for all surface water runoff monitoring sites, excluding the pits and ponds which contain water all year. The surface water monitoring program is designed to assist in identifying changes over time and the surface water monitoring programme locations, analysis type, frequency and measured parameters are included in Table 37 and Table 38 respectively with their spatial locations illustrated in Figure 32.

Table 37 Quest 29 surface water monitoring programme

Monitoring Site ID	Lat	Long	Monitoring Site Description	Analysis Type/Frequency					
				0	1	2	3	4	6
Surface Water				Frequency					
SWQ01	-12.936285	131.574827	Located on Charles creek at the northern boundary to ML 29738 Charles creek flows in a westerly direction and joins Mt Bunday Creek which flows past Toms Gully mine site	-	M	M	M	M	M
SWQ02	-12.913378	131.526515	Located on Mt Bunday creek downstream of ML 29738. The sample site is accessed by the Rustlers Roost access road	-	M	M	M	M	M
SWQ04	-12.914863	131.536995	Located on Mount Mt Bunday Creek downstream of ML 29738 prior to the junction of waters entering Mt Bundy Creek from Rustlers Roost	-	M	M	M	M	M
SWQ06	-12.958629	131.586393	Located in 8800N Drill line. The drill line receives both Zamu and Taipan Pits overflow	-	M	M	M	M	M
SWQ07	-12.954672	131.585979	Upstream of Zamu Pit	-	M	M	M	M	M
SWQ08	-12.965815	131.594393	Downstream of SWQ03 (Zamu Pit) and SWQ06 sites	-	M	M	M	M	M
Pits, Dams and Ponds									
SWQ03	-12.958053	131.586908	Zamu Pit	-	B	B	B	B	B
SWQ05	-12.958212	131.583814	Taipan Pit	-	B	B	B	B	B
SWQ BHS Pit	-12.938599	131.576454	Stormwater pond located west of the Leach Pond which stores any leach overflow water	-	Q	Q	Q	Q	Q
SWQ Leach Ponds	-12.938094	131.577923	Lower leach pond	-	M	M	M	M	M

Table 38 Quest 29 surface water monitoring parameters and frequency

Type	Analysis
Type 0	Standing water level
Type 1	Field parameters (pH, EC, DO, ORP, turbidity, temperature, surface water flow)
Type 2	Filtered and Total metals (Al, As, Cd, Co, Cr, Cu, Fe, Pb, Mn, Ni, U & Zn)
Type 3	Major cations (Ca, K, Na, Mg) Major anions (SO ₄) - filtered
Type 4	Titratable acidity, Alkalinity, Hardness (CaCO ₃) and Total suspended solids (TSS)
Type 6	Total nitrogen (TN), Total phosphorus (TP), Nitrate + Nitrite (NO ^x) and Ammonia (NH ₃)
Frequency	
F	Fortnightly (when creeks are consistently flowing)
M	Monthly (when creeks are consistently flowing)
Q	Quarterly (Q1(Jan-March); Q2(April-June); Q3 (July-Sept); Q4 (Oct-Dec)
B	Biannual (first consistent flow-October/November and recessional flow April/May)

Surface Water Performance Against GVs

SWQ03 – Zamu Pit water. (Partially contained).

Zamu pit water is partially contained and when it overtops it's to the southern catchment. Measured water quality indicates that the pH ranges from 7.1 to 7.37 and the EC is between 63-64 μ S/cm. Turbidity ranges from 3.2-18 NTU.

All total metal parameters are within the SWGs and SSTV. Sampling indicates that some dissolved metals have on occasions been recorded above the ecosystem protection GVs. Copper and Zinc values were above the 95% GVs in 2021, 2020, and 2019, 2017 and 2016. Copper and Zinc median values for the same period was above 95% GV.s.

SWQ05 – Taipan bund water.(partially contained).

Taipan pit water is partially contained and when it overtops it's to the southern catchment. Measured water quality indicates that the pH ranges from 6.48 to 8.11 and the EC is between 26-52.1 μ S/cm. Turbidity ranges from 1.2-27.1 NTU.

All total metal parameters are within the SWGs and SSTV. Sampling indicates that some dissolved metals have on occasions been recorded above the ecosystem protection GVs. Arsenic, Copper and Zinc above the 95% GVs in 2021, 2020, and 2019. Copper median values for the same period was above 95% GV.s.

SWQ BHS Pit

Located in the northern catchment, this open cut pit receives pumped water from the heap leach pond. Measured water quality indicates that the pH ranges from 6.34 to 8.31 and the EC is between 220-510 μ S/cm. Turbidity ranges from 1.1-28.6 NTU.

All total metal parameters are within the SWGs and SSTV. Sampling indicates that some dissolved metals have on occasions been recorded above the ecosystem protection GVs. Copper values were 97% of the time above the 95% GVs in 2021, 2020, and 2019. Copper median values for the same period was above 96% GV.s

SWQ Leach – lower leach pond water.

This is a created mine landform designed for capturing stormwater runoff from the heap leach. Water is contained and pumped to the BHS pit during each wet season to avoid overtopping. This is the only water managed area on Q29.

Monitoring site SWQ leach is the storm water pond which was originally designed to capture stormwater runoff from the heap leach pad. Water monitoring results are influenced by the seasonal filling, pumping and drying cycle of the pond (evapo-concentration). Following the rehabilitation of the Leach pad and ponds and storm water ponds this monitoring site will become redundant.

Measured water quality indicates that the pH ranges from 7.0 to 8.47 and the EC is between 467-1574 μ S/cm. Turbidity ranges from 0.42-10.23 NTU.

All total metal parameters are within the SWGs and SSTV. Sampling indicates that some dissolved metals have on occasions been recorded above the ecosystem protection GVs. Arsenic, Aluminium, Copper was above the 95% GVs in 2020, 2019 and 2016. No median values for any of the dissolved metals were exceeded.

SWQ07

Location is drainage to the southern catchment and directly upstream of Zamu Pit. Measured water quality indicates that the pH ranges from 6.64 to 8.33 and the EC is between 38.4-80.94 μ S/cm. Turbidity ranges from 17.9-45.4 NTU. Capturing flow events is often difficult due to the flash flowing events in the upper catchment.

All total metal parameters are within the SWGs and SSTV. Sampling indicates that some dissolved metals have on occasions been recorded above the ecosystem protection GVs. Arsenic, Copper and Zinc were above the 95% GVs in 2020 and 2019 with median values for Arsenic and Copper for dissolved metals exceeded.

SWQ06

Location is in a drainage line between Taipan and Zamu Pits which receives surface flows from the pit's catchments.

Measured water quality indicates that SWQ06 pH ranges from 6.08 to 6.77 and the EC is between 27.4-53.7 μ S/cm. Turbidity ranges from 3.3-28.9 NTU.

All total metal parameters are within the SWGs and SSTV. Sampling indicates that some dissolved metals have on occasions been recorded above the ecosystem protection GVs. Copper and Aluminium median values for dissolved metals were the 95% GVs in 2020 and 2019.

SWQ01

Location at the northern tenement (ML 29783) boundary northern catchment surface water discharge point which is directly downstream of the BHS Pit, Heap Leach and Leach Ponds. Measured water quality indicates that the pH ranges from 5.26 to 7.25 and the EC is between 49.24-272.6 μ S/cm. Turbidity ranges from 2.7-478 NTU. The NTU value of 478 is likely an anomaly outlier and sampled in December likely being a first flush event.

All total metal parameters are within the SWGs and SSTV. Sampling indicates that some dissolved metals have on occasions been recorded above the ecosystem protection GVs. 85% of dissolved copper values and median were above the 95% GVs in 2020 and 2019. Dissolved Aluminium median value in 2020 and 2019 exceed GVs. 85%.

SWQ08

Located at the south tenement (ML 29783) boundary southern catchment surface water discharge point which is directly downstream of Taipan and Zamu Pits. Measured water quality indicates that the pH ranges from 4.1 to 7.12 and the EC is between 20-124 μ S/cm. Turbidity ranges from 9.41-38.7 NTU.

All total metal parameters are within the SWGs and SSTV and GVs 95%. Aluminium was recorded on one event in February 2021 above Toms Gully SSTV (80th Percentile) and median values above 95% GVs in 2021.

SWQ04

Located on Charles Creek, prior to the junction of waters from Rustlers Roost mine site. This is a downstream location in the northern catchment before influence from Rustlers Roost. Discharge enters the Mary River catchment. Measured water quality indicates that the pH ranges from 5.7 to 7.07 and the EC is between 20.6-64 μ S/cm. Turbidity ranges from

13.8-220.4 NTU. The NTU value of 220 is likely an anomaly outlier and sampled in December likely being a first flush event.

All total metal parameters are within the SWGs and SSTV. Sampling indicates that some dissolved metals have on occasions been recorded above the ecosystem protection GVs. Aluminium was above the above Toms Gully SSTV (80th Percentile) and 95% GVs in 2020 and 2019 with median values for dissolved Copper above 95% GVs in 2020.

SWQ02

Located on Charles Creek after the junction of waters from Rustlers . Roost mine site. This is a downstream location in the northern catchment influenced by Rustlers Roost discharge. Discharge enters the Mary River catchment. Measured water quality indicates that the pH ranges from 5.94 to 7.44 and the EC is between 23.9-46.1µS/cm. Turbidity ranges from 18-360 NTU. The NTU value of 360 is likely an anomaly outlier and sampled in December likely being a first flush event.

All total metal parameters are within the SWGs and SSTV. Sampling indicates that some dissolved metals have on occasions been recorded above the ecosystem protection GVs. Aluminium was above the above Toms Gully SSTV (80th Percentile) and 95% GVs in 2020 and 2019. Chromium had 1 sample above 95% GVs in March 2021.

7.7.3.3 Accommodation Camp surface water quality

Proposed Accommodation Camp – Coulter Creek – Mary River Catchment

Table 39 details four surface water quality monitoring sites downstream of the proposed accommodation camp location in Coulter Creek, a tributary to Mount Bundey Creek. While all sites have been sampled for aquatic ecosystem monitoring requirements at Toms Gully Mine project, only two sites provide Project relevant baseline data for current Coulter Creek WQ in this area (CC02 and CC01) and therefore, these are the two sites proposed for surface water monitoring Figure 40.

Table 39 Accommodation camp – Coulter Creek surface water monitoring sites

Monitoring Site ID	Lat	Long	Monitoring Site Description	Analysis Type/Frequency					
				0	1	2	3	4	6
Surface Water				Frequency					
CC02	-12.847370	131.563955	Coulter Creek approximately 500 m downstream from accommodation camp boundary.	-	M	M	M	M	M
CC01	-12.843499	131.573087	Coulter Creek approximately 1.5 km downstream from CC02 outside of mining lease.	-	M	M	M	M	M
CK7	-12.836734	131.577921	Coulter Creek at Arnhem Highway crossing.	-	M	M	M	M	M
CC03	-12.835209	131.585475	Coulter Creek approximately 400 m downstream from CK7.	-	M	M	M	M	M

Surface water monitoring sites have been sampled with changing frequency and intensity since at least 2016.

Table 40 Accommodation Camp surface water monitoring parameters and frequency

Type	Analysis
Type 0	Standing water level
Type 1	Field parameters (pH, EC, DO, ORP, turbidity, temperature, surface water flow)
Type 2	Filtered and Total metals (Al, As, Cd, Co, Cr, Cu, Fe, Pb, Mn, Ni, U & Zn)
Type 3	Major cations (Ca, K, Na, Mg) Major anions (SO ₄) - filtered
Type 4	Titratable acidity, Alkalinity, Hardness (CaCO ₃) and Total suspended solids (TSS)
Type 6	Total nitrogen (TN), Total phosphorus (TP), Nitrate + Nitrite (NO ^x) and Ammonia (NH ³)
Frequency	
F	Fortnightly (when creeks are consistently flowing)
M	Monthly (when creeks are consistently flowing)
Q	Quarterly (Q1(Jan-March); Q2(April-June); Q3 (July-Sept); Q4 (Oct-Dec)
B	Biannual (first consistent flow-October/November and recessional flow April/May)

Toms Gully Mine – Lower Mount Bunday Creek – Mary River Catchment

Table 41 identifies the eight surface water monitoring sites within the lower Mount Bunday Creek. While all sites have been sampled for aquatic ecosystem monitoring requirements at Toms Gully Mine project, only three sites provide Project relevant baseline data for current Mount Bunday Creek WQ in this area (SWTG1A, SWTG2 and SWTG3). Therefore, these sites are in close proximity and downstream from the mine. The furthest upstream site (SWTG1A) is also approximately 20 km downstream from the Rustlers Roost and Quest 29 Project area.

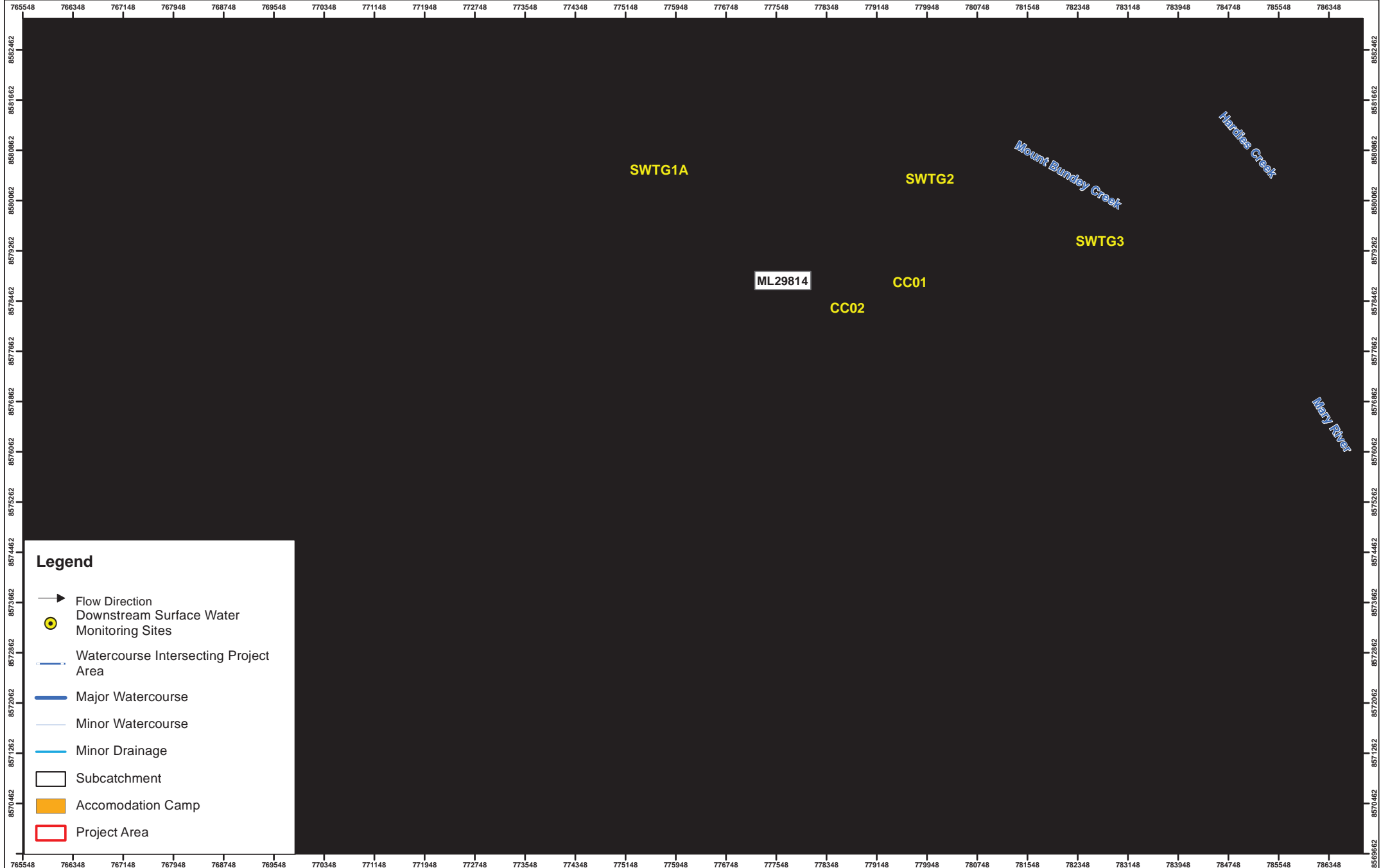
Table 41 Toms Gully Mine – Lower Mount Bunday Creek Surface Water Monitoring Sites

Monitoring Site ID	Lat	Long	Monitoring Site Description	Analysis Type					
				0	1	2	3	4	6
Surface Water				Frequency					
SWTG1C	-12.840458	131.539658	Mount Bunday Creek approximately 2.5 km upstream of SWTG1A.	-	M	M	M	M	M
SWTG1A	-12.828336	131.545764	Mount Bunday Creek upstream of mine at lease boundary.	-	M	M	M	M	M
SWTG1	-12.830286	131.550333	Mount Bunday Creek at confluence of drainage line from mine site.	-	M	M	M	M	M
MBC0	-12.825761	131.557606	Mount Bunday Creek approximately 1.5km downstream of SWTG1.	-	M	M	M	M	M
MBC01	-12.829051	131.567791	Mount Bunday Creek adjacent Toms Gully Mine Tailings Dam 2.	-	M	M	M	M	M
SWTG2	-12.828622	131.574529	Mount Bunday Creek at Arnhem Highway Crossing.	-	M	M	M	M	M
MBC03	-12.831725	131.584946	Mount Bunday Creek approximately 1.8 km downstream of SWTG2.	-	M	M	M	M	M
SWTG3	-12.837374	131.599889	300 m upstream of confluence between Mount Bunday Creek and Coulter Creek.	-	M	M	M	M	M

Table 42 Toms Gully Mine surface water monitoring parameters and frequency

Type	Analysis
Type 0	Standing water level

Type	Analysis
Type 1	Field parameters (pH, EC, DO, ORP, turbidity, temperature, surface water flow)
Type 2	Filtered and Total metals (Al, As, Cd, Co, Cr, Cu, Fe, Pb, Mn, Ni, U & Zn)
Type 3	Major cations (Ca, K, Na, Mg) Major anions (SO ₄) - filtered
Type 4	Titrateable acidity, Alkalinity, Hardness (CaCO ₃) and Total suspended solids (TSS)
Type 6	Total nitrogen (TN), Total phosphorus (TP), Nitrate + Nitrite (NO ^x) and Ammonia (NH ³)
Frequency	
F	Fortnightly (when creeks are consistently flowing)
M	Monthly (when creeks are consistently flowing)
Q	Quarterly (Q1(Jan-March); Q2(April-June); Q3 (July-Sept); Q4 (Oct-Dec)
B	Biannual (first consistent flow-October/November and recessional flow April/May)



Legend

- Flow Direction
- Downstream Surface Water Monitoring Sites
- Watercourse Intersecting Project Area
- Major Watercourse
- Minor Watercourse
- Minor Drainage
- Subcatchment
- Accomodation Camp
- Project Area

R	Details	Date
1	Final	27/09/21
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Notes:			

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0 550 1,100 2,200

Meters
1 cm = 546 meters
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DATA SOURCE
NT Government Open Source Data

DESIGNER

CLIENT

FIGURE 40

Proposed Ongoing Monitoring Sites - Downstream

DRG Ref:

7.7.4 Erosion and Sediment Control

An erosion and sediment control plan was developed for operations and closure (refer to draft EIS). Erosion and sediment control features are proposed to be installed downstream of constructed landforms and disturbance areas to manage site discharge sediment loading to drainage features.

To minimise sedimentation to drainage systems, the follow erosion and sediment control structures and management actions will be implemented:

- Perimeter drains, bunds, and sediment basins constructed at the down-gradient base of each of the surface WRDs (toe drain) to manage sediment and monitor surface water quality runoff and seepage.
- Check dams within diversion channels to provide velocity control where needed based on engineering estimates of maximum stormwater velocity.
- Sediment will be cleaned out of the sediment basins as required and in anticipation of the wet season to provide greater runoff capacity.
- Water volume will be measured within basins to manage the site water balance and maintain capacity needed for peak water periods.
- The sediment basins will remain post rehabilitation until the landform is stable.
- To minimise contact of clean water with WRDs, minimise AMD generation volume, and reduce clean water inflows into open pits and ponds, clean water run-on diversions will be installed to route clean unimpacted water away from the disturbed mine area and directly into area catchments. Further details are provided in the ESCP provided in the Draft EIS.
- These approaches will be implemented, inspected, and maintained in accordance with the associated plans for the mine operation (e.g., WMP, ESCP).
- Engineering details of ESCMs are provided in the ESCP (refer to the Draft EIS).
- Water will be managed in accordance with the WMP (refer to the Draft EIS) and the water balance provided in the Water Balance and Groundwater Modelling Report (refer to the Draft EIS).
- Water captured within stormwater ponds will be sampled and assessed through the established network of surface water monitoring sites in accordance with the WMP (refer to the Draft EIS).

7.8 Flora and Fauna

A number of flora and fauna and vegetation surveys completed for Rustlers Roost and Q29 sites as part of mining approvals from 1993 to date as are detailed below.

- Vegetation survey report for Rustlers Roost and Quest 29, by Ecoz Consultants in 2020.
- Flora and Fauna Reports for Toms Gully, Rustlers Roost and Quest 29, by Low Ecological Services in 2016.
- Flora and Fauna Reports for Toms Gully, Rustlers Roost and Quest 29, by Low Ecological Services in 2017.
- Fauna, Flora, and soils study for proposed Rustlers Roost Gold Mine, by Kinhill Engineers Pty Ltd, 1993.

The surveys completed by Low Ecological was done for the broader Project area. The DEPWS requested as part of this Projects EIS requirements that further flora surveys were required. However, fauna survey effort was adequate, and no further surveys were necessary. (Ecoz, 2020(a))

Ecoz Consultants conducted field vegetation surveys in 2020 that included land unit mapping which is detailed in section 7.4; document riparian habitat value and condition within and adjacent to the Project area; and habitat suitability survey of the endangered sub-shrub *Helicteres macrothrix* and the endangered trigger plant *Stylidium ensatum* which is detailed in section 7.8.1. In 2021, the project disturbance footprint expanded to include additional areas which fall within the potential habitat modelled for *Helicteres macrothrix* and additional water courses or riparian corridors along the Haul Road route required habitat and condition assessment. In 2021 Ecoz consultants conducted targeted (*Helicteres macrothrix*) surveys to determine presence/absence; and riparian habitat condition and suitability for threatened flora (*Helicteres macrothrix* and *Stylidium ensatum*) along the Haul Road route. Results of this additional survey work in included in Section 7.8.1.

7.8.1 Significant and sensitive vegetation and flora species

In the NT, sensitive vegetation types are those considered 'significant' under the NT Land Clearing Guidelines (NRETAS 2010). These are rainforest, vine thicket, closed forest or riparian vegetation, mangroves, monsoon vines forest, sand sheet heath and vegetation containing large trees with hollows suitable for fauna.

7.8.1.1 Sensitive vegetation and habitats

As part of the vegetation survey conducted by Ecoz consultants in 2020 a habitat assessment was done to collect baseline information about community structure and assess the riparian habitat value and current condition of riparian areas both upstream and downstream of the Project area, Figure 41.

Riparian vegetation is defined as native vegetation surrounding a waterway and plays a critical role in protecting wetland systems, providing habitat, shade, and food resources for native fauna, maintaining nutrient levels in waterways, and providing bank stabilisation (DENR 2020).

Riparian vegetation, containing monsoonal species, was recorded within and to the east of Rustlers Roost and were disturbed due to mining activities. Riparian areas to the west of Rustlers Roost were largely intact and weed free. A patch of closed forest was recorded in Rustlers Roost south. Areas within the Quest 29 proposal area were classified as

the riparian land unit 6a and comprised of riparian and monsoon vine species. Much of these riparian areas have been disturbed by previous clearing and stockpiling of fill material; weeds and feral animals were observed in these areas. (Ecoz, 2020(a)).

Closed forest, riparian and monsoon vine vegetation are sensitive and significant vegetation types in the NT, meaning that they are easily impacted by adjacent land uses or management, and/or are spatially restricted habitat types important to several wildlife species (DENR 2020).

In 2021 PGL requested Ecoz Consultants conducted additional targeted flora studies (namely *Helicteres macrothrix* and *Stylidium ensatum*) focusing on the expanded mine disturbance footprint and a watercourse and habitat assessment focusing on disturbance sensitive vegetation (riparian) and threatened flora along the Haul Road route drainage lines.

It is important to note that the haul road riparian habitat assessment has used two term to describe vegetation along a watercourse as per the NT Land Clearing Guidelines (DENR, 2020). These include riparian vegetation and drainage line vegetation. Examples of these two terms are illustrated below. The example to the left is an example of significant riparian vegetation and the photo was not taken from the Project site. The example to the right is a drainage line vegetation and this photo was taken from the Project site.

Outcomes of the Haul Road assessment determined that the overall condition of the drainage/riparian sites was good for the riparian channels considered drainage lines (RP02, RP03 and RP04), noting that drainage lines were degraded in the neighbouring property/s. The condition of the riparian channel RP01 where it intersected the haul road was poor, with two collapsed bridges, cleared areas, weeds and erosion. The riparian/drainage sites RP01 to RP04 were mostly consistent with land unit 6a1, except for RP01 which contained riparian vegetation and is also located on the edge of a river system. However, the scale of land unit mapping is such that RP01 is most reasonably considered to be 6a1. (Ecoz, 2021).



Photo: Examples of significant riparian vegetation (left-photo not taken from project site) compared with drainage line vegetation (right- taken from the Project site.) (Ecoz, 2021)

From the ten photograph sites established along the haul road/s between the Rustlers Roost and Quest 29, no monsoon species were observed along the haul road except for the riparian corridor (RP01), namely *Syzigium armstrongii*,

Cupaniopsis anacardioides, and *Barringtonia acutangula*. The habitats observed adjacent to the haul roads were typically low open Eucalyptus woodlands reaching 6 to 8 m in height. The haul roads fall within three main land units (1:25,000 from Forster and Fogarty 1975): 2b – Rises with low open woodlands, 3a – Rises with low woodlands , and 6a1 – Drainage systems with woodlands.

Weeds were also observed along the haul roads mostly concentrated around the drainage lines and establish vegetation. Details are included in section 7.8.2.

A large portion of the surveyed riparian areas are situated directly within the project footprint, and it is likely that these areas will be directly and indirectly impacted by mining activities. At closure, rehabilitation of disturbed riparian areas is proposed to return to a self-sustaining, stable, vegetation and habitat vegetation like surrounding riparian vegetations and the agreed post-mining land use. Further research/investigations are necessary to determine suitable riparian species selection and rehabilitation performance and engineered hydrological controls required post closure.

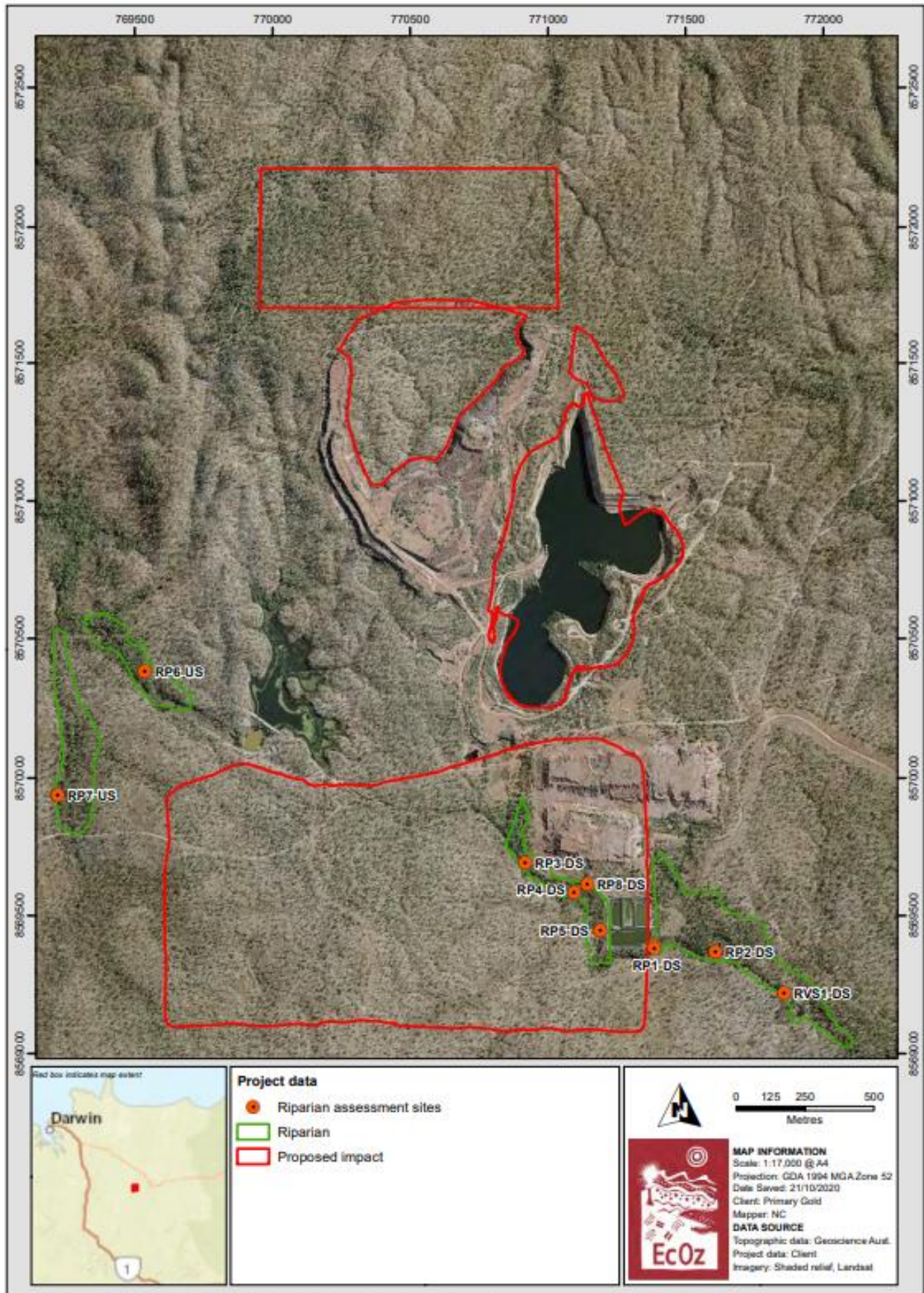


Figure 41 Riparian survey areas within and adjacent to Rustlers Roost (Ecoz, 2020(a))

7.8.1.2 Significant flora species

As part of the ecological surveys done by Ecoz Consultants in 2020, survey work included targeted flora surveys including habitat suitability survey of the endangered sub-shrub *Helicteres macrothrix* and the endangered trigger plant *Stylidium ensatum* which is detailed in section 7.8.1. Targeted intensive transects surveys did not detect *H. macrothrix* in proposal areas modelled as potential habitat. As the plants of that species at a nearby reference population were readily detectable, it appears unlikely that *Helicteres macrothrix* occurs within the proposal area. (Ecoz, 2020(a)).

For *Stylidium ensatum*, only one small (approximately 3,000 m²) patch of modelled habitat was marginally suitable habitat based on the known ecology of the plant; however, as the plant is only detectable in June/July, it is not possible to confirm presence or absence of the species at this time. Other areas modelled as potential *S. ensatum* habitat within the proposal area were assessed as being unsuitable and unlikely to support this species. (Ecoz, 2020(a))

In 2021, the Project disturbance footprint expanded to include additional areas (North WRD, TSF, Annie Oakley pit and Annie's Dam pit) which all fall within the potential habitat modelled for *H. macrothrix*. PGL commissioned Ecoz Consultants in 2021 to conduct additional targeted flora studies (namely *Helicteres macrothrix* and *Stylidium ensatum*) focusing on the expanded mine disturbance footprint and Haul Road corridor. Details of the habitat assessment focusing on disturbance sensitive vegetation (riparian) is detailed in 7.8.1.1.



Photo: Photographs of *Helicteres macrothrix* leaves and flowers. (Ecoz, 2021)

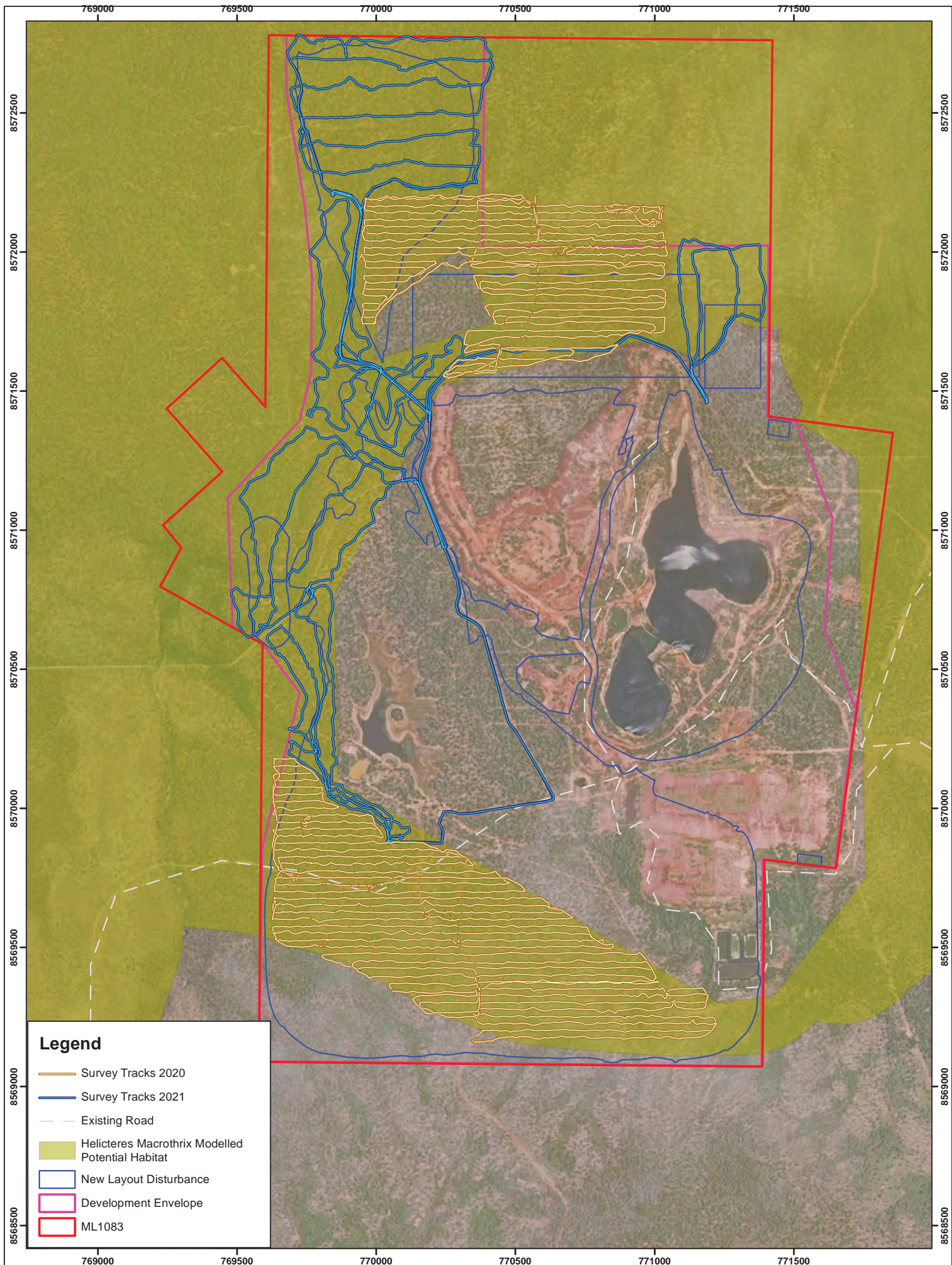
During the site surveys in 2021, visits to the revised disturbance footprint reference site confirmed the detectability of *H. macrothrix* (Figure 42). No *H. macrothrix* plants were observed during surveys at the Rustlers Roost site. These results align with the results of previous *H. macrothrix* survey conducted in 2020. A similar species, *H. darwinensis* was occasionally detected on site and along access tracks. The dominant land unit throughout the additional survey areas was land unit 2b 1 which is consistent with results from the ecological surveys in 2020 (Ecoz 2020). Consultations with Ian Cowie (Chief Botanist at the Darwin Herbarium) confirmed that *H. macrothrix* has only been observed in soils associated with granite hills within the Mt Bunday area, which has a different geology to that of the survey area.

Therefore, given the results from the two surveys and advice from the herbarium, it is unlikely that *H. macrothrix* occurs within the Rustlers Roost mining lease.

For the Haul Road corridor, of the four sites assessed, three occurred within the modelled *H. macrothrix* habitat – RP01, RP03 and RP04. No *H. macrothrix* plants were observed during the surveys. In addition, these channels are not considered suitable habitat for *H. macrothrix* which prefers habitats associated with granite hills. Three of these sites also occurred within *S.ensatum* modelled habitat. Given it was the incorrect time of year to survey for this species, habitat assessments were made as to whether the habitat would be suitable to support the species. All three sites were deemed unlikely to be suitable based on the following observations:

- RP01 and RP02 had soils containing a very low organic content (i.e., sandy and gravelly), and overstorey species were inconsistent with those observed in suitable habitat.
- RP03 soils were low in organic materials, although this site supported overstorey species consistent with those found in suitable habitat. The overstorey was closed and water was still present in the channel.

To conclude, the drainage/riparian areas all exhibited signs of erosion, contained several weed species and did not support the correct habitat types for *H. macrothrix* and *S. ensatum*.




Legend

- Survey Tracks 2020
- Survey Tracks 2021
- Existing Road
- Helicteres Macrothrix Modelled Potential Habitat
- New Layout Disturbance
- Development Envelope
- ML1083

R	Details	Date
1	Final	01/10/21
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APPROVED	-	DATE	01/10/21
Notes:			



0 90 180 360

Meters

1 cm = 120 meters

GCS GDA 1994 MGA Zone 52

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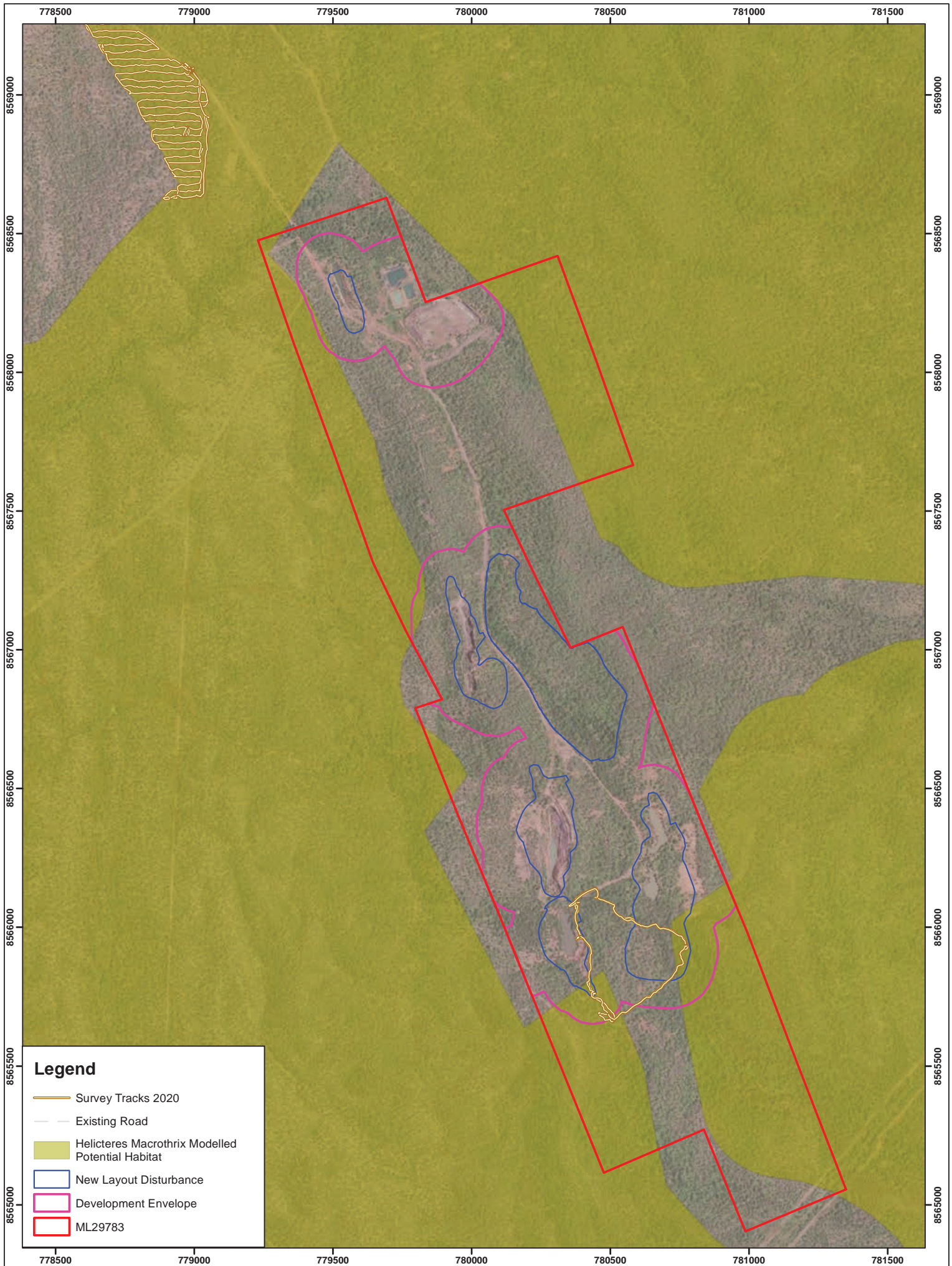
DATA SOURCE
NT Government Open Source Data



FIGURE 42

Map of Helicteres Macrothrix Survey Tracks at Rustlers Roost

DRG Ref: 1001087-EIS-07-7.12



Legend

- Survey Tracks 2020
- Existing Road
- Helicteres Macrothrix Modelled Potential Habitat
- New Layout Disturbance
- Development Envelope
- ML29783

R	Details	Date
1	Final	01/10/21
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0 90 180 360

Meters
1 cm = 120 meters
GCS GDA 1994 MGA Zone 52

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FIGURE 43

Map of *Helicteres macrothrix* Survey Tracks at Quest 29

DRG Ref: 1001087-EIS-07-7.12

7.8.2 Weeds and Introduced fauna

Weeds

The more recent weed survey work completed for the Project area was done by Ecoz Consultants during the vegetation survey in 2020. Invasive weed species incidentally observed within the Project area were recorded, with the majority established in disturbed areas, and occasionally occurring in native bushland. The declared weed species, Hyptis (*Hyptis suaveolens*) was the most abundant; it was recorded in high densities in Quest 29 south. Scattered Perennial Mission Grass (*Cenchrus polystachios*) and Gamba Grass (*Andropogon gayanus*) were also observed, mostly within Quest 29 south and along roadsides. Other weed species included Sida sp. Gamba Grass and Perennial Mission Grass are listed as Class B weeds under the NT Weeds Management (WM) Act, with Gamba Grass also listed as a Weed of National Significance (WoNS). *Mimosa pigra* (*Mimosa*) a listed WoNS was reported at Rustlers Roost at the ROM silt trap. This is actively managed to prevent spread through routine herbicide spraying under the sites Care and Maintenance.

A targeted survey assessment of the Haul Road route done by Ecoz consultants in 2021 observed weeds along the haul roads and include Gamba Grass, Annual Mission Grass, Sida sp., Sicklepod, Hyptis, Calopo, and Stinking Passionfruit and mostly concentrated around the drainage lines; however, Gamba Grass and Hyptis were observed along the haul roads and within established vegetation adjacent the road.

Further, weed surveys and incidental field siting's collected by PGL since 2013 and included in the respective mine Management Plans for each site are shown on Table 43 and Figure 44.

NT declared weeds are grouped into the following classes:

- class A - eradicate
- class B - control
- class C - prevent entry.

All class A and class B weeds are also class C weeds.

Table 43 Introduced flora species within and surrounding the Project area

Site	Scientific name	Common name	Plant type	Declared listed status	
				NT WM Act	WoNs
All sites	<i>Andropogon gayanus</i>	Gamba grass	Grass	Class A/B	✓
Rustlers Roost	<i>Mimosa Pigra</i>	Mimosa	Shrub	Class A/B (zoned)	✓
Rustlers Roost	<i>Hymenachne amplexicaulis</i>	Olive Hymanechne	Grass	Class B	✓
Toms Gully	<i>Calopogonium mucunoides</i>	Calopo	Climber		-
All sites	<i>Sida acuta</i>	Spiney-headed Sida	Shrub	Class B	-
All sites	<i>Hyptis suaveolens</i>	Hyptis	Herb	Class B	-

Site	Scientific name	Common name	Plant type	Declared listed status	
				NT WM Act	WoNs
All sites	<i>Sida cordifolia</i>	Flannel Weed	Shrub	Class B	-
AI sites	<i>Cenchrus polystachios</i>	Perennial Mission Grass	Grass	Class B	-
All sites	<i>Stachytarpheta spp.</i>	Snake weed	Shrub	Class B	-
All sites	<i>Stylosanthes viscosa</i>	Stylo	Grass		-
All sites	<i>Trimfetta rhomboidea</i>	Diamond burbark or	Shrub		-
All sites	<i>Triumfetta sp.</i>	Diamond burbark	Shrub		-
All sites	<i>Xanthium strumarium</i>	Ngoora burr	Shrub	Class B	-

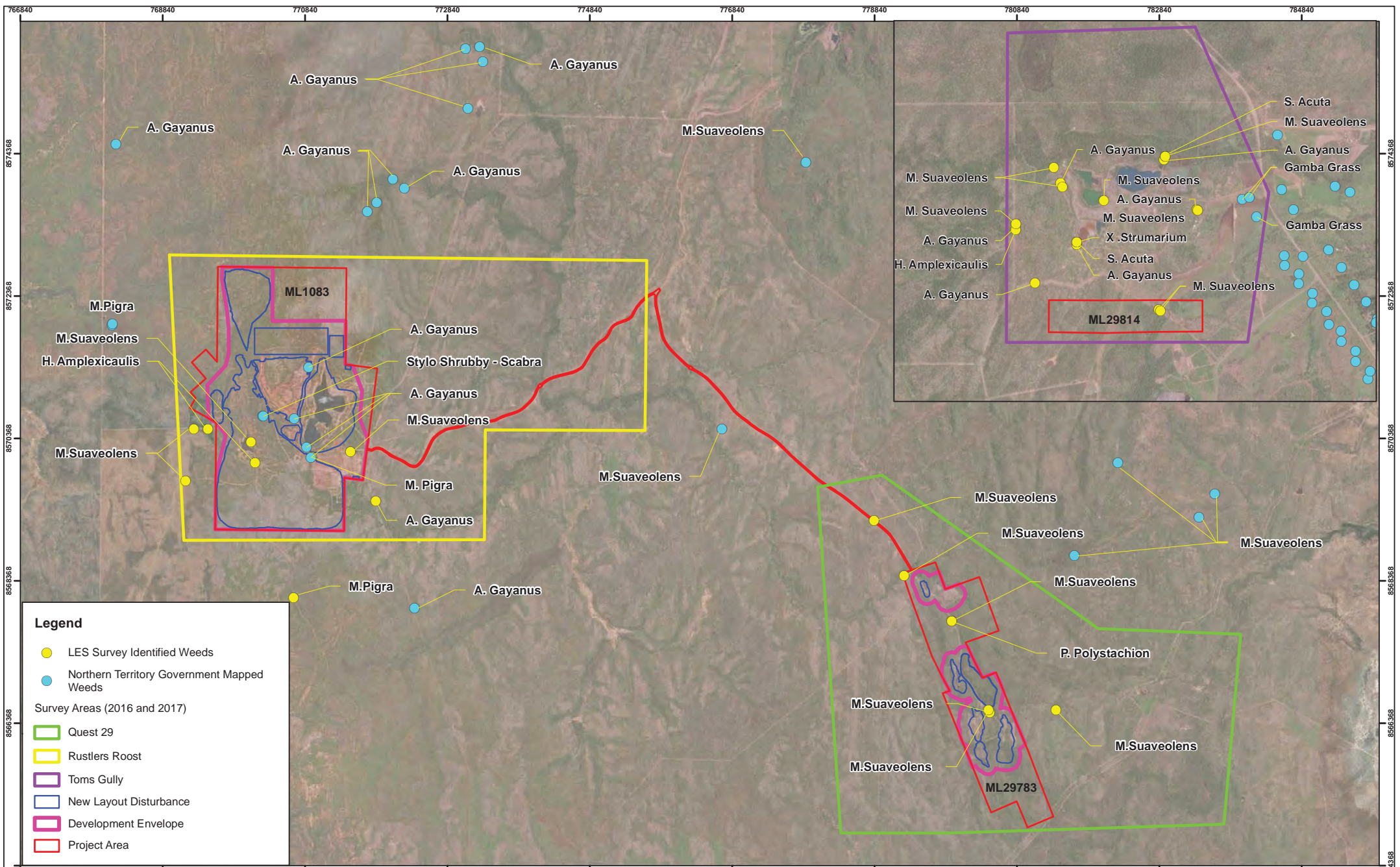
Introduced fauna species

The 1993 Flora, Fauna and Soils Study (Kinhill, 1993a) identified seven (7) introduced species including the dingo, cat, horse, donkey, pig, water buffalo and cattle. Similar introduced species were also recorded during the 2016 survey by Low Ecological Services, with the addition of cane toads.

Several introduced fauna species were recorded during surveys of Toms Gully, Rustlers Roost and Quest 29 during the November 2016 on-ground survey. These were cattle, water buffalo, cane toad, horse, house mouse and pig. Cattle were recorded in Rustlers Roost. Water buffalo were recorded at Annie's Dam in Rustlers Roost. Cane toads were ubiquitous throughout all three survey areas. The impacts of three of these species are listed Key Threatening Processes and all have associated Threat Abatement Plans prepared by DAWE.

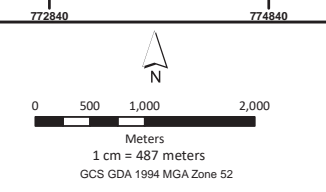
During the vegetation survey in 2020, Ecoz Consultants noted the presence of pigs and cattle commonly observed in the proposal areas, mainly located around drainage channels and remaining pools at Quest 29. Introduced fauna identified within the Q29 would likely include, feral pig (*Sus scrofa*) and cane toad (*Rhinella marina*) swamp buffalo (*Bubalus bubalis*) have been sighted in the area surrounding the Q29, but they have not been sighted within it.

Thirteen introduced fauna species were identified by the EPBC PMST as occurring or potentially occurring within 20 km of the survey areas. Nine introduced fauna species were identified by the NT Fauna Atlas within 20 km of the survey areas.



R	Details	Date
1	Final	12/08/21
-	-	-
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FIGURE 44

Location of Weeds Within and Surrounding Project Area

DRG Ref: 1001087-EIS-07-7.15

7.8.3 Terrestrial fauna

7.8.3.1 Significant fauna

The NT Fauna Atlas identified 14,929 records of 386 fauna taxa identified to species level and a further 18 fauna taxa identified to genus level within 20 km of the survey areas. The majority of these records are along the Kakadu Highway and in the low lying areas near the Mary River that have been used as quarries. The NT Fauna Atlas identified records of 14 species listed as threatened under the TPWC Act within a 20 km radius of the survey areas. One of these species is listed as critically endangered, one as endangered and 12 as vulnerable.

The EPBC PMST identified 32 fauna species listed as threatened under the EPBC Act as occurring or potentially occurring within 20 km of the survey area. Four are listed as critically endangered, 13 as endangered and 25 as vulnerable. Twenty-five bird species of conservation significance were identified by the PMST and/or NT Fauna Atlas as occurring or potentially occurring within a 20 km radius of the survey area.

An initial likelihood of occurrence assessment was completed for all fauna species identified in the records (Appendix K within the Draft EIS). The bird, mammal and reptile species listed in Table 44 were identified as having either a moderate or high likelihood of occurrence in the Project area.

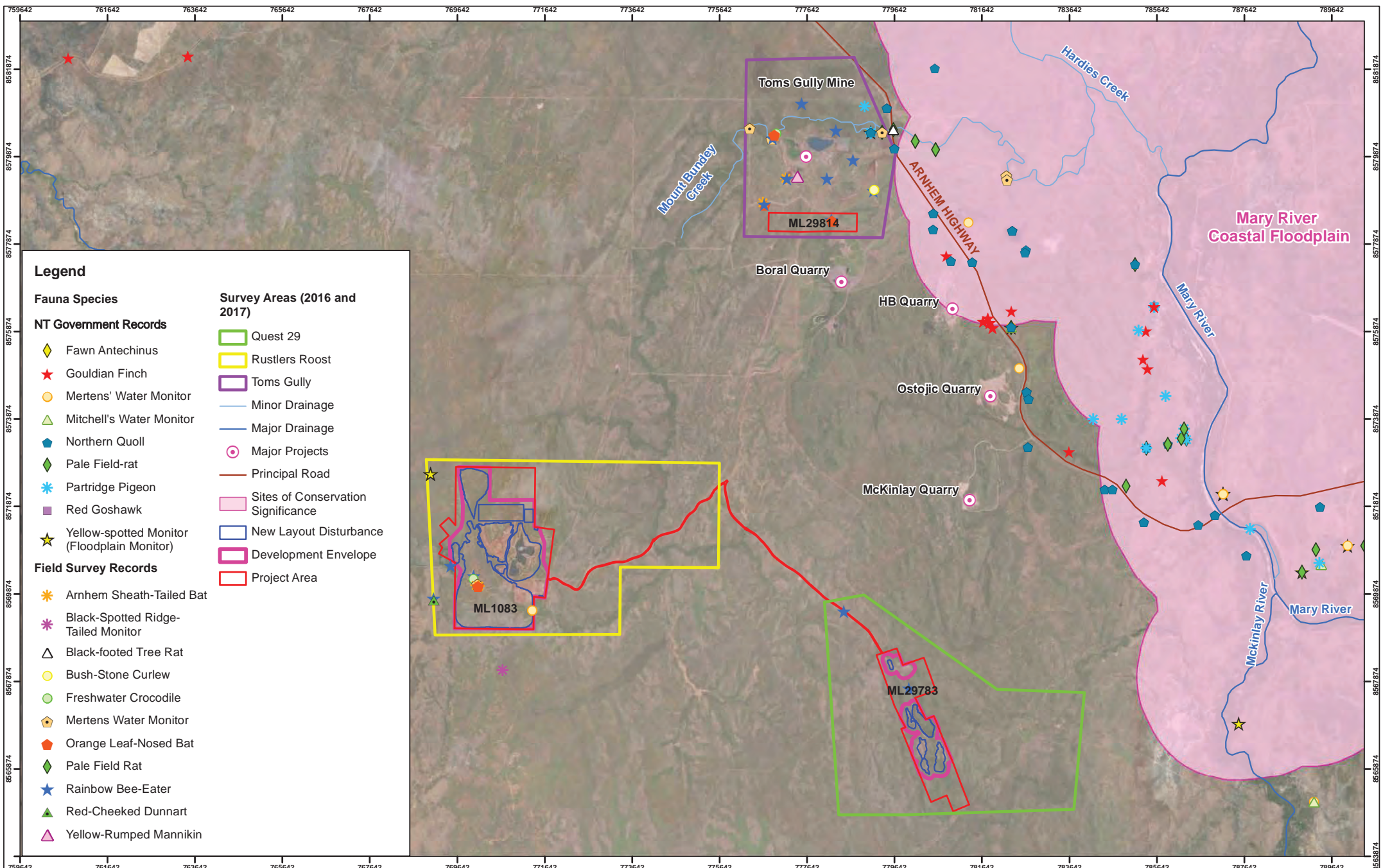
Table 44 Threatened fauna species lists and likelihood of occurrence in Project area

Threatened fauna species		Status		Allocated Likelihood of Occurrence
Species name	Common name	NT Threatened status	EPBC Listed	
Birds				
<i>Burhinus grallarius</i>	Bush Stone-curlew	NT	-	High
<i>Calidris ferruginea</i>	Curlew Sandpiper	VU	CR	Moderate
<i>Epthianura crocea tunneyi</i>	Alligator Rivers yellow chat	EN	EN	Moderate
<i>Erythrotriorchis radiatus</i>	Red goshawk	VU	VU	High
<i>Erythrura gouldiae</i>	Gouldian finch	VU	EN	High
<i>Falco hypoleucos</i>	Grey falcon	VU	-	High
<i>Geophaps smithii smithii</i>	Partridge pigeon (eastern)	VU	VU	High
<i>Lonchura flaviprymna</i>	Yellow-rumped mannikin	NT	-	High
<i>Rostratula australis</i>	Australian painted snipe	VU	EN	Moderate
<i>Tyto novaehollandiae kimberli</i>	Masked owl (northern)	VU	VU	Moderate
Mammals				
<i>Antechinus bellus</i>	Fawn antechinus	EN	VU	High

Threatened fauna species		Status		Allocated Likelihood of Occurrence
Species name	Common name	NT Threatened status	EPBC Listed	
<i>Dasyurus hallucatus</i>	Northern quoll	CR	EN	Moderate
<i>Macroderma gigas</i>	Ghost bat	NT	VU	Moderate
<i>Phascogale pirata</i>	Northern brush-tailed phascogale	EN	VU	Moderate
<i>Rattus tunneyi</i>	Pale field-rat	VU	-	High
<i>Rhinonictis aurantia</i>	Orange leaf-nosed bat	NT	-	High
<i>Saccolaimus saccolaimus nudicluniatus</i>	Bare-rumped sheath-tailed bat	DD	CR	Moderate
<i>Sminthopsis virginiae</i>	Red-cheeked dunnart	DD	-	High
Reptiles				
<i>Lucasium occultum</i>	Yellow-snouted gecko	VU	EN	Moderate
<i>Varanus mertensi</i>	Mertens' water monitor	VU	-	High
<i>Varanus mitchelli</i>	Mitchell's water monitor	VU	-	High
<i>Varanus panoptes</i>	Floodplain monitor	VU	-	High

* DD – Data Deficient, NT – Near Threatened, VU – Vulnerable, EN – Endangered, CR – Critically Endangered

Note – no fish or shark species of conservation significance were deemed to have more than a low likelihood of occurrence.



Legend

Fauna Species

NT Government Records

- ◆ Fawn Antechinus
- ★ Gouldian Finch
- Mertens' Water Monitor
- △ Mitchell's Water Monitor
- ◆ Northern Quoll
- ◆ Pale Field-rat
- ★ Partridge Pigeon
- Red Goshawk
- ★ Yellow-spotted Monitor (Floodplain Monitor)

Field Survey Records

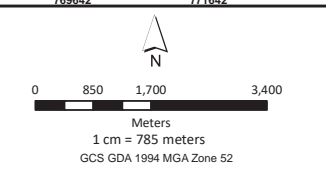
- ★ Arnhem Sheath-Tailed Bat
- ★ Black-Spotted Ridge-Tailed Monitor
- △ Black-footed Tree Rat
- Bush-Stone Curlew
- Freshwater Crocodile
- Mertens Water Monitor
- ★ Orange Leaf-Nosed Bat
- ◆ Pale Field Rat
- ★ Rainbow Bee-Eater
- △ Red-Cheeked Dunnart
- △ Yellow-Rumped Mannikin

Survey Areas (2016 and 2017)

- Quest 29
- Rustlers Roost
- Toms Gully
- Minor Drainage
- Major Drainage
- Major Projects
- Principal Road
- Sites of Conservation Significance
- New Layout Disturbance
- Development Envelope
- Project Area

R	Details	Date
1	Final	25/08/21
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

DESIGNED				SS	CHECKED	TK
DRAWN				SS	CHECKED	TK
APPROVED				TK	DATE	25/08/21
Notes:						



DISCLAIMER
 CDM Smith has endeavoured to ensure accuracy and completeness of the data. CDM Smith assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
 NT Government Open Source Data



FIGURE 45

Fauna Field Survey Locations and Conservation Significant Species Records

DRG Ref: 1001087-EIS-07-7.15

The assessment of likelihood of occurrence of the species, was subsequently reviewed and refined, to consider the latest state of knowledge from survey efforts and observations specific to each species. This is presented further below.

During the field surveys, five species classified under the TPWC Act as threatened, near threatened and data deficient fauna species were recorded during the 2016 and 2017 field surveys (LES 2017a). The Northern Territory threatened species included the Merten's water monitor (*Varanus mertensi*) recorded at Rustlers Roost in 2017. Two near threatened species were recorded at Rustlers Roost in 2017; these were the Orange Leaf-nosed Bat (*Rhinoicteris aurantia*), and Arnhem Sheath-tailed Bat (*Taphozous kapalgensis*). Two data deficient species were recorded. These were the Red-cheeked Dunnart (*Sminthopsis virginiae*), and Black-spotted Ridge-tailed Monitor (*Varanus baritji*), both species were recorded during the 2016 survey at Rustlers Roost. No fauna species listed as migratory were recorded during either survey (LES 2017a).

While survey effort was targeted toward detecting flora and fauna species of conservation significance, there remains a possibility that some species are present in the survey areas but were not recorded. One notable fauna species identified by the NT EPA was the Yellow-snouted Gecko.

Spotlighting efforts targeting the Yellow-snouted Gecko was undertaken over six nights during each survey (i.e. six nights in November 2016 and six nights in May 2017 totalling 12 nights). Searches for habitat suitable for the Yellow-snouted Gecko were also undertaken during the day while travelling through the survey areas. The Yellow-snouted Gecko has been recorded in areas with well-developed leaf litter and grasses in open forests with red sandy-loam soils. Red sandy loam soils were not recorded in the survey areas. Therefore, survey effort was targeted towards those sites with woodland vegetation and well-developed leaf litter. Despite survey efforts, the Yellow-snouted Gecko was not recorded in the survey areas during either on-ground survey period. Therefore, there is a low residual likelihood that the Yellow-snouted Gecko occurs in the Project area.

Camera traps, cage traps, spotlighting and searches for suitable habitat were undertaken for the Black-footed Tree rat. Specifically, signs of scratching on trees and eaten fruit that may indicate the presence of the species were looked for. These signs were not found, and Black-footed Tree Rats were not camera- or live-trapped and were not found during spotlighting despite there being potentially suitable habitat in the survey areas. Therefore, there remains a low likelihood that the Black-footed Tree Rat occurs within the Project area.

Habitat searches were undertaken to look for habitat suitable for the Bare-rumped Sheath-tail Bat. This species is considered to be an obligate hollow-roosting species, with potential habitat including woodlands and forests from coastal to adjacent inland areas in the Top End (Milne *et al.* 2006). All survey sites consisted of potentially suitable habitat for the Bare-rumped Sheath-tailed Bat and detectors were deployed at sites thought to be suitable for 12 nights for each of the two detectors. Despite these targeted survey efforts, this species was not recorded during either the November 2016

or May 2017 on-ground surveys. However, the assessment determined there was still a moderate likelihood that the Bare-rumped Sheath-tailed bat is present in the Project area.

Survey effort for the Northern Quoll involved searches for suitable habitat, live- and camera-trapping, search for secondary sign and spotlighting. Only one site in the survey areas (Cam T3.2) was identified as being suitable habitat for the Northern Quoll (T3.2 is 1.25 km north of the accommodation camp Project area). A camera-trap was placed at this site but did not detect Northern Quolls and no secondary sign was apparent. This species was not recorded in any survey area during either the November 2016 or May 2017 on-ground surveys despite these targeted efforts. Given the low availability of habitat in the survey areas, and the lack of sign that the Northern Quoll was present during on-ground surveys, there is considered to be a low likelihood that this species is present in the Project area⁷.

Habitat searches, live- and camera-trapping and spotlighting were undertaken to investigate the presence of the Fawn Antechinus and Pale Field Rat. The Fawn Antechinus occurs in savanna woodland and tall open forest. These habitat types are widespread through the survey areas. Despite targeted survey effort, the Fawn Antechinus was not recorded during either November 2016 or May 2017, but the species has been recorded 3.5 km south-east of the accommodation camp. This species has undergone widespread declines across the Top End in the last decade (Young 2012), after this record was taken. Therefore, there remains a low to-moderate subsequent likelihood that the Fawn Antechinus occurs within the Project area⁷.

The Pale Field Rat occurs in dense vegetation along creek lines. Vegetation along creek lines was not very dense during the November 2016 and May 2017 on-ground surveys and thought not to be optimal for Pale Field Rat. However, density of vegetation may differ between years due to differences in climatic conditions or grazing pressure and there is still a moderate likelihood that Pale Field Rat will be present in the Project area and immediately downstream if vegetation density increases along creek lines.

Searches for suitable habitat were undertaken for the Gouldian Finch and Partridge Pigeon. Further area searches were undertaken for these species in potentially suitable habitat. The Gouldian Finch inhabits wooded hills in the late wet and dry season, and lowland drainage during the wet season. This species has been particularly associated with *E. brevifolia* and *E. tintinnans* in the Northern Territory (Brazill-Boast *et al.* 2016; Tidemann *et al.* 1992). Despite targeted survey effort and potentially suitable habitat being present in the area, Gouldian Finches were not recorded during either the November 2016 or May 2017 on-ground surveys but have been recorded 1.5 km south-east of the Project area in the

⁷ This is a low subsequent likelihood considering the outcome of the surveys.

past. There is a high possibility that this species could occur in the Project area as potentially suitable habitat exists, and groups are known to be mobile depending on habitat suitability.

The Partridge Pigeon occurs in lowland eucalypt open forest and woodland with grassy understorey. These habitats are present throughout the Project area, particularly Rustlers Roost. The Partridge Pigeon was not recorded during either the November 2016 or May 2017 on-ground surveys but has been recorded within the survey area to the north of the accommodation camp in the past. There remains a high likelihood that the Partridge Pigeon could occur in the Project area.

Searches for suitable habitat, live- and camera-trapping and area searches were undertaken for the Floodplain Monitor and Mitchell’s Water Monitor. Inland, the Floodplain Monitor inhabits waters in all river systems and Mitchell’s water monitor inhabits floodplains, grasslands and woodlands. Watercourses through the survey area are ephemeral and standing water is in dams and mine pits. Therefore, there is limited habitat available for the Floodplain Monitor and likelihood of occurrence is considered low. Due to the proximity of prior records and potentially suitable habitat occurring within the survey areas, there remains a high likelihood that Mitchell’s Water Monitor will occur within or immediately downstream of the Project area.

Each of the five species identified during the surveys are discussed below in more detail. In addition to these, details of the species considered to have either residual moderate or high likelihood of occurrence in the Project area have been considered further.

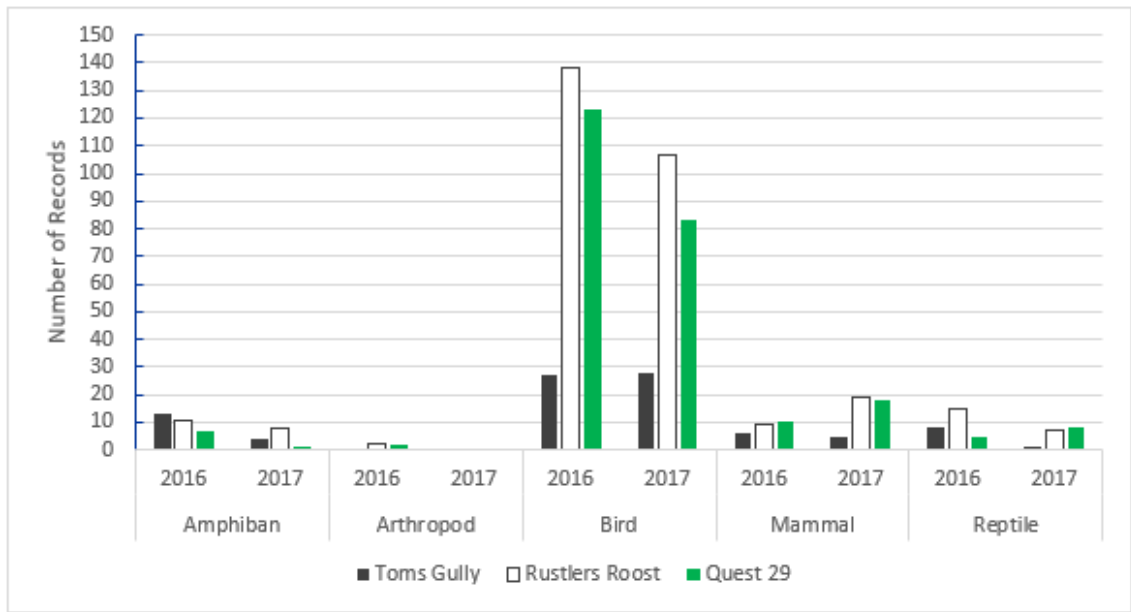


Figure 46 Fauna Surveys from November 2016 and May 2017 (LES 2017a)

Merten's Water Monitor

The Merten's Water Monitor is a medium- to large-sized semi-aquatic monitor found across far north Australia from the Kimberley to the west side of Cape York Peninsula (Ward *et al.* 2006). It is listed as vulnerable under the TPWC Act and is under review to be listed as Endangered under the EPBC Act. The Merten's Water Monitor is widespread throughout the Northern Territory, inhabiting all river systems throughout the Territory (Ward *et al.* 2006). The biggest threat to the monitor is from the invasion of the cane toad and the risk that it poses as a food source. The Merten's Water Monitor has been known to eat the cane toads and die as a result of the ingested toxins (Ward *et al.* 2006).

There was only a single sighting of the Merten's Water Monitor at Rustlers Roost over the two survey efforts (November and May). This was at the trapping location of SR1 situated at the southern point of Annie's Dam west of the existing mine pit. There is also a single record of the species occurring in the southern portion of the Rustlers Roost Project area in NR Maps. The details indicate the species was recorded in November 2015 foraging in the existing retention ponds (Figure 46).

The NT Fauna Atlas indicates that this species has a widespread distribution, and that this individual record is not likely to indicate the presence of an important population of the species. Due to the localised scale of the Project, it is not likely that the Project will negatively affect the conservation status of Merten's Water Monitor (LES 2017a). Mitigation measures for the protection of the Merten's Water Monitor have been included in Section 7.2.3 within the Draft EIS.

Orange Leaf-nosed Bat

The Orange Leaf-nosed Bat is found across the top end of Australia, from the Kimberley to north-west Queensland. The populations of Orange Leaf-nosed Bats in the Pilbara are treated separately to those from the Kimberley, Northern Territory and Queensland (DES 2018). The *Rhinonictis aurantia* species is native to the Northern Territory and classified as 'Near Threatened' under the TPWC Act. The field survey recorded the Orange Leaf-nosed Bat at location SR1 at Rustlers Roost in 2017 (Figure 46).

The Orange Leaf-nosed Bat forages in a range of habitats including grassland, open woodland, savannah woodland, and spinifex covered hills. The known threats to Orange Leaf-nosed Bat have been identified as the destruction and disturbance of roosts from human visitation to caves, mining activities, and the collapse or flooding of ageing mine roosts. In addition, inappropriate fire regimes is a potential threat to the bat (DES 2018).

The closest NT Fauna Atlas record of the Orange Leaf-nosed Bat is 4 km south-east of trapping site ST3 (Figure 46). The NT Fauna Atlas records indicate that this species is common in the local area that correlates with the land unit described as plains with open forest. TH island unit has not been identified as present in the Project area. Given the localised scale of the proposed operations there is a low likelihood that operations will negatively affect the conservation status of this

species (LES 2017a). Mitigation measures for the protection of the Orange Leaf-nosed Bat have been included in Section 7.2.3 within the Draft EIS.

Arnhem Sheath-tailed Bat

The Arnhem Sheath-tailed Bat has a restricted distribution of the western and northern coastline of the Top End. *Taphozous kapalgensis* native to the Northern Territory and is classified as 'Threatened' under the TPWC Act. The field survey recorded the Arnhem Sheath-tailed Bat at location SR1 at Rustlers Roost in 2017 (Figure 46).

Little appears to be known about the Arnhem Sheath-tailed Bat. It is thought that they possibly roost in tree hollows, whilst also utilising the base of pandanus leaves (Australian Museum 2020). The Arnhem Sheath-tailed Bat is vulnerable to the loss habitat through a decline in roosting locations from the clearing of native vegetation and the loss of feeding areas by land degradation through agricultural activities.

The closest record from the NT Fauna Atlas for the Arnhem Sheath-tailed Bat is 55 km north-east of the ST3 survey area, in woodland habitat next to a tributary of the West Alligator River. Given that the Arnhem Sheath-tailed Bat was only recorded at one site in the survey area, it is likely that the species is not locally common in the area. Given the localised scale of the proposed operations there is a low likelihood that operations will negatively affect the conservation status of this species (LES 2017a). Mitigation measures for the protection of the Arnhem sheath-tailed bat have been included in Section 7.2.3 within the Draft EIS.

Black-Spotted Ridge-tailed Monitor

The Black-spotted Ridge-tailed Monitor is endemic to the Top End and appears to be primarily located north of the Nitmiluk National Park. There is little information available for the *Varanus baritji*, and the species is considered to be one with a data deficiency.

The field survey recorded the black-spotted ridge-tailed monitor at location SR3 at Rustlers Roost. Trap location SR3 is outside of the Project Development Envelope and lies approximately 900 m south of the Project area.

The NT Fauna Atlas records of the black-spotted ridge-tailed monitor indicate that this species is widespread. Due to the localised scale of the proposed operations, it is not likely that they will have a negative effect on the conservation status of this species (LES 2017a). Mitigation measures for the protection of the black-spotted ridge tailed monitor have been included in Section 7.2.3 within the Draft EIS.

Red-cheeked Dunnart

The Red-cheeked Dunnart (*Sminthopsis virginiae*) is distributed in Australia and Papua New Guinea. The habitat for the Red-cheeked Dunnart includes woodlands, open rocky forests, savannah grasslands, swamps, soaks and margins of tropical forests. There is little information available for the Red-cheeked Dunnart which leads the species to be listed as one that is data deficient.

The Red-cheeked Dunnart is understood to have a breeding season between October to March during the wet season and that the diet is mainly made up of small reptiles. The field survey recorded the Red-cheeked Dunnart at location SR4 at Rustlers Roost in 2016 which is approximately 480 m west of the Project area.

The Red-cheeked Dunnart was recorded on woodland on slope habitat. This is 13 km west of the nearest record of the species in the Mary River National Park. Potential impacts on this species from operations include vehicle impact and habitat clearance. NT Fauna Atlas records of the Red-cheeked Dunnart indicate that this species is widespread in the region. Therefore, due to the localised scale of the operations, it is unlikely that they will negatively affect the conservation status of this species (LES 2017a). Mitigation measures for the protection of the Red-cheeked Dunnart have been included in Section 7.2.3 within the Draft EIS.

Pale Field-rat

The Pale Field-rat is a medium sized rodent found in higher rainfall areas of northern Australia (Young and Hill 2012). It is listed as vulnerable under the TPWC Act. The Pale field-rat inhabits dense vegetation along creeks (Young and Hill 2012). The closest record of the species is 3.5 km south-east of Project area around the accommodation camp. Given the potentially suitable habitat and the proximity of prior records, there is a moderate residual likelihood that this species is present in the survey area.

The decline of the pale field rat in the NT is thought to be associated with inappropriate fire regimes and predation by feral cats. The proposed operations are not likely to increase the impacts of these threats on the Pale Field-rat. Therefore, there the proposed operations are not likely to have a significant impact on an important population of the species. Nevertheless, Section 7.2.3 within the Draft EIS provides measures targeted at managing the fire regime within and surrounding the Project area, as well as controlling pests.

Bare-rumped Sheath-tailed Bat

The Bare-rumped Sheath-tailed Bat (*Saccolaimus saccolaimus*) is a large, high-flying, insectivorous bat distributed across north-eastern Australia (Milne and Woinarski 2006). It is listed as data deficient under the TPWC Act and critically endangered under the EPBC Act. The Bare-rumped Sheath-tailed Bat has been found in Pandanus woodland fringing the sedgeland of the South Alligator River in Kakadu National Park, and also in the eucalypt tall open forests of the Northern

Territory (Milne and Woinarski 2006). Its status in the Northern Territory is very difficult to assign, given the low number of records, with just one specimen currently residing in the Northern Territory Museum.

There is no information from which to consider trends in status. Known threats to the species include habitat loss (prefers tree hollow roosts in tall eucalyptus open forest), competition for hollows by other species, and the possibility that more frequent burning impacts prey abundance and hollow (TSSC 2016). While the known range is currently very limited, this may largely reflect sampling constraints. Given this lack of critical information, the taxon is considered Data Deficient.

Habitat searches were undertaken to look for habitat suitable for the Bare-rumped Sheath-tailed Bat. Despite the targeted survey efforts, this species was not recorded during either the November 2016 or May 2017 on-ground surveys. It is difficult to distinguish the calls of the Bare-rumped Sheath-tailed Bat with several of the sympatric species *Chaerophon jobensis*, *Mormopterus beccarii* and *S. flaviventris*. All three of these species were identified during the on-ground surveys; *C. jobensis* and *S. flaviventris* in all three survey areas, and *M. beccarii* in Toms Gully and Quest 29. There is still a moderate likelihood that the Bare-rumped Sheath-tailed Bat is present in the survey areas.

The Project area is within a location that has previously undergone disturbance, and any further disturbance will be localised and it is not expected to have a significant impact on the population of the Bare-rumped Sheath-tailed Bat. Nevertheless, Section 7.2.3 within the Draft EIS provides measures targeted at managing the fire regime within and surrounding the Project area, as well as identification and search of hollow bearing trees prior to clearing.

Gouldian Finch

The Gouldian Finch (*Erythrura gouldiae*) is an easily recognised colourful finch that is restricted to isolated areas of tropical savannas in the NT and the Kimberley (DENR 2019). It is listed as vulnerable under the TPWC Act and endangered under the EPBC Act. In the late wet season and dry season (February to October) the Gouldian finch inhabits wooded hills containing a group of eucalypts called snappy or salmon gums, with hollows for nesting sites (DENR 2019).

Relevant threatening processes that have potentially contributed to the decline of Gouldian finches include the parasitic mite *Sternostoma tracheacolum*, trapping, and pastoral grazing practices. However, the most important factor in the decline appears to be change in the availability of foraging habitat of the understorey vegetation, impacted by pastoralism and/or changed fire regimes. Evidence suggests that large-scale late dry season fires reduce the seed availability that the Gouldian Finch relies on particularly during the early wet season.

Searches for suitable habitat were undertaken for the Gouldian Finch, however despite the targeted search effort, no Gouldian Finches were recorded in either the November 2016 or May 2017 field surveys. The closest record of a Gouldian Finch was 1.5 km south-east of the accommodation camp. There is a high possibility that this species could occur in the

survey area as potentially suitable habitat exists, and groups are known to be mobile depending on habitat suitability (LES 2017a).

The Project is not likely to increase the impacts of the threatening processes identified above and from the lack of recorded evidence of the Gouldian Finch inhabiting the area, the Project is unlikely to have a significant impact on a population of this species. Nevertheless, Section 7.2.3 within the Draft EIS provides measures targeted at managing the fire regime within and surrounding the Project area.

Mitchell's Water Monitor

Mitchell's Water Monitor (*Varanus mitchelli*) is a slender medium-sized (total length up to 70 cm) semi-aquatic monitor found across far north Australia from the Kimberley to the west side of Cape York Peninsula. It is listed as Vulnerable under the TPWC Act.

The Mitchell's Water Monitor is found in the catchments of all rivers flowing to the Timor Sea, Arafura Sea and the Gulf of Carpentaria. Mitchell's Water Monitor inhabits the margins of watercourses, swamps and lagoons in Northern Australia, and is a strong swimmer that feeds largely on aquatic insects, fish, small lizards and frogs (Ward 2012).

The dominant threat to the Mitchell's Water Monitor is its propensity to eat cane toads and the high toxicity level that result from ingestion. Generally, monitors are highly susceptible to cane toad toxin and a Mitchell's Water Monitor can easily eat a cane toad large enough to result in death. Cane toads also deplete areas of potential prey for monitors, especially targeting the foods that are preferentially eaten by juvenile monitors. The competition will slow the recovery of populations following the initial crash (Ward 2012).

Searches for suitable habitat, live- and camera-trapping and area searches were undertaken for the Mitchell's Water Monitor, however, despite the targeted survey effort, Mitchell's Water Monitor was not recorded during either the November 2016 or May 2017 field surveys. There has been a record of the Mitchell's Water Monitor within 3.5 km of the accommodation camp in the past. Given the proximity of this previous record and the potentially suitable habitat occurring within the Project area, there remains a high likelihood that Mitchell's Water Monitor may occur within the Project area (LES 2017a).

Activities resulting from the Project are unlikely to impact the Mitchell's Water Monitor, and the Project is unlikely to increase the population of cane toads in the area, which has been identified as the dominant threat to the species. Nevertheless, Section 7.2.3 within the Draft EIS provides measures targeted at managing pest species in the Project area and water quality in the downstream environment which would be important to maintain prey species.

Floodplain Monitor (Yellow-Spotted Monitor)

The Floodplain Monitor (*Varanus panoptes*) is also known as the Northern Sand Goanna or Yellow-spotted Monitor. The Floodplain Monitor is a large terrestrial monitor that can grow up to 1.4 m long (Ward *et al.* 2012). It is listed as vulnerable under the TPWC Act.

The Floodplain Monitor has a broad geographic range across far north of Australia from the Kimberley to Cape York Peninsula, and southwards through most of Queensland. It is a strong ground-dwelling monitor occupying a variety of habitats, including beaches, floodplains, grasslands and woodlands. The Floodplain Monitor feeds mostly on small terrestrial vertebrates and insects (Ward *et al.* 2012).

Similar to the Mitchell's Water Monitor mentioned above, the greatest threat to the Floodplain Monitor is the cane toad, and its toxic effects to the Floodplain Monitor once ingested (Ward *et al.* 2012).

The field surveys conducted in November 2016 and May 2017, searched for suitable habitat, performed live- and camera-trapping; and area searches for the Floodplain Monitor. The watercourses identified throughout the survey area are considered to be ephemeral and the only standing water is in dams and mine pits, which are not considered to be suitable habitat for the Floodplain Monitor, therefore within the Project area there is limited habitat available for the species and despite the targeted survey effort, Floodplain Monitor was not recorded during either of the field surveys (LES 2017a).

Activities resulting from the Project are unlikely to impact the population Floodplain Monitor, and the Project is unlikely to increase the population of cane toads in the area, which has been identified as the dominant threat to the species. Nevertheless, Section 7.2.3 within the Draft EIS provides measures targeted at managing pest species in the Project area and water quality in the downstream environment for which the species may inhabit.

Partridge Pigeon (Eastern)

The Partridge Pigeon (*Geophaps smithii smithii*) is a medium-sized grey-brown bird with conspicuous white leading edge to the wing and red bare skin on the face, which forages entirely on the ground, and only flies in response to danger (Woinarski 2006a). The Partridge Pigeon is listed as Vulnerable under both the TPWC Act and EPBC Act.

The Partridge Pigeon is distributed across the Northern Territory and Kimberley but has disappeared from the lower rainfall parts of its range (Woinarski 2006a). The Partridge Pigeon occurs in lowland eucalypt open forest and woodland with grassy understorey. These habitats are present throughout the Project area, particularly Rustlers Roost.

The dominant threat to the Partridge Pigeon is the change in grass composition and fire regimes. The increase in invasive grass species such as Gamba Grass has displaced the density and diversity of native grasses that previously existed for foraging activities. This has changed the diversity, timing and abundance of seed availability for the diet of the Partridge Pigeon (Woinarski, 2006a). Partridge Pigeon was likely advantaged by the previous fire regime of frequent, patchy but

localised fire, and is likely greatly disadvantaged by the current fire regime of fewer but more extensive fires (Woinarski 2006a). That current fire regime presents a greater disadvantage by the inclusion of high fuel loads associated with exotic grasses, that make for far hotter and more extensive fire (Woinarski 2006a).

Furthermore, the ground-dwelling behaviour of the Partridge Pidgeon for nesting, roosting and foraging, makes the species highly susceptible to the predation of feral cats. Additionally, Partridge Pigeons also rely on daily access to water for survival, and climate change is posing an additional threat to the survival of the species (Woinarski 2006a).

The Partridge Pigeon was not recorded during either the November 2016 or May 2017 on-ground surveys, but there were three records noted north of the accommodation camp in the past (recorded in 1987 and 1988). As this species can move up to 5-10 km in response to changes in resource availability, and due to potentially suitable habitat occurring within the survey areas and the past record of the species north of the Project area there remains a high likelihood that the Partridge Pigeon could occur in the Project area in the future. The main threats to the Partridge Pigeon are thought to be predation by feral cats, loss of water sources, the interactive impacts of invasive plant species and changes in fire regimes and the clearance of suitable habitat (Woinarski 2006a). The proposed operations are not likely to increase the impact of these threats on the Partridge Pigeon. Therefore it is not expected that the Project will have a significant impact on an important population of this species. Nevertheless, Section 7.2.3 within the Draft EIS provides measures targeted at managing pest species, the fire regime and the quality of water in the downstream environment.

Red Goshawk

The Red Goshawk (*Erythrotriorchis radiates*) occurs across the northern portion of Australia, from near Broome in the south-west Kimberley to south-eastern Queensland. The Red Goshawk generally occurs in taller forests characteristic of higher rainfall areas, but there are some isolated records from central Australia (Woinarski 2006b). The Red Goshawk is listed as Vulnerable under both the TPWC Act and EPBC Act.

The Red Goshawk preys on medium-sized birds (up to the size of Kookaburras and Black Cockatoos) and dominates a territory of typically up to 200 km² (Woinarski 2006b). The preferred habitat of the Red Goshawk is tall open eucalypt forest and riparian areas, including paperbark forest and gallery forests (Woinarski 2006b).

The threatening processes of particular relevance to the Red Goshawk include the clearance of preferred habitat for agriculture, with some localised problems related to illegal egg-collection, shooting, and threats from fire.

The Red Goshawk was not recorded during either the November 2016 or May 2017 on-ground surveys. The closest historic record of the Red Goshawk was recorded prior to the field survey and was noted to be 6.5 km east of the accommodation camp. With appreciation of the large territorial area that the Red Goshawk can occupy, and the historic disturbance that has previously occurred within the Project area, the proposed operations are not likely to contribute to

the increase of threats on the Red Goshawk. Therefore, it is not expected that the Project will have a significant impact on an important population of the Red Goshawk.

7.9 Social Environment

7.9.1.1 Heritage sites

The Heritage Act sets a system for assessing, declaring, and protecting heritage places. Heritage places are areas that have been declared as significant for their historical, scientific, aesthetic, or social significance. All Aboriginal or Macassan archaeological places have been declared to be heritage places. According to the Northern Territory Government (NTG) Heritage Register there are no Registered Heritage Places in the Mount Bunday area (NTG, 2020c). Sacred sites are places within the landscape that have a special meaning or significance under Aboriginal tradition. Aboriginal sacred sites are recognised and protected as an integral part of NT and Australian cultural heritage, under the Aboriginal Land Rights (Northern Territory) Act 1976 and the Aboriginal Sacred Sites Act. All sacred sites, including those not recorded or registered in the NT are protected by the Aboriginal Sacred Sites Act. Valdora commissioned an archaeological investigation as part of the 1994 PER. The study was undertaken by Kinhill Engineers Pty Ltd (Kinhill), and the findings were outlined in the report “Archaeological Investigations of the Proposed Rustlers Roost Gold Mine November 1993”. Four prehistoric archaeological sites and several background scatters were located during the survey. Sites 1, 2 and 3 are best described as small, low density artefact scatters and like many others located in the wider Mount Bunday region. Site 4 consists of an artefact scatter and knapping location. The mining history of the region is recent, having commenced in the 1940's. One six metre shaft with a metal ladder remains (partially disturbed).

The Aboriginal Areas Protection Authority (AAPA) is an independent statutory authority responsible for overseeing the protection of Aboriginal sacred sites across the NT. All sacred sites in the NT are protected and the AAPA maintains records of all sacred sites that it has identified. There are strict secrecy provisions and Aboriginal cultural traditions covering these sites.

Anyone proposing to use or work on land in the NT may apply to the AAPA for an Authority Certificate to cover their proposed activities. The AAPA will only issue an Authority Certificate when it is satisfied that the use of, or work on, the area in question can proceed without there being a substantive risk of damage to, or interference with, a sacred site on or in the vicinity of the area.

- An AAPA Certificate (C93/153) was issued to Valdora Minerals in October 1993 for the construction of open pits, tailings ponds, leach pads and infrastructure associated for Rustlers Roost Gold Project. In December 1994, Primary Gold requested an update on the location or registration of Sacred Sites or Restricted Work Areas in an area (including the Rustlers Roost) from the AAPA. The AAPA confirmed that no sites were known to exist in or around the Rustlers Roost (ML 1083).

- An AAPA Certificate (C98/147) was issued to Kintaro Mines Pty Ltd in December 1998 for the open pit operations at Q29.
- An AAPA Certificate (C2010/017) was issued to Crocodile Gold in January 2010 for mining activities.
- An AAPA Certificate (C2016/168) was issued to Primary Gold in December 2016 for the works associated with exploration drilling at areas of old mining activities and gold anomalies and ongoing maintenance. This exploration drilling included the Mount Bunday areas including all the tenements described in the Project.

7.9.1.2 Native Title

A native title claim exists over the Mount Bunday Pastoral Lease. The details of the claim are NTD 6033 of 2000.

7.10 Waste rock characterisation

Land and Water consulting was commissioned by PGL to conduct a geochemical assessment, from recent the drilling programme (2018 for Rustlers Roost and 2020 for Q29) to further characterise the geochemistry of each of the main lithologies, with a particular focus on those in the transitional zone. From this test work, a more informed understanding and the risk of acid and/or metalliferous drainage (AMD) at the Rustlers Roost and Q29 sites. Findings from this work is provided in the draft EIS and a summary of information to date is provided below.

The following summary information is taken from an update on progress and summary of stat test results for the Preliminary Geochemical Assessment which provided to PGL in August 2021 by Land and Water Consulting. Task 1 and Task 2 are complete and Task 3 -kinetic test work is currently underway.

The Geochemical assessment scope of works involved the following:

Task 1 - Desk Study

Task 2 - Complete a static geochemical assessment for Rustlers Roost and Q29; and

Task 3 - Complete a kinetic geochemical assessment for Rustlers Roost and Q29.

Since kinetic studies are ongoing (Refer to Draft EIS), predictions of net acid generation rate from different sources cannot yet be detailed. This information will be added to a revised EIS (and associated appendices) upon completion of those studies and evaluation of results. The project water balance is described in the Draft EIS (Water Balance and Groundwater Modelling Report). The water balance results that predict groundwater inflows to the various pits will be used to estimate the volume of AMD produced, where applicable.

7.10.1.1 Existing Waste Rock and Heap Leach Materials at Rustlers Roost and Q29

Previous geochemical studies and site investigations were undertaken during and post mining at Rustler's Roost and Q29. A summary of key findings has been detailed to provide a clearer understanding of the sites geochemistry and current site conditions pertaining to water quality, landforms, and general site health.

Environmental Geochemistry International (EGi), site visits in 2011 to the Mount Bunday projects, and noted:

- selective mine waste placement had not been implemented during operation of these sites. Given the lack of segregation of materials in the WRD's, EGi recommended that all WRD's be considered as acid and metalliferous drainage (AMD) sources.
- Arsenic bearing acid generating wastes were likely at the sites particularly from the transitional and fresh zone of the geological profile.
- Acid neutralising capacity is sufficient in some areas to neutralise the acid and thus not all mined material from the transition and fresh zones is potentially acid forming.
- EGi referenced a wider more regional study completed of the Pine Creek Inlier in recent times. 243 samples were collected from across multiple deposits, the sulphur content and acid neutralising capacity were highly variable, and the geochemistry was described as without lithological control. EGi proposed a sulphur cut-off of 0.2 %S for acid generation based on their earlier regional study. The cut off applicable to most materials within the region to manage AMD, as a conservative estimate.
- EGi concluded further geochemical assessment should focus on in-situ materials and not materials stored in WRD's.
- EGi recommended detailed characterisation of lithologies present be carried out to assess the acid generation potential and distribution of metals such as lead, zinc, cadmium, antimony, nickel and cobalt and metalloids such as arsenic and molybdenum.

Preliminary waste characterisations study for Q29 proposed pits, 1998, Woodward Clyde. Reported:

- A preliminary waste characterisation study for the pits proposed at Q29 at the time. 20 samples were selected for geochemical characterisation from 18 drill holes across the suite of geological materials present within the project likely to be waste, oxide and fresh rock. Sample depths ranged from 3 to 65 m.
- The review of ore and waste rocks described the composition of the geology as relatively homogeneous, consequently compositing of samples of 2-5m intervals was completed to gain sufficient samples for the test suite. The samples were described as representative of ore and waste, however no lithological descriptions were provided other than for the dolerite samples.

- Nineteen of the 20 samples were found to be potentially acid forming (PAF) or uncertain (UC) with one sample of dolerite classified as non-acid forming (NAF).
- Recommendation: further assessment of the project should include more sampling with greater descriptions of the rock type, weathering, and mineralogy.

In 2019, CDM Smith conducted a limited characterisation study at Rustlers Roost of the existing WRD (11 samples), ROM (4 samples) and HLP (11 samples). All samples collected from surface had low sulphur content (all less than 0.04 %) and all samples were classified as NAF. The assessment determined that the materials currently stored on-site at Rustlers Roost had low potential to leach significant dissolved chemical load into the receiving environment. This was informed by surface and groundwater quality monitoring. Previous mining targeted the weathered oxide zone through open-cut mining methods that have been characterised as Non-acid forming (NAF). The assessment determined that the materials currently stored on-site at Rustlers Roost had low potential to leach significant dissolved chemical load into the receiving environment.

At Quest 29, the current indicated AMD risk from previously mined materials is considered low based on the existing shallow pit depth, predominantly mining of the weathered oxide zone, available pit water quality and no visual AMD observations from site visits or satellite imagery.

Management of HLP leachate residuals is currently implemented through storage in lined ponds at both sites. These ponds may be subject to overflow during storm events however are actively managed by pumping water to BHS pit during the wet season months. Although the sulphur content of the mined spent oxide ore material in the HLPs is low, there is potential that leachate from HLPs may have increased salinity (electrical conductivity) and similarly depressed pH (4 to 5) as runoff from surrounding soils due to the naturally elevated aluminium and iron in the weathered oxides.

7.10.1.2 New Rustlers Roost Waste Rock (CDM Smith, 2021)

No. samples selected for waste characterisation	131
Paste pH	4.5-9.6, with an average 7.2
Paste EC (uS/cm)	Ranged from 38-1180 average 183
Sulphur %	<0.01 to 2.55 with an average of 0.336
No. samples with sulphur % below LOR (<0.01)	61
No. samples for sulphur speciation	30

Comments	<p>. The highest sulphur values were in shales in the transitional zone. The fresh zone and oxide zone had relatively low sulphur content in all lithologies.</p> <p>In all samples, most of the sulphur was sulphide. Based on the ongoing waste characterisation work it is expected that fresh material will be NAF and transitional material will be a mixture of potentially acid forming (PAF) and uncertain (UC). The oxide material is expected to be predominately NAF, although some of the deeper material near the transitional zone may classify as PAF. In contrast, some NAF or UC material is present in the fresh zone due to the significant acid neutralising capacity (ANC) measured because of carbonates.</p> <p>Kinetic testing of samples is still ongoing and will be evaluated upon receipt of results to better predict long-term acid generating potential.</p>
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7.10.1.3 New Quest 29 Waste Rock (CDM Smith, 2021)

No. samples selected for waste characterisation	59
Paste pH	.6.0 to 8.7 with an average of 6.33
Paste EC (uS/cm)	ranged from 60 to 5,680 with an average of 1,340
Sulphur %	0.01 to 21.56 with an average of 3.23
No. samples with sulphur % below LOR (<0.01)	0
No. samples for sulphur speciation	20
Comments	<p>The highest sulphur values were in shales in the fresh zone.</p> <p>In all samples, most of the sulphur was sulphide. Based on the ongoing waste characterization work, it is expected that the fresh material will be PAF, and the transitional and oxide material will be a combination of NAF and PAF.</p> <p>Kinetic testing of samples is still ongoing and will be evaluated upon receipt of results to better predict long-term acid generating potential.</p>

7.10.2 Tailing's mineralogy and characterisation

A single TSF will be constructed to store tailings from the mine processing circuit and will operate continuously producing 4 Mt/year of tailings for 12 years (48 Mt). The TSF storage capacity volume is designed to hold 28.9 Mm³. The mineralogy

of the tailings was characterised by XRD analyses. Major minerals (8 to 42%) included clinocllore, muscovite, quartz, magnesio-ferro hornblende and microcline. Smaller quantities (1 to 4 %) of pyrite, calcite, albite, maghernite, grossular and fluorapatite were also observed. The total sulphur was 1.76 % with the majority being sulphide (1.5 %). The paste pH was 8.6 and the paste EC (uS/cm) was 30. The tailings sample had a positive net acid generation (NAG) and a low NAG pH indicating that the ANC present is insufficient to buffer the acid generated and upon oxidation the tailings are acid forming.

7.10.3 PAF/NAF estimated quantities

Based on the Materials Characterisation Study, static test results were used to estimate the quantities of PAF/NAF materials proposed to be mined for the Project. Table 45 and Table 46 shows the waste quantities by weathering zones. The number in parenthesis is the total number of samples characterised for NAF, PAF and UC.

Table 45 Rustlers Roost waste quantities by weathering zone (CDM Smith, 2021)

Waste Zone	Quantity (MT)	No. samples assessed	No. containing S	NAF	PAF	UC
Oxide	20.7	8	1	0(1)	0(1)	1(1)
Transitional	9.0	76	26	0(14)	3(14)	11(14)
Fresh	26.7	47	43	12(15)	2(15)	1(15)
Total Waste	56.4 MT	131	70	12(30)	5(30)	13(30)

Approximately 46% of waste does not contain sulphur and thus up to 25.9 Mt could potentially be used for construction, rehabilitation, and closure purposes.

Based on the data in Table 46 all the waste at Q29 contain sulphur and approximately 60% could be PAF and 40% NAF.

Table 46 Quest 29 waste quantities by weathering zone (CDM Smith, 2021)

Waste Zone	Quantity (MT)	No samples assessed	No containing S	NAF	PAF	UC
Oxide	4.6	13	13	2(3)	1(3)	0(3)
Transitional	2.8	9	9	4(6)	2(6)	0(6)
Fresh	4.7	36	36	2(11)	9(11)	0(11)
Total Waste	12.1 MT	58	58	8(20)	12(20)	0(20)

7.10.3.1 Redeveloped Mine Sources

Redevelopment of the mines will result in expanded waste rock dumps, expanded open pits, and a new TSF. In general, studies indicate that deeper materials than previously mined become more PAF with depth. Estimated PAF/NAF material quantities were provided in Section 3 of the EIS which summarises that oxide materials are generally classified as NAF, transition zone to the fresh zone is likely to be PAF or UC, and fresh zone materials are usually classified as PAF. For tailings, the preliminary geochemical assessment indicates that tailings (which will represent a composite of all lithologies) will be PAF. However, these classifications do not inform the solubility of the materials, rate of sulfide oxidation, and potential composition of leachate formed. These types of predictions will need to be made based on conclusions of the ongoing kinetic testing currently being completed (refer to Draft EIS).

In addition to waste rock and tailings as sources for AMD and associated elevated metals, tailings will be processed using cyanide to extract the gold. Residual cyanide will be removed and detoxified from tailings prior to disposal in the TSF; however, there is potential that residual cyanide may remain in the TSF and within any leachate that may be generated from the TSF.

As noted in the Draft EIS, thorium bearing fluoroapatite has been measured in some fresh zone samples. As a result, some associated waste rock and tailings generated from this zone may result in sources of radioactivity because of thorium decay.

7.11 Conceptual Site Model of water and AMD transport at Rustlers Roost

The mineralised geology at Rustlers Roost and Quest 29 has been discussed in terms of waste rock and tailings geochemistry.

Figure 47 provides an illustrative conceptual site model (CSM) as an example of the general processes existing at the Rustlers Roost site with regards to water and potential AMD transport towards the Mt. Bundey Creek catchment. These same general water flow pathways also occur to the Marrakai Creek catchment and at the Quest 29 site catchments.

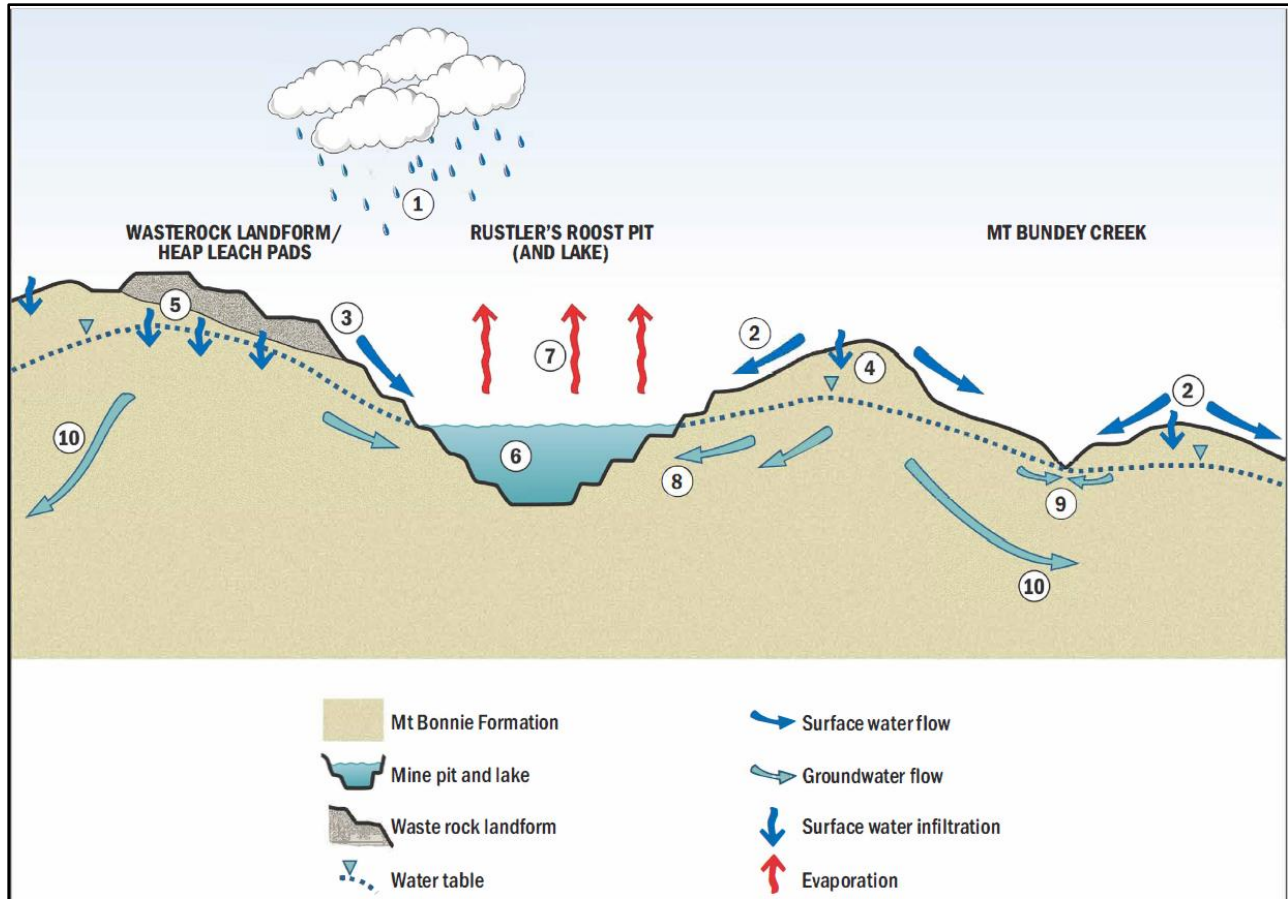


Figure 47 Conceptual site model of water and AMD transport at Rustlers Roost. (LWC, 2021)

- ① Wet season rainfall generates surface water runoff (sheet and stream flow) and groundwater recharge
- ② Runoff to local catchments
- ③ Seasonal runoff specifically from WRD and HLP
- ④ Rainfall infiltration and recharge
- ⑤ Infiltration of water from WRD and HLP to underlying groundwater system
- ⑥ Pit Lake formed from groundwater discharge to former mine pit, incident rainfall and seasonal runoff
- ⑦ Evaporative losses from pit lake maintain a dynamic steady state pit lake level (seasonal fluctuations)
- ⑧ Groundwater discharge to pit lake
- ⑨ Possible seasonal groundwater discharge to creeks (reliant on water table rise due to seasonal recharge)
- ⑩ Deep regional groundwater flow toward Mt. Bunday Creek and Mary River

7.11.1 Controls and Maintenance

To minimise the risk and volumes of AMD on site, a number of operation controls have been designed. Typical management considerations where the avoidance of disturbance is not an option include:

- Segregation and selective placement;
- Encapsulation with NAF material of sufficient thickness to limit infiltration and/or use of low permeability cover systems;
- Submergence withing aqueous environment (e.g., pit lakes);
- Backfilling of hydrogeologically contained voids with minimal re-handling of materials;
- Erosion and sediment control measures such as bunding, run-on/runoff diversions, and stormwater ponds; and
- Water treatment and discharge.

The selection of the most appropriate management measures will be based on site specific environmental considerations including the climate, geology, hydrogeology, hydrology and geochemistry of the materials and cost and schedule implications to the project. Encapsulation should consider not only the acid generation potential of the waste but should also consider radioactivity requirements given the results gathered for the ore that may contain thorium-bearing fluorapatite.

7.12 Analysis of environmental data for closure – knowledge gaps and further work

From the review of environmental data and consideration of the Closure Domains, the following points identify further work required and knowledge gaps that will need to be done to refine the risk process and severity of impacts to inform management measures. Section 9 of this MCP details each domains research, trials and studies and gaps of uncertainty.

PGL proposes to collect the following information during project planning and throughout LOM.

7.12.1.1 Further research, trials, and studies

- Determination of physical stability of overburden waste material and its suitability for construction.
- Determination of material volume and geochemistry requirements for rehabilitation and sources of material (structural, physical, and chemical and microbiological properties and suitable minimum requirements for plant root zone development.)
- Conduct ongoing rehabilitation trials and investigations throughout operations and subsequent performance monitoring to inform closure design. Local species will be preferred on the basis to reflect the surrounding vegetation, topography, and surrounding land use.
- Confirm capping and cover thickness and material suitability as capping and cover (growth medium) for WRD rehabilitation. And the optimum land form profile and cover design for maximum stability and vegetation establishment success.
- Develop specific, quantitative performance indicators for the measurements of success that are based on research and monitoring outcomes.
- Routine materials characterisation/geochemical testing during operations to understand tailings supernatant geochemical properties and develop a strategy for disposal of surplus water.
- Calibration of pit groundwater seepage by monitoring pit dewatering during early stages of operations to increase certainty of hydraulic conductivity of the regional aquifer and plan for site water balance and closure.
- Investigate options for PAF waste rock placement in pit and whether liming is required prior to backfilling.

7.12.1.2 Gaps and Uncertainty

- Final results of the Kinetic testing is yet to be provided as part of the Geochemical assessment of the Project sites. The final results will provide information of the net acid generation rate from different sources to inform suitable waste rock placement, solubility of the waste materials, rate of sulphide oxidation, and potential composition of leachate formed.

- Thorium bearing fluoroapatite has been measured in some fresh zone samples. As a result, some associated waste rock and tailings generated from this zone may result in sources of radioactivity because of thorium decay. Physical and chemical properties of cover and capping for WRD's to be confirmed.
- Lack of understanding of select plants to demonstrate their capacity for establishment, survival, and propagation post mining. Suitable vegetation covers utilising provenance selection or local seed for rehabilitation suited to the new local conditions such as topography, soil structure, aspect.
- TSF Capping and cover thickness have been determined. TSF cover and capping quantities to be confirmed in the subsequent design phase.
- Uncertainty of the regional groundwater aquifer hydraulic conductivity for operations and closure.
- Determine BHS pit closure criteria for either backfilling with Q29 heap leach material or remain as an open pit at closure.
- There is uncertainty around haul roads and access roads to be retained by Pastoral Lease Holders. Continual engagement throughout operations will assist to confirm decisions and provide positive outcomes to Lease holders and PGL.

Section 8 Closure Risk Assessment

8.1 Assessment approach

A whole of Project impact analysis and risk assessment was done in preparation of the EIS. Separate risk assessments were undertaken for the construction/operations phase and the rehabilitation/closure phase. For the closure phase, potential impacts and risks were assessed for each of the broad closure objectives and closure domains.

Criteria were developed to rank the likelihood and consequence (severity) of each identified impact. The likelihood descriptors consider the type of activity, the nature of the environment where the proposal will take place and experience in relation to similar activities/projects outlined in Table 49. The consequence descriptors consider the scale, intensity, duration, and frequency of impacts (i.e., criteria used to determine the severity of potential impacts) and the importance/sensitivity of the receiving environment outlined in Table 47.

Table 48 outline the risk matrix used to assign risks ratings and management response to the evaluated risks respectively.

Table 47 Risk assessment - Consequence categories and descriptions

NT EPA Themes and Factors		Consequence				
Theme	Factors	(1) Insignificant	(2) Minor	(3) Moderate	(4) Major	(5) Significant
Land	Terrestrial Environmental Quality	Negligible impact to isolated area	Contained low impact, not impacting on any environmental values of soil or land	Uncontained impact, able to be rectified in short-term without causing pollution or contamination to soil or land	Extensive hazardous impact on an environmental value requiring long-term remediation of soil or land	Uncontained hazardous impact with residual effect, even with long term remediation of soil or land
	Terrestrial Ecosystem	Alteration or disturbance to an isolated area that is unlikely to affect the habitat, species, or ecosystem functioning	Alteration or disturbance to less than 5% of a habitat, species or ecosystem functioning resulting in a minor, recoverable impact within 1 year	Alteration or disturbance to 5-30% of a habitat, species or ecosystem functioning resulting in a moderate, recoverable impact within 1-2 years	Alteration or disturbance to 30-70% of a habitat, species or ecosystem functioning result in a major, recoverable impact within 3-10 years	Alteration of more than 70% of a habitat, species or ecosystem functioning resulting in an extinction or permanent change or reduce threshold level below 30%. Recovery, if possible is greater than 10 years
Water	Hydrological Processes	Negligible impact to hydrological processes in Project area (surface or groundwater) and no consequence to the use of water	Contained low impact to hydrological processes in Project area (surface or groundwater) with minor recoverable impact within 1 year	Uncontained impact to hydrological processes that will affect the use of the water including outside the Project area but can be remediated in the short-term (1-2 years)	Extensive impact to hydrological processes that will affect the use of the water including outside the Project area and requires long-term remediation (3-10 years)	Uncontained hazardous impact to hydrological processes with residual effect, even with long-term remediation (greater than 10 years)

NT EPA Themes and Factors		Consequence				
Theme	Factors	(1) Insignificant	(2) Minor	(3) Moderate	(4) Major	(5) Significant
	Inland Water Environmental Quality	Negligible impact to water quality (surface or groundwater) in Project area and no consequence to the human or ecological uses of the water	Contained low impact to water quality (surface or groundwater) in Project area with minor recoverable impact within 1 year	Uncontained impact to water quality that will affect the human or ecological use of the water including outside the Project area but can be remediated in the short-term (1-2 years)	Extensive impact to water quality that will affect the human or ecological use of the water including outside the Project area and requires long-term remediation (3-10 years)	Uncontained hazardous impact to water quality with residual effect, even with long-term remediation (greater than 10 years)
	Aquatic Ecosystems	Negligible impact to aquatic ecosystems through quality or flow changes in Project area, but unlikely to affect the habitat, species, or ecosystem functioning	Contained low impact to aquatic ecosystems through quality or flow changes in Project area, with minor recoverable impact within 1 year	Uncontained impact to aquatic ecosystems through quality or flow changes, with moderate consequence to habitat, species or ecosystem functioning including outside the Project area but can be remediated in the short-term (1-2 years)	Extensive impact to aquatic ecosystems that will affect the species or ecosystem functioning including outside the Project area and requires long-term remediation (3-10 years)	Uncontained impact to aquatic ecosystem with residual effect, even with long-term remediation (greater than 10 years)
People	Community and Economy	Incident with or without minor injury. No impact on human health or very minor short-term inconvenience or symptoms OR	Injuries requiring first aid treatment. Minor short-term inconvenience or symptoms to human health OR	Injury or illness requiring medical treatment. Short term or reversible disabling effect (impairment) to human health OR	Injuries requiring hospitalisation. Serious long term or permanent disabling effects on human health	Loss of life / fatality or long term or permanent disabling effects on human health
		Adverse local social or economic implications that are brief or periodic	Adverse local or regional, social, or economic implications that last for 1 year	Adverse local or regional, social, or economic implications that last for 1-2 years	Adverse local, regional, or territory-wide, social, or economic implications that last for 3-10 years	Adverse local, regional territory-wide or national, social, or economic implications that last for greater than years

Table 48 Risk assessment matrix

Likelihood	Consequence				
	(1) Insignificant	(2) Minor	(3) Moderate	(4) Major	(5) Significant
(A) Almost certain	High (15)	High (10)	Extreme (6)	Extreme (3)	Extreme (1)
(B) Likely	Moderate (19)	High (14)	High (9)	Extreme (5)	Extreme (2)
(C) Possible	Low (22)	Moderate (18)	High (13)	Extreme (8)	Extreme (4)
(D) Unlikely	Low (24)	Low (21)	Moderate (17)	High (12)	Extreme (7)
(E) Rare	Low (25)	Low (23)	Moderate (20)	High (16)	High (11)

Table 49 Risk assessment - Likelihood categories and descriptions

Categories	Descriptions
Almost certain	The event/impact will occur or is expected to occur. The impact occurs regularly in association with similar projects and/or in similar environments.
Likely	The impact will probably occur in most circumstance but there is some uncertainty about the likelihood. The impact has occurred on more than one occasion in association with similar projects and/or in similar environments.
Possible	The impact could occur in some circumstances. The impact has occurred infrequently on similar projects and/or in similar environments.
Unlikely	The impact is not expected to occur. The impact occurs very infrequently on similar projects and/or in similar environments.
Rare	The impact is very unlikely to occur. The impact has not occurred on similar projects and/or in similar environments.

Table 50 Project residual risk level of certainty

Control Rank	Description	Guidance
C1	Low	Risk ranking is based on subjective opinion or relevant past experiences.
C2	Moderate	Risk ranking is based on similar conditions being observed previously and/or qualitative analysis.
C3	High	Risk ranking is based on testing, high fidelity modelling or simulation, use of prototype or experiments. Analysis is based on verified models and/or data. Assessment is based on an historical basis.

Table 51 Management response to evaluated risks level

Risks Level	Lower Range Value	Upper Range Value	Management Action/Response
Extreme	1	8	Risk is unacceptable. Specific action plans required to reduce risk to an acceptable level. Director/CEO level management attention required.
High	9	16	Risk is generally unacceptable without action. Specific action plans required to reduce risk to ALARP. Senior management attention required.
Moderate	17	20	Risk is generally acceptable. Proactive action is required to reduce risk to ALARP. Requires routine monitoring and adaptive management in accordance with Mine Management Plan (MMP).
Low	21	25	Risk(s) is acceptable. Management by routine policies and procedures.

8.2 Summary of closure risks

A summary of the Project Closure risks is summarised in Table 52. These risks are based on the inherent risk rating and before mitigation measures are put in place and residual risk rating once mitigation measures are put in place. A complete risk register is provided in Appendix B.

Table 52 Summary of the Project inherent/residual closure risks

Domains	Impact source	Consequence	Risk rating	
			Inherent	Residual
D2 - Tailing Storage Facility	Overtopping, embankment a failure from the TSF prior to rehabilitation.	Uncontrolled release of tailings material to surrounding environment.	Extreme (8)	Moderate (17)
	Overtopping, embankment a failure or seepage from the process water storage prior to rehabilitation.	Uncontrolled release of process water to surrounding environment.	Extreme (8)	Moderate (17)
	Lack of or incorrect (physical and chemical) rehabilitation capping and cover materials.	Unsuccessful site rehabilitation and inadequate tailings closure.	High (9)	Low (21)
	Geotechnically unstable TSF embankment .	Landform embankment instability, slumping and erosion.	High (9)	Moderate (17)
	Uneven tailings consolidation at closure.	Landform surface instability, slumping and erosion.	High (12)	Low (23)
	Unexpected early closure landform.	Incomplete rehabilitation or unsafe TSF landform.	High (12)	Low (23)
	Ineffective site security and barriers to prevent unauthorised access (public and livestock) to backfilled TSF rehabilitated areas.	Resulting in land disturbance and unsuccessful rehabilitation.	Extreme (8)	High (13)
D1 – Waste Rock Dumps	WRD construction - poor waste material handling, segregation, placement and compaction allowing for surface and ground water infiltration.	AMD seepage and release to surface and shallow groundwater systems impacting downstream beneficial uses of the Mary River and Adelaide River catchments.	High (9)	Moderate (18)
	WRD Construction – unstable batter angle causing geotechnical movement instability resulting in failure	Resulting in failure (instability, slumping and erosion) rehabilitation failure and sedimentation impacting beneficial uses locally downstream to the Mary River and Adelaide River catchments.	High (9)	Moderate (18)

Domains	Impact source	Consequence	Risk rating	
			Inherent	Residual
	(instability, slumping and erosion) at closure.			
	Lack of/or incorrect (physical and chemical) capping and cover materials.	Resulting in unsuccessful site rehabilitation and inadequate WRD closure.	High (9)	Low (21)
	Unexpected early closure leading to incomplete rehabilitation or unsafe WRD landform' s.	Resulting in incomplete rehabilitation or unstable WRD landform's.	High (13)	Low (21)
		Risk of injury or death to general public and livestock.	Extreme (8)	Moderate (18)
	Ineffective site security and barriers to prevent unauthorised access (public and livestock) to WRD rehabilitated areas at closure.	Risk of injury or death to general public.	Extreme (8)	Moderate (18)
		Resulting in land disturbance and unsuccessful rehabilitation.	High (13)	Low (21)
3a -Open pit voids	Seasonal overtopping/planned overtopping of poor-quality pit water during extreme rainfall and flooding events at closure.	Contaminated pit water (COPC metals) discharging to surface water and impacting aquatic ecosystems and terrestrial ecosystems, and surface and groundwater water characteristics, sediment. Cumulative (COPC) in aquatic organisms.	High (13)	Low (21)
	Ineffective site security and barriers to prevent unauthorised access (public and livestock) to open pit void at closure.	Resulting in injury or death to general public and livestock.	Extreme (8)	High (16)
	Exposed PAF on pit walls affecting pit lake water quality	Resulting in acidic pit lake water impacting terrestrial fauna species utilising pit water for drinking and the quality of groundwater in the area through seepage.	Moderate (18)	Low (22)

Domains	Impact source	Consequence	Risk rating	
			Inherent	Residual
	Poor pit water quality becomes a groundwater source.	Gradual development of plume of contaminated groundwater. Pit lake water quality may become more acidic and with higher concentration of contaminants which may impact fauna species and local vegetation surrounding the landform.	Moderate (18)	Low (22)
	Geotechnical instability and failure of pit walls.	Loss of ground stability in the area surrounding the wall failure resulting in surface erosion movement. Impact on structural integrity of engineered embankments. Ecological impacts of pit wall failure in the immediate area.	Moderate (17)	Low (22)
3b – backfilled pits	Incorrect PAF waste backfill handling, placement, and compaction.	Resulting in exposure of contaminated PAF waste rock seepage leaching to groundwater	High (14)	Low (21)
	Waste backfill not placed and compacted to structural design criteria.	Resulting in unstable landforms prone to slumping and erosion.	High (12)	Low (23)
	Ineffective site security and barriers to prevent unauthorised access (public and livestock) to backfilled pit rehabilitated areas.	Resulting in land disturbance and unsuccessful rehabilitation at clos	High (12)	Low (23)
	Lack of/or incorrect (physical and chemical) capping and cover materials.	Resulting in leaching and unsuccessful site rehabilitation at closure.	High (9)	Low (24)
D5 - Support Infrastructure	Un-remediated soils from the bulk fuel storage area, workshop, camp area, landfill, explosives magazine.	Hazardous materials (hydrocarbons, landfill leachate, ANFO) contamination of soil, surface water, sediment, and groundwater quality and associated ecosystems.	High (13)	Low (21)

Domains	Impact source	Consequence	Risk rating	
			Inherent	Residual
	Disposal of hazardous waste /containers to Rustlers Roost landfill.	Hazardous (toxic) leachate escaping Rustlers Roost landfill (hydrocarbons, ANFO and containers) contamination of surface water, soil sediment, and groundwater quality and associated ecosystems.	Moderate (18)	Low (24)
	Remaining Infrastructure and waste, footings, steel, pipework, strewn litter left at Closure.	Remaining Infrastructure materials, footings, steel, pipework, strewn litter become an entrapment hazard to fauna and livestock with the risk of injury.	Moderate (18)	Low (24)
	Un-remediated soils from the bulk fuel storage area, workshop, camp area, landfill, explosives magazine.	Hazardous materials (hydrocarbons, landfill leachate, ANFO) contamination of soil, surface water, sediment, and groundwater quality and associated ecosystems.	High (13)	Low (21)
D4 -Processing Infrastructure	Disposal of chemical waste/containers to Rustlers Roost landfill resulting in toxic leachate seepage.	Leachate contamination in the area proximal to the landfill affecting the chemical, physical and biological qualities of soil, surface water and groundwater chemical, physical, biological. Moderate impact to aquatic ecosystems.	Moderate (18)	Low (24)
	Un-remediated contaminated soils from process plant chemical stores.	Hazardous materials (Cyanide, HCL, NaOH, CuSO4, Hydrogen peroxide, Blanking agent, Quicklime, Flocculent, LPG, smelting fluxes) contamination of surface water, soil, sediment, and groundwater quality and associated ecosystems.	High (13)	Low (21)
	Disposal of chemical waste /containers to Rustlers Roost landfill.	Hazardous (toxic) leachate escaping Rustlers Roost landfill (Cyanide, HCL, NaOH, CuSO4, Hydrogen peroxide, Blanking agent, Quicklime, Flocculent, LPG, smelting fluxes) contamination of surface water, soil sediment, and groundwater quality and associated ecosystems.	Moderate (18)	Low (24)

Domains	Impact source	Consequence	Risk rating	
			Inherent	Residual
D6 - Haul road and access roads	Haul road and access roads left unrehabilitated or if rehabilitated not maintained.	Unauthorised vehicular site access and risk of injury /death.	Extreme (8)	High (16)
		Soil erosion, scouring, loss of topsoil resulting in sedimentation to drainage lines and creeks.	High (13)	(Low 21)
Whole of Project	Reduction in workers at early/temporary/final closure affecting the local community economy	Affecting the local community economy	High (13)	Low (21)
	Stakeholder expectations at closure not met – closure criteria	Causing delays in site relinquishment and increased costs	High (13)	Low (21)
	Unexpected early/temporary closure i.e. inadequate funds, catastrophic weather event, low grade recovery, drop in gold price.	Resulting in unfinished rehabilitation, unstable polluting landforms, site safety, poor public perception and key stakeholders concerns not met.	High (12)	Low (21)
	Ineffective implementation of closure environmental management plans/system/procedures.	Agreed Post Mine Land Use (PMLU) cannot be achieved. Regulatory commitments for closure not checked for compliance. Incident response and reporting ineffectively managed and at risk of corporate negligence.	Extreme (8)	Low (21)
	Vehicle/machinery for closure interaction with threatened fauna.	Loss of life or injury to threatened fauna species.	Moderate (18)	Low (21)
	Poor water quality discharging from closed site during wet season (stormwater).	Release of COPC during wet season result in poor quality drinking water for fauna and sedimentation of riparian environments for which terrestrial fauna inhabit. Habitat modification and/or lifecycle disruption and/or impact on the size of a population (flora and/or terrestrial fauna).	High (13)	Low (21)

Domains	Impact source	Consequence	Risk rating	
			Inherent	Residual
All Domains	Lack of or incorrect (physical and chemical) rehabilitation capping and cover materials leading to unsuccessful site rehabilitation.	leading to unsuccessful site rehabilitation .	High (9)	Low (21)
	Inappropriate management of the site in closure/post closure.	Resulting in unauthorised access ,safety concerns, degraded landforms.	Moderate (18)	Low (21)
	Long term positive water balance	Resulting in increased poor water quality inventory. Not meeting PMLU and increased costs at closure.	Moderate (18)	Low (21)
	Disturbance of site/objects of heritage significance heritage items or places and sacred sites.	Damage, destruction or removal of an unknown heritage item, place or sacred site.	High (12)	Low (21)
	Altered creeks and drainage lines do not conform to the surrounding drainage features and catchment areas.	Resulting scouring, incision altered flow paths not consistent with local and broader catchment features.	High (13)	Low (23)
	Inadequate waste clean-up	Resulting in contamination to soil, surface and ground water, fauna entrapment, safety, fire hazard, visual amenity.	Moderate (18)	Low (24)
	Machinery and activities causing fire through sparks or a heat ignition source.	Resulting in wildfires causing broad scale loss of vegetation on and off site, human safety, asset loss.	High (13)	Low (21)
	Dust generation from closure activities i.e. vehicular movements and earthworks	Resulting in dust emissions, to land, water and vegetation.	Moderate (19)	Low (22)
	Introduction of new declared weeds and spread of existing weeds and their densities.	Resulting in poor/ unsuccessful revegetation and completion criteria not met, displacement of native vegetation/riparian zones. Increased fire risk. Reduced foraging and nesting grounds for fauna.	High (9)	Low (22)

Domains	Impact source	Consequence	Risk rating	
			Inherent	Residual
	Indiscriminate use of existing rock for closure activities.	Contamination of soil surfaces, surface water, sediment, and groundwater quality and associated ecosystems.	High (13)	Low (21)
	Poor/lack of establishment of revegetation species.	Completion criteria and environmental outcomes not met. Soil erosion, topsoil loss ,sedimentation (through both water and wind erosive forces).	High (13)	Low (21)

8.3 Management of closure risks

Outcomes of the risk assessment identified issues that may have the potential to impact PGLs ability to meet post mining land use objectives and closure criteria and site relinquishment. For each potential impact, mitigation measures were identified to reduce risk to as low as reasonably practicable (ALARP). These management control measures are summarised below and documented in the risk register in Appendix B.

- All mining related landforms and disturbances must be rehabilitated, in a progressive manner where practicable, to ensure they are safe, stable, non-polluting, integrated with the surrounding landscape and support self-sustaining, functional ecosystems or alternative agreed outcome
- All excavations will be backfilled and/or closed to ensure they are stable and safe.
- Placement of waste material must be such that the final footprint after rehabilitation will not be impacted upon by pit wall subsidence or be within the zone of pit instability.
- All waste materials, rubbish, plastic sample bags, abandoned equipment and temporary buildings to be removed from the mining prior to or at the termination of the operation
- Any watercourses that are disturbed by mining operations will be restored, as far as practicable, to the pre-disturbance conditions.
- All chemicals and hydrocarbons will be removed from site prior to or at the termination of the operation.

8.4 Residual risks

Implementation of management controls and other closure tasks detailed in the Closure Work Program and aims to reduce the risk of the potential impacts affecting successful mine closure. Subject to the implementation of controls outlined in this MCP, most risks were reduced to medium or low.

There are four potential impacts greater than a LOW residual risk at closure:

1. Unauthorised access and public safety resulting in injury /death.
2. Landform instability (open pit walls, tailings storage facility embankments and WRD batter angles) causing slumping and erosion leading to increased water infiltration resulting in seepage and sedimentation impacting downstream beneficial uses of the Mary River and Adelaide River catchments.
3. AMD seepage from WRD's and release to surface and shallow groundwater systems impacting downstream beneficial uses of the Mary River and Adelaide River catchments.
4. Prior to TSF rehabilitation, uncontrolled release of tailings, process water, seepage impacting downstream beneficial uses of the Mary River and Adelaide River catchments.

Unauthorised public access is an existing issue. The Project area is situated near the Marrakai township, a one-hour drive from Darwin and accessed via the Arnhem Highway. Hunters, fossickers, and general public have accessed the Mount Bunday area over a number of years and to some extent the roads are a thoroughfare to other off-road locations. There has been reports of property theft particularly at the Toms Gully site. The pastoral lease holder has often raised public access concerns and has locked gates to prevent access resulting in locks and gates being damaged. To change this culture a substantial effort from PGL will be necessary. This issue is not a stand-alone to a mine site in this region. However, will need to be addressed during start-up and operations.

Long term landform stability of open pit walls, tailings storage facility embankments and WRD batter angles is particularly challenging in the Northern Australia climate that has distinct wet and dry seasons involving annual cycles of landform saturation and drying. Sound engineering design to conform to the northern Australia climatic conditions, effective construction execution and waste rock management, remediation and maintenance is paramount for long term landform performance to meet the closure criteria and end land use.

Section 9 Closure Implementation

9.1 Closure Strategy

The planned closure strategy will involve the following key components:

- Shut down and infrastructure removal
- Stabilise and secure open pits.
- TSF closure
- Permanent stabilisation of post-mining landforms (backfilled pits, WRD's, TSF)
- Research and trials throughout LOM
- Progressive rehabilitation through LOM.
- Filling knowledge gaps/uncertainty through LOM.
- Performance monitoring at closure/post closure.

This planned closure strategy is reflected in the work programmes detailed in Section 9 .

Unplanned closure, though not anticipated, due to temporary suspension (care and maintenance) or unforeseen closure is detailed in each of the domains closure strategy and Section 9.3.

9.2 Closure Work Programme by Domain/Feature

A closure work program and closure schedule for each domain is presented in the following tables. It is important to note that the closure work program may be amended if completion criteria are changed in future MCPs.

9.2.1 Closure implementation strategies and tasks

PGL intends to implement its closure strategies and progressive rehabilitation activities throughout all phases of LOM. Broad closure implementation strategies and tasks associated with each phase of the Projects life are presented below.

Timelines for progressive rehabilitation is illustrated in Table 53 and completion criteria will be regularly reviewed as the project progresses and the MCP's will be updated to reflect this.

Table 53 Project rehabilitation timeline

Mining Schedule	Approvals	Construction/ Commissioning	Operations										Decommissioning/Closure/Post Closure									
	2 years		10 years										10 years									
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	
Approvals	Q1 21'-Q3 22'																					
Construction/Commissioning		Q3 22'-Q1-23'																				
Operations (summary)			Q1 23' to Q3 31'																			
Annie's Dam pit																						
Annie Oakley pit																						
Rustlers Roost main pit																						
Zamu pit																						
South Koolpin pit																						
North Koolpin pit																						
Taipan pit																						
BHS pit																						
WRD's Construction																						
Tailing's deposition and settlement																						
Decommissioning																						
Prog/ Rehabilitation (summary)			23'-33'																			
Domain 1 – WRD's																						
Closure work tasks (East Koolpin, North & South																						

Mining Schedule	Approvals	Construction/ Commissioning	Operations									Decommissioning/Closure/Post Closure										
	2 years		10 years									10 years										
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	
Research, investigations, trials		2022-2032																				
Rehabilitation											31'-32'											
Availability of closure materials sources											31'-32'											
Information gaps/uncertainty		22'-31'																				
Performance monitoring and maintenance tasks												32'-41'										
Domain 2 – TSF																						
Closure work tasks (TSF)												32'-34'										
Research, investigations, trials		2022-2032																				
Rehabilitation												32'-34'										
Availability of closure materials sources												32'-34'										
Information gaps/uncertainty		22'-31'																				
Performance monitoring and maintenance tasks												32'-41'										
Domain 3a – Open pit voids (main pit, North Koolpin pit, south Koolpin pit, Taipan pit)																						
Closure work tasks											30'-32'											
Research, investigations, trials		2022-2032																				
Rehabilitation												31'-34'										
Availability of closure materials sources												31'-34'										
Information gaps/uncertainty		22'-31'																				
Performance monitoring and maintenance tasks												32'-41'										

Mining Schedule	Approvals	Construction/ Commissioning	Operations									Decommissioning/Closure/Post Closure										
	2 years		10 years									10 years										
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	
Domain 3b – Backfilled pits (Annie Oakley pit, Annie’s Dam pit, BHS pit, Zamu pit)																						
Closure work tasks				24'							29'-32'											
Research, investigations, trials		2022-2032																				
Rehabilitation				24'-25'							29''-32'											
Availability of closure materials sources											29'-32'											
Information gaps/uncertainty		22'-32'																				
Performance monitoring and maintenance tasks													32'-41'									
Domain 4 – Processing Infrastructure (CIL Process plant, chemical stores, ROM water ponds)																						
Closure work tasks													33'-34'									
Research, investigations, trials		2022-2032																				
Rehabilitation														34'-35'								
Availability of closure materials sources													32'-34'									
Information gaps/uncertainty		22'-31'																				
Performance monitoring and maintenance tasks													32'-41'									
Domain 5 – Support Infrastructure (Mine Contractor Facility, workshop, main offices, infrastructure, bulk fuel storage, accommodation camp)																						
Closure work tasks													32'-34'									
Research, investigations, trials		2022-2032																				
Rehabilitation														33'-35'								
Availability of closure materials sources													32'-34'									

Mining Schedule	Approvals	Construction/ Commissioning	Operations									Decommissioning/Closure/Post Closure											
	2 years		10 years									10 years											
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041		
Information gaps/uncertainty			22'-31'																				
Performance monitoring and maintenance tasks												32'-41'											
Domain 6 – Haul roads and access roads (Haul Road and access tracks for Rustlers Roost, Q29 and accommodation camp tracks)																							
Closure work tasks												32'-35'											
Research, investigations, trials			2022-2032																				
Rehabilitation												33'-35'											
Availability of closure materials sources												32'-34'											
Information gaps/uncertainty			22'-32'																				
Performance monitoring and maintenance tasks												32'-41'											
Domain 7 - Existing disturbances																							
RR heap leach pads and ponds rehabilitation			Q2/Q3																				
Q29 heap leach pads and ponds rehabilitation											Q1 31'												
Closure												32'/35'											
Post Closure												32'/41'											
Stakeholder Eng'mt			21'-41'																				

9.2.2 Domain 1 – Waste rock dumps

Table 54 Domain 1 - Waste rock dumps closure implementation

Project Site (location of domain 1): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)	Domain/feature: Domain 1 -Waste Rock Dumps
<p>Description of Domain/Feature: Waste rock dumps: Rustlers Roost site- South WRD, North WRD Quest 29 site -East Koolpin WRD.</p> <p>All WRD's are composed of sulphide and oxide waste rock.</p> <p>Waste rock at Rustlers Roost will be placed in two separate WRDs termed the North WRD and the South WRD. The South WRD is an extension to the existing WRD. The shorter haul distances ensured haulage costs were kept low as it is close to the main pit exit.</p> <p>For the Quest 29 site, East Koolpin WRD will be developed in the area north of Zamu Pit and will be comprised of waste rock from Zamu pit. The WRD location was selected to minimise haulage distances for the initial stage of mining Zamu pit.</p> <p>To provide geotechnical stability and water shedding on WRDs, final landform designs will have a maximum of 17-degree slope (approximately 3:1 horizontal to vertical). An adopted downstream slope profile of 3H:1V with 5 m benches at 10m intervals will manage erosion and drainage control. Suitable cover material to be stockpiled (main pit oxide material) and alternative engineered erosion controls will be assessed (i.e., rip rap). Construction of the final profile will be prior to the onset of wet season rainfall (no later than September) and seeding to commence at least three weeks after regular rainfall events i.e., January. Provenance or locally available native plant species will be used for rehabilitation.</p> <p>To limit air and water contact with PAF material causing AMD generation for the WRDs will include:</p> <ul style="list-style-type: none"> • Material classified as NAF will be placed at the outer annulus of the WRD; • NAF material with sufficient ANC will be placed on the natural surface, lining the drainage lines; • Temporary and/or final cover systems over waste rock will be designed to limit infiltration to the extent needed based on the propensity for the material to generate AMD; and • PAF material will be encapsulated with the central areas of the dump, not near the outer slopes or toe areas, and covered with NAF waste material from the outer perimeter. <p>East Koolpin WRD will receive waste from Zamu pit which will cease mining Q4 2029. Rehabilitation will commence in the following year 2030. Rustlers Roost main pit will be the source of waste from the South and North WRD's. At cessation of the Main pit mining is Q3 2031. Rehabilitation of WRD's will likely commence in Q3-Q4 2031</p>	
<p>Land Use Information</p>	

Project Site (location of domain 1): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)		Domain/feature: Domain 1 -Waste Rock Dumps
Post Mining land use	Waste rock dumps and waste rock stockpiles, non-polluting which supports stable natural habitats compatible with pastoral use.	
Activity	Closure 1 WRD's - Closure work tasks	Schedule
Demolish	Remove and reprofile WRD's access ramp to match the outer wall profile.	East Koolpin WRD Q2 2030 North WRD/South WRD Q3 2031
Waste rock/stockpiles	Acid and Metalliferous Drainage (AMD) and Potentially Acid Forming (PAF) material derived from waste stockpiles/drilling cuts will be backfilled into pits to avoid AMD and PAF related issues on site. Waste stockpiles/drill cutting containing Radioactive/NORM will be backfilled into pits to avoid radiation related issues on site.	2031
WRD's	Segregation and selective placement of PAF and NAF materials during WRD construction. Encapsulation with NAF material of sufficient thickness to limit infiltration and/or use of low permeability cover systems; Reshape/re-contour area consistent to the surrounding landform and drainage and remove any erosion prone features. Retain locally occurring tree species where possible. Install erosion and sediment controls (bundling, run-on/runoff diversions, and stormwater ponds where erosion is evident or likely to occur (ESCP).	East Koolpin WRD Q2 2030 North WRD/South WRD Q3 2031

Project Site (location of domain 1): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)		Domain/feature: Domain 1 -Waste Rock Dumps
Clean-up and dispose	Remove all domestic rubbish to landfill. All hazardous wastes to be removed from site by licensed waste contractor and to an approved waste management /recycling facility.	2031
Site landform and drainage reconstruction	<p>Final WRD landform designs will have a maximum of 17-degree slope (approximately 3:1 horizontal to vertical).</p> <p>Reshape/re-contour area consistent to the surrounding landform and drainage and remove any erosion prone features.</p> <p>Retain locally occurring tree species where possible.</p> <p>Install erosion and sediment controls where erosion is evident or likely to occur (ESCP)</p> <p>WRDs (toe drain) draining to a sediment basin to manage sediment and monitor surface water quality runoff and seepage.</p> <p>Check dams within diversion channels to provide velocity control where needed based on engineering estimates of maximum stormwater velocity.</p> <p>Sediment will be cleaned out of the sediment basins as required and in anticipation of the wet season to provide greater runoff capacity.</p> <p>Water volume will be measured within basins to manage the site water balance and maintain capacity needed for peak water periods.</p> <p>The sediment basins will remain post rehabilitation until the landform is stable.</p>	<p>East Koolpin WRD Q2 2030</p> <p>North WRD/South WRD Q3 2031</p>

Project Site (location of domain 1): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)		Domain/feature: Domain 1 -Waste Rock Dumps
Rehabilitation and revegetation	<p>WRD's will be ripped across the contour cover.</p> <p>Seeding with local pioneer species which reflect the surrounding vegetation, topography, and surrounding land use.</p> <p>Create fauna habitats (e.g., using rocks and available vegetation detritus).</p>	<p>East Koolpin WRD Q1 2031</p> <p>North WRD/South WRD Q1 2032</p>
Security and signage	<p>Stock fencing put in place around WRD's to prevent cattle access , particularly during the early growth years immediately post closure. Fencing will be maintained by post-closure landowner/pastoralist if required to be maintained in the long term.</p> <p>Install clear and visible signage at gates displaying the company name and the area is under rehabilitation and no unauthorised access.</p>	Q2 2032
Activity	Schedule of work for research, investigations, and trials	Schedule
Using monitoring results, research, investigation, and trials, refine criteria specific to WRD's		2022-2032
Confirm capping and cover thickness and material suitability as capping and cover (growth medium) for WRD rehabilitation		2022-2032
Develop specific, quantitative performance indicators for the measurements of success that are based on research and monitoring outcomes.		2022-2032
Continue with progressive rehabilitation and/or rehabilitation trials and subsequent vegetation performance monitoring to inform closure design		2022-2032
Kinetic testing in progress to inform suitable waste rock placement that will inform the solubility of the waste materials, rate of sulphide oxidation, and potential composition of leachate formed.		Report to be provided in Q1 2022
Activity	Schedule of work for progressive rehabilitation	Schedule
Earthwork's area	South WRD and North WRD and East Koolpin WRDS scheduled for rehabilitation towards end of operations. No progressive rehabilitation is proposed.	2031-2032

Project Site (location of domain 1): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)		Domain/feature: Domain 1 -Waste Rock Dumps
Topsoil	Capping and cover material to be confirmed	2031-2032
Seeding	Seeding utilising provenance selection or local seed suited to the new local conditions such as topography, soil structure, aspect. Purchase seed either from a local supplier or collection inhouse through structured seed collection programmes.	Q1 2031/2032 3 wks of first rains (January)
Activity	Availability and management of closure material sources/resource	Schedule
Earthwork's area	Area requiring land forming and contouring based on surface area of WRD's. Other areas requiring minor earthworks (i.e., soil stockpile areas).	2031/2032
Topsoil	Overburden and oxide waste from pits will be stockpiled and used for rehabilitation purpose subject to chemical, physical analysis of a suitable cover material. Topsoil will be in the form of oxide waste rock won from each site pits and either be used for beneficial mine closure purposes, such as use in rehabilitation (capping) or other beneficial mine closure purposes.	2031/2032
Aspects	Information gap/uncertainty	Schedule
Landform and rehabilitation Design	Thorium bearing flouroapatite has been measured in some fresh zone samples. As a result, some associated waste rock and tailings generated from this zone may result in sources of radioactivity because of thorium decay. Physical and chemical properties of cover and capping for WRD's to be confirmed.	2022-2031
	Design thickness of cover and capping for WRD's to be confirmed through, structural stability or material, physical and chemical and microbiological properties of material and suitable minimum requirements for plant root zone development.	2022-2031

Project Site (location of domain 1): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)		Domain/feature: Domain 1 -Waste Rock Dumps
Vegetation covers	Lack of understanding of select plants to demonstrate their capacity for establishment, survival and propagation post mining. Suitable vegetation covers utilising provenance selection or local seed for rehabilitation suited to the new local conditions such as topography, soil structure, aspect.	2022-2031
Aspects	Performance monitoring and maintenance tasks	Schedule
Post Closure monitoring	<p>Post closure monitoring programme (against objective and completion criteria):</p> <p>Landscape/vegetation monitoring using Ecosystem Function Analysis (EFA).</p> <p>Water monitoring at sediment basin located downstream of WRD toe basin</p> <p>Surface and Ground water monitoring</p> <p>Geotechnical stability of landforms</p> <p>Land management and remediation (fire, weeds and pests, soil, and landform)</p> <p>Key stakeholder engagement</p> <p>Public safety assessment</p>	2032-2041

9.2.3 Domain 2 – Tailing Storage facility

Table 55 Domain 2 - Tailing storage facility closure implementation

Project Site (location of domain 2) : Rustlers Roost Site (ML 1083)	Domain/feature: Domain 2 -Tailing storage facility
<p>Description of Domain/Feature: TSF: Rustlers Roost site- TSF.</p> <p>The TSF is designed in accordance with (ANCOLD) guidelines and is located at the southern section of ML 1083 occupying 244.7ha of land. The TSF 's treatment rate is 4 Mtpa for a 48 Mt capacity raised progressively in height (embankment height 33m and crest level of 85.3m RL) over a 10- year LOM. The natural topography (ridge lines) was incorporated into the design to reduce the volume of embankment construction materials and encapsulate Annie's Dam.</p> <p>As part of the TSF design, the dam break and consequence assessment were completed in accordance with (ANCOLD) "Guidelines on the Consequence Categories for Dams" (2012). The TSF failure consequence category was rated as a High A. This establishes severity of impact and population at risk in the event of a dam failure, and to assign minimum design criteria and control measures whilst considering safety, environmental and economic factors. A dam breach assessment was done for the eastern and western embankments. Tailings flow pathways were identified causing impact to downstream receptors including the Adelaide River or Mary River, national parks, local agriculture and large floodplains, local access roads and unclassified buildings.</p> <p>With the final ore haulage in Q3-4 2031, processing will continue for another 6-8 months, depending on ore quantities. After the cessation of mining, decommissioning and closure of the process plant and TSF will commence in Q2-Q3 2032. Consolidation and drying out of tailings will take approximately 12 months following commencement of capping and cover placement.</p> <p>To ensure an even surface for rehabilitation, tailings distribution and deposition, sub-aerial spigots will be placed at regular intervals around the eastern, western, and southern embankments to ensure that the supernatant pond will be in the northern valley of the TSF. Later in operations, deposition will be to the head of the northern valley to push the supernatant pond further south towards an existing drainage course in the east of the Annie's Dam basin. At closure a spillway will be excavated from this valley, graded around the waste dump, and discharging into the open pit. Rehabilitation of the tailings surface will commence upon termination of tailings deposition and settlement.</p> <p>At closure, seepage control will be gravity fed and directed towards the main pit.</p> <p>Removal and disposal of all infrastructure including, tailings pipeline located on the embankment and the water return lines to the process plant and bunding corridor. The decant turret and associated infrastructure will be decommissioned and removed to suit the staged development of the facility and the tailings beach. TSF operational monitoring will continue during decommissioning and prior to the submission of a TSF closure report, a decommissioning and rehabilitation review will be conducted by a competent person to provide an engineering status report of the TSF to assist with planning for closure.</p>	

Project Site (location of domain 2) : Rustlers Roost Site (ML 1083)		Domain/feature: Domain 2 -Tailing storage facility
<p>Construction of the final profile cover will be prior to the onset of wet season rainfall (no later than September) and seeding commence at least 3 weeks after regular rainfall events i.e., January. Provenance or local available native plant species will be used for rehabilitation.</p>		
Land Use Information		
Post Mining land use	A Tailings Storage Facility to be stable, non-polluting which supports stable natural habitats compatible with pastoral use.	
Activity	Domain 2 TSF - Closure work tasks	Approx. timing and
Development	During the later stages of operation and in preparation for closure, tailings deposition will be relocated to the head of the northern valley to push the supernatant pond further south towards an existing drainage course in the east of the Annie's Dam basin. A diversion channel will be excavated along this northern valley, running around the waste dump, and discharging into the open pit.	2030-2031
Decommission	<p>Disconnected services (power and water) and make safe.</p> <p>Disconnect seepage control and underdrainage collection systems from the return pipeline to process plant and redirect seepage flows towards the main pit.</p>	Q1,Q2,Q3 2032
Demolish	Removal of all TSF infrastructure including the decant turret and associated infrastructure (floating polyethylene decant turret unit, with associated piped connections, pump mobile standing pump unit, water return pipeline); tailings pipeline located on the embankment and earthen bunding corridor.	Q1,Q2,Q3 2032

Project Site (location of domain 2) : Rustlers Roost Site (ML 1083)		Domain/feature: Domain 2 -Tailing storage facility
Clean-up and dispose	Tailings pipelines cleared of tailings residue and redundant pumps and associated infrastructure cleared of hydrocarbons and either reused onsite or disposed to onsite landfill or removed from site by licensed waste contractor to an approved waste management facility.	Q1,Q2,Q3 2032
Site landform and drainage reconstruction	<p><u>TSF</u></p> <p>The TSF embankment details will have a final downstream slope of 3H:1V with 5 m benches at 10 m intervals for erosion and drainage control and profile for re-vegetation.</p> <p>TSF cover is generally shaped to be a water shedding landform to achieve dry closure with no ponding.</p> <p>Drainage reinstatement and diversion away from TSF and maintain surface drainage patterns consistent with the regional drainage shedding pattern to either the Adelaide River or Mary River catchments.</p> <p>Construction of a diversion channel on the TSF redirect any surface flows from the TSF surface into the open pit.</p> <p>Seepage control and underdrainage collection systems will be directed towards the pit.</p> <p>Tailing's capping/cover:</p> <p>Coarse rockfill over tailings (nominal 0.5 thickness)</p> <p>Low permeability mine waste (nominal 0.3m thickness)</p> <p>Covered with topsoil (0.3 m)</p> <p>Revegetation with suitable native plant species for TSF cover.</p> <p><u>TSF pipeline corridor</u></p>	Q3,Q4 2032

Project Site (location of domain 2) : Rustlers Roost Site (ML 1083)		Domain/feature: Domain 2 -Tailing storage facility
Rehabilitation and revegetation	<p>Rehabilitation of the tailings surface will commence upon termination of tailings deposition. Soil fill covers are proposed for the TSF as the most appropriate long-term solution. This is subject to ongoing geochemistry testing during operation.</p> <p>Suitable vegetation covers will be determined, and trials conducted throughout operations. Local species will be preferred on the basis to reflect the surrounding vegetation, topography, and surrounding land use.</p> <p>Create fauna habitats (e.g., using rocks and available vegetation detritus).</p>	2033-2034
Security and signage	<p>Stock fencing put in place around TSF to prevent cattle access, particularly during the early growth years immediately post closure.</p> <p>Fencing will be maintained by post-closure landowner/pastoralist if required to be maintained in the long term.</p> <p>Install clear and visible signage at gates displaying the company name and the area is under rehabilitation and no unauthorised access.</p>	2033/2034
Activity	Schedule of work for research, investigations and trials	Schedule
Site landform and drainage reconstruction	Routine geochemical testing during operations to understand tailings supernatant geochemical properties and develop a strategy for disposal of surplus water.	2022-2031
Rehabilitation and revegetation	<p>Undertake further geochemistry testing of suitable soil fill rehabilitation cover materials. Document and use learnings from existing site rehabilitation.</p> <p>Conduct ongoing trials and investigations throughout operations. Local species will be preferred on the basis to reflect the surrounding vegetation, topography, and surrounding land use.</p>	2022-2031
Activity	Schedule of work for progressive rehabilitation	Schedule
Earthwork's area	TSF area and pipe return area will be rehabilitated at end of operations. There is no progressive rehabilitation proposed on TSF cells.	2033-2034
Topsoil	Capping and cover material to be confirmed	2033-2034

Project Site (location of domain 2) : Rustlers Roost Site (ML 1083)		Domain/feature: Domain 2 -Tailing storage facility
Seeding	Seeding utilising provenance selection or local seed suited to the new local conditions such as topography, soil structure, aspect. Purchase seed either from a local supplier or collection inhouse through structured seed collection programmes.	3 wks of first rains (January
Activity	Availability and management of closure material sources/resource	Schedule
Earthwork's area	Capping and cover thickness have been determined and total quantities of TSF cover and capping material will be confirmed during the subsequent design phase.	-
Topsoil	The pipeline line return bunding corridor originally sourced from oxide material from the Main Pit will be pushed and spread over footprint. Total quantities of topsoil will be confirmed during TSF design phase. Hi degree of certainty there will be enough material for rehabilitation.	2034
Aspects	Information gap/uncertainty	Schedule
Site landform and drainage reconstruction	The TSF will be designed to contain a range of design storm and rainfall sequences events up to and greater than the required design criteria. The design criteria for the TSF will be governed by the ANCOLD consequence category, to be determined during the subsequent design phase based on a TSF dam break assessment.	2021-2022
	Capping and cover thickness have been determined. TSF cover and capping quantities to be confirmed in the subsequent design phase.	2021-2022
	Routine geochemical testing during operations to understand geochemical properties of the tailings supernatant to develop a strategy for the disposal of the surplus water will be determined.	2022-2031

Project Site (location of domain 2) : Rustlers Roost Site (ML 1083)		Domain/feature: Domain 2 -Tailing storage facility
Rehabilitation and revegetation	<p>Geochemistry testing of suitable soil fill rehabilitation capping and cover materials to include material structural, physical and chemical and microbiological properties and suitable minimum requirements for plant root zone development. Document and use learnings from existing site rehabilitation.</p> <p>Determine the optimum landform profile and cover design for maximum stability and vegetation establishment success.</p>	2022-2031
Landform and rehabilitation Design	Thorium bearing flouroapatite has been measured in some fresh zone samples. As a result, some associated waste rock and tailings generated from this zone may result in sources of radioactivity because of thorium decay. Physical and chemical properties of cover and capping for TSF to be confirmed.	2022-2031
Vegetation covers	Lack of understanding of select plants to demonstrate their capacity for establishment, survival and propagation post mining. Suitable vegetation covers utilising provenance selection or local seed for rehabilitation suited to the new local conditions such as topography, soil structure, aspect.	2022-2031
Aspects	Performance monitoring and maintenance tasks	Schedule

Project Site (location of domain 2) : Rustlers Roost Site (ML 1083)		Domain/feature: Domain 2 -Tailing storage facility
Decommissioning/Closure monitoring	<p>Rehabilitation/compliance audit -Landform construction audit, geotechnical audit.</p> <p>Landscape/vegetation monitoring using Ecosystem Function Analysis (EFA).</p> <p>Surface and ground water monitoring.</p> <p>Contaminated site assessment</p> <p>Public safety/security assessment</p> <p>Key stakeholder engagement</p> <p>TSF operational monitoring will continue during decommissioning and prior to the submission of a TSF closure report. A decommissioning and rehabilitation review will be conducted by a competent person to provide an engineering status report of the TSF to assist with planning for closure and refining performance monitoring of TSF for Closure.</p> <p><u>Routine facility monitoring includes</u> inspections of all TSF infrastructure, survey pins to monitor embankment displacement, piezometers to measure pore water pressure within the embankment; boreholes to monitor water quality and seepage levels downstream of the TSF; surface water monitoring stations to monitor water quality in surface flows downstream of the TSF, TSF surface flows and seepage prior to discharge in pit; and ongoing operational monitoring and water balance calibration.</p> <p><u>Routine tailings performance monitoring includes</u> solids tonnage to the TSF; water volume to the TSF; rainfall and evaporation at TSF; water return from the TSF; collection efficiency of the underdrainage system; tailings moisture contents and densities, and survey of the tailings beach and supernatant pond locations to be conducted quarterly.</p>	2032-2033

Project Site (location of domain 2) : Rustlers Roost Site (ML 1083)		Domain/feature: Domain 2 -Tailing storage facility
Post closure monitoring	Post closure monitoring programme (against objective and completion criteria): Landscape/vegetation monitoring using Ecosystem Function Analysis (EFA). Surface and Ground water monitoring Geotechnical stability of TSF landforms and wall Land management and remediation (fire, weeds and pests, soil, and landform) Key stakeholder engagement Public safety assessment	2033-2041

9.2.4 Domain 3a – Open Pit Voids

Table 56 Domain 3a - Pit voids remaining open at closure implementation

Project Site (location of domain 3a): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)		Domain/feature: Domain 3 -Pit voids to remain open
<p>Description of Domain/Feature: Open Pit voids: Rustlers Roost site- Main pit Quest 29 site: North Koolpin pit, South Koolpin pit, Taipan pit.</p> <p>Post-mining, the Rustlers Roost pit lake is predicted to be stabilised at similar levels than the current one within 30 years post-mining (median estimate) and the likelihood of overflow is very small (regardless of the uncertainty on model parameters including aquifer hydraulic conductivity). (CDM, 2021b).</p> <p>Post-mining, Quest 29 open pits are unlikely to overflow however further hydrological and water quality considerations are necessary to confirm closure criteria for these pits.</p> <p>With the final ore haul will be in Q3-4 2031, all pits will be made stable, secured and closed and left to form pit lakes.</p> <p>BHS pit closure criteria are not confirmed. Further research is required. Refer to the backfilled pits domain 3b.</p>		
Land Use Information		
Post Mining land use	Open Pits will be stable, non-polluting which supports stable natural habitats compatible with pastoral use.	
Activity	Domain 3a - Closure work tasks	Schedule
Decommission	Disconnected dewatering pumps, generators and pipelines and make safe.	Q3-Q4 2031
Demolish	Removal of any infrastructure around/near pits.	Q3-Q4 2031
Clean-up and dispose	Remove all domestic rubbish, old pipes and pumps to landfill.	Q3-Q4 2031

Project Site (location of domain 3a): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)		Domain/feature: Domain 3 -Pit voids to remain open
Pits	<p>Cut/ barricade pit ramp to prevent access into pit.</p> <p>Allow the open pit to flood.</p> <p>Monitor groundwater level rebounds.</p> <p>Construct abandonment bunds around pits to prevent accidental access to the pit area to the Western Australia Guidelines for 'Safety bund walls around abandonment open pit mines.'(DoIR, 1997)</p>	Q3-Q4 2031
Site landform and drainage reconstruction	<p>Reshape/re-contour area consistent to the surrounding landform and drainage and remove any erosion prone features.</p> <p>Install erosion and sediment controls where erosion is evident or likely to occur (ESCP)</p> <p>Deep rip parking areas/roads not required by the post-closure land user.</p> <p>Remove weeds/exotic plant species as required.</p> <p>Fill depressions, holes and spread available topsoil at >100 mm where required and rip on contour.</p> <p>Reinstatement of surface drainage patterns consistent with the regional drainage patterns.</p>	Q3-Q4 2031
Rehabilitation and revegetation	<p>Seeding around pit perimeter and cleared areas with local pioneer species which reflect the surrounding vegetation, topography, and surrounding land use.</p> <p>Create fauna habitats (e.g., using rocks and available vegetation detritus).</p>	Q1 2032
Security and signage	<p>Stock fencing put in place around the pit bund if pit water quality is not suitable for stock drinking. The open pit fencing and/or abandonment bund is located (and constructed as required) in accordance with the Safety Bund Walls Around Abandoned Open Pit Mines Guideline (DoIR, 1997).</p>	Q1 2032
Activity	Schedule of work for research, investigations and trials	Schedule

Project Site (location of domain 3a): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)		Domain/feature: Domain 3 -Pit voids to remain open
Rehabilitation	Calibration of pit groundwater seepage by monitoring pit dewatering during early stages of operations to increase certainty of hydraulic conductivity of the regional aquifer and plan for site water balance and closure.	2022-2032
	Develop specific, quantitative performance indicators for the measurements of success that are based on research and monitoring outcomes. Using monitoring results, research, investigation, and trials, refine criteria that are specific to the closure domains.	2022-2032
	Determine BHS pit closure criteria for either backfilling with Q29 heap leach material or remain as an open pit at closure.	2022-2032
Activity	Schedule of work for progressive rehabilitation	Schedule
Earthwork's area	No progressive rehabilitation occur as all open pits will be completed by end of mine life. Construction of abandonment bund and other areas requiring minor earthworks (i.e., soil stockpile areas).	Q3-Q4 2031
Topsoil	No topsoil required as abandonment bund will use oxide waste	Q3-Q4 2031
Seeding	Seeding utilising provenance selection or local seed suited to the new local conditions such as topography, soil structure, aspect. Purchase seed either from a local supplier or collection inhouse through structured seed collection programmes.	Q1 2031/2032 3 wks of first rains (January)
Activity	Availability and management of closure material sources	Schedule
Earthwork's area	Area requiring land forming and contouring based on surface area of haul road. Other areas requiring minor earthworks/landscaping (i.e., soil stockpile areas).	Q3-Q4 2031

Project Site (location of domain 3a): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)		Domain/feature: Domain 3 -Pit voids to remain open
Topsoil	Overburden and oxide waste from pits will be used to create the abandonment bunds and used for rehabilitation purpose subject to chemical, physical analysis of a suitable cover material. Topsoil will be in the form of oxide waste rock won from each site pits and either be used for beneficial mine closure purposes, such as use in rehabilitation (capping) or other beneficial mine closure purposes.	Q3-Q4 2031
Aspects	Information gap/uncertainty	Schedule
	Uncertainty of the regional groundwater aquifer hydraulic conductivity for operations and closure. Proposed to conduct pit dewatering monitoring during early stages of operations to increase certainty for the water balance.	2022-2033
Aspects	Performance monitoring and maintenance tasks	Schedule
Post Closure monitoring	<p>Post closure monitoring programme (against objective and completion criteria):</p> <p>Surface and ground water monitoring up and downstream of TSF, where available.</p> <p>Geotechnical assessment of pit walls</p> <p>Key stakeholder engagement</p> <p>Public safety assessment</p> <p>Landscape/vegetation monitoring using Ecosystem Function Analysis (EFA)</p> <p>Water monitoring at sediment basins located downstream of TSF areas</p> <p>Land management and remediation (fire, weeds and pests, soil, and landform)</p>	2032-2041

9.2.5 Domain 3b – Backfilled Pits

Table 57 Domain 3b – Backfilled pit closure implementation

Project Site (location of domain 3b) Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)		Domain/feature: Domain 3b -Backfilled Pits
<p>Description of Domain/Feature: Backfilled Pits: Rustlers Roost site-Annie Oakley pit, Annie’s Dam pit, Quest 29 site: BHS pit, Zamu pit.</p> <p>Open pit mining at Annie’s Dam pit and Annie Oakley pit will cease in Q2 2024. Both pits will be backfilled with fresh waste from the Main pit and covered with oxide waste overburden from the Main pit. This approach will encapsulate fresh waste deeper within the pit backfill, surrounded by NAF bedrock on the pit walls and floor, and limit the amount of water and oxygen contact with PAF material. Annie’s Dam pit will be eventually encapsulated within the TSF and therefore no rehabilitation or land forming is proposed.</p> <p>Zamu pit will be completely backfill with waste rock from the four consecutive pits including Taipan pit, South Koolpin, North Koolpin pits. Oxide waste from the other Q29 pits will be used to cover and cap Zamu pit.</p> <p>BHS pit may be back filled with the decommissioned Q29 heap leach facility and oxide waste used for cover and capping. This is to be confirmed. For the closure task, it is assumed the BHS pit will be backfilled.</p>		
Land Use Information		
Post Mining land use	Backfilled pits to be stable, non-polluting which supports stable natural habitats compatible with pastoral use.	
Activity	Domain 3b - Closure work tasks	Schedule
Decommission	Disconnected dewatering pumps, generators and pipelines and make safe.	Annie’s Dam and Annie Oakley Dam pits Q3-Q4 2024. Zamu pit Q4 2029 BHS pit Q4 2031

Project Site (location of domain 3b) Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)		Domain/feature: Domain 3b -Backfilled Pits
Demolish	Removal of any infrastructure around/near pits.	Annie's Dam and Annie Oakley Dam pits Q3-Q4 2024. Zamu pit Q4 2029 BHS pit Q4 2031
Clean-up and dispose	Remove all domestic rubbish, old pipes and pumps to landfill.	Annie's Dam and Annie Oakley Dam pits Q3-Q4 2024. Zamu pit Q4 2029 BHS pit Q4 2031
Backfilled Pits	<p>Segregation and selective placement of PAF and NAF materials during pit backfilling to ensure PAF waste is retained permanently submerged within backfilled pit.</p> <p>Cover and capping with NAF material of sufficient thickness to limit infiltration and/or use of low permeability cover systems.</p> <p>Reshape/re-contour area consistent to the surrounding landform and drainage and remove any erosion prone features.</p> <p>Install erosion and sediment controls (bunding, run-on/runoff diversions, and stormwater ponds where erosion is evident or likely to occur (ESCP).</p>	Annie's Dam and Annie Oakley Dam pits Q3-Q4 2024. Zamu pit Q4 2029 BHS pit Q4 2031

Project Site (location of domain 3b) Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)		Domain/feature: Domain 3b -Backfilled Pits
Site landform	<p>Reshape/re-contour area consistent to the surrounding landform and drainage and remove any erosion prone features.</p> <p>Monitoring of waste rock placement and compaction tests at every 5 metre depth intervals.</p> <p>Retain locally occurring tree species where possible.</p> <p>Install erosion and sediment controls where erosion is evident or likely to occur (ESCP)</p>	Zamu pit and BHS pits Q4 2029
Site landform and drainage reconstruction	<p>Fill depressions, holes and spread available topsoil at >100 mm where required and rip on contour.</p> <p>Reinstatement of surface drainage patterns consistent with the regional drainage patterns.</p>	Zamu pit and BHS pits Q4 2029
Rehabilitation and revegetation	<p>Seeding with local pioneer species which reflect the surrounding vegetation, topography, and surrounding land use.</p> <p>Create fauna habitats (e.g., using rocks and available vegetation detritus).</p>	Zamu pit and BHS pits Q4 2029
Security and signage	<p>Stock fencing put in place around the pit bund to keep cattle off the bund surface and from accessing pit water, particularly during the early growth years immediately post closure. Fencing will be maintained by post-closure landowner/pastoralist if required to be maintained in the long term.</p>	Q2 2030
Activity	Schedule of work for research, investigations and trials	Schedule
Using monitoring results, research, investigation, and trials, refine criteria specific to back filled pits.		2022-2032
Develop specific, quantitative performance indicators for the measurements of success that are based on research and monitoring outcomes.		2022-2032
Continue with progressive rehabilitation and/or rehabilitation trials and subsequent vegetation performance monitoring to inform closure design		2022-2032

Project Site (location of domain 3b) Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)		Domain/feature: Domain 3b -Backfilled Pits
Kinetic testing in progress to inform suitable waste rock placement that will inform the solubility of the waste materials, rate of sulphide oxidation, and potential composition of leachate formed.		Report to be provided in Q1 2022
Activity	Schedule of work for progressive rehabilitation	Schedule
Earthwork's area	Zamu and BHS pits scheduled for backfilling rehabilitation towards end of operations. Annie's Dam and Annie Oakley pit will be backfilled in 2024 and the TSF footprint will cover the pit footprints. No progressive rehabilitation is proposed.	Zamu pit and BHS pits Q4 2029
Topsoil	Capping and cover material to be confirmed	Zamu and BHS pits Q4 2029
Seeding	Seeding utilising provenance selection or local seed suited to the new local conditions such as topography, soil structure, aspect. Purchase seed either from a local supplier or collection inhouse through structured seed collection programmes.	Q1 2032 3 wks of first rains (January)
Activity	Availability and management of closure material sources	Schedule
Earthwork's area	Area requiring land forming and contouring based on surface area of the backfilled pit footprints. Other areas requiring minor earthworks (i.e., soil stockpile areas).	2029/2032
Topsoil	Overburden and oxide waste from pits will be stockpiled and used for rehabilitation purpose subject to chemical, physical analysis of a suitable cover material. Topsoil will be in the form of oxide waste rock won from each site pits and either be used for beneficial mine closure purposes, such as use in rehabilitation (capping) or other beneficial mine closure purposes.	2031/2032
Aspects	Information gap/uncertainty	Schedule

Project Site (location of domain 3b) Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)		Domain/feature: Domain 3b -Backfilled Pits
Landform and rehabilitation design	Thorium bearing flouroapatite has been measured in some fresh zone samples. As a result, some associated waste rock from this zone may result in sources of radioactivity because of thorium decay. Physical and chemical properties of cover and capping for backfilled pits capping and cover to be confirmed.	2022-2032
	Investigate options for PAF waste rock to be limed prior to backfilling	2022-2032
	Design thickness of cover and capping for backfilled pits to be confirmed through, structural stability or material, physical and chemical and microbiological properties of material and suitable minimum requirements for plant root zone development.	2022-2032
Vegetation covers	Lack of understanding of select plants to demonstrate their capacity for establishment, survival and propagation post mining. Suitable vegetation covers utilising provenance selection or local seed for rehabilitation suited to the new local conditions such as topography, soil structure, aspect.	2022-2032
Aspects	Performance monitoring and maintenance tasks	Schedule
Post Closure monitoring	<p>Post closure monitoring programme (against objective and completion criteria):</p> <p>Surface and ground water monitoring up and downstream of backfilled pits, where available.</p> <p>Geotechnical assessment of backfilled pits surface structures</p> <p>Key stakeholder engagement</p> <p>Public safety assessment</p> <p>Landscape/vegetation monitoring using Ecosystem Function Analysis (EFA)</p> <p>Water monitoring at sediment basins located downstream of TSF areas</p> <p>Land management and remediation (fire, weeds and pests, soil, and landform)</p>	2032-2041

9.2.6 Domain 4 – Processing Infrastructure

Table 58 Domain 4 - Processing infrastructure closure implementation

Project Site (location of domain 4): Rustlers Roost Site (ML 1083)		Domain/feature: Domain 4 -Processing infrastructure
<p>Description of Domain/Feature: Processing Infrastructure include Rustlers Roost site-CIL Process plant, water ponds, crib(mill), chemical stores (Cyanide, HCL, NaOH, CuSO4, Hydrogen peroxide, Blanking agent, Quicklime, Flocculent, LPG, smelting fluxes), conveyor and crusher, Run of Mine (ROM).</p> <p>Final ore haul will be in Q3-4 2031. Processing will continue for another 6-8 months, depending on ore quantities, after cessation of mining, decommissioning of the process plant, TSF and associated process plant infrastructure will commence in Q3 2033.</p>		
Land Use Information		
Post Mining land use	Processing Infrastructure areas will be stable, non-polluting which supports stable natural habitats compatible with pastoral use.	
Activity	Domain 4 -Closure work tasks	Schedule
Demolish	<p>Removal of all process plant infrastructure (unless appropriate stewardship can be established) including buildings above services and structures. Concrete pathways, pads and footings to be broken up and disposed to pit.</p> <p>Remove water supply and management infrastructure from surface. Remove pumps and standpipes once dust management is no longer required.</p>	2033-2034

Project Site (location of domain 4): Rustlers Roost Site (ML 1083)		Domain/feature: Domain 4 -Processing infrastructure
Site landform and drainage reconstruction	<p>Reshape/re-contour area consistent to the surrounding landform and drainage and remove any erosion prone features.</p> <p>Fill depressions, holes and spread available topsoil at >100 mm where required and rip on contour.</p> <p>Reinstatement of surface drainage patterns consistent with the regional drainage patterns.</p> <p>Install erosion and sediment controls where erosion is evident or likely to occur (ESCP)</p> <p>Deep rip parking areas/roads not required by the post-closure land user.</p> <p>Remove weeds/exotic plant species as required.</p>	Q2 2033-2034
Waste rock/stockpiles	<p>Acid and Metalliferous Drainage (AMD) and Potentially Acid Forming (PAF) material derived from waste stockpiles/drilling cuts will be backfilled into pits to avoid AMD and PAF related issues on site.</p> <p>All remaining oxide stockpiles to be used for cover/fill material around Project site.</p> <p>waste stockpiles/drill cuttings containing Radioactive/NORM will be backfilled into pits to avoid radiation related issues on site.</p>	Q2 2033-2034
Site landform and drainage reconstruction	<p>Reshape/re-contour area consistent to the surrounding landform and drainage and remove any erosion prone features.</p> <p>Retain locally occurring tree species where possible.</p> <p>Install erosion and sediment controls where erosion is evident or likely to occur (ESCP)</p> <p>Deep rip parking areas/roads not required by the post-closure land user.</p> <p>Remove weeds/exotic plant species as required.</p> <p>Fill depressions, holes and spread available topsoil at >100 mm where required and rip on contour.</p> <p>Reinstatement of surface drainage patterns consistent with the regional drainage patterns.</p>	Q2 2033-2034

Project Site (location of domain 4): Rustlers Roost Site (ML 1083)		Domain/feature: Domain 4 -Processing infrastructure
Clean-up and dispose	Remove all domestic rubbish to landfill. All hazardous wastes (oily rags, waste oil, oil filters, batteries), remaining /spent chemicals and containers to be removed from site by licensed waste contractor and to an approved waste management /recycling facility.	Q2 2033-2034
Rehabilitation and revegetation	Seeding with local pioneer species which reflect the surrounding vegetation, topography, and surrounding land use. Create fauna habitats (e.g., using rocks and available vegetation detritus).	Q1 2034
Security and signage	Stock fencing put in place around rehabilitated areas to prevent cattle access, particularly during the early growth years immediately post closure. Fencing will be maintained by post-closure landowner/pastoralist if required to be maintained in the long term. Install clear and visible signage at gates displaying the company name and the area is under rehabilitation and no unauthorised access.	Q2 2033-2034
Activity	Schedule of work for research, investigations and trials	Schedule
	Undertake further details materials characterisation for available rehabilitation cover materials. Document and use learnings from existing site rehabilitation.	2022-2032
	Using monitoring results, research, investigation, and trials, refine criteria that are specific to the closure domains.	2022-2032
	Develop specific, quantitative performance indicators for the measurements of success that are based on research and monitoring outcomes.	2022-2032
	Continue with progressive rehabilitation trials and subsequent vegetation performance monitoring to inform closure design.	2022-2032
Activity	Schedule of work for progressive rehabilitation	Schedule

Project Site (location of domain 4): Rustlers Roost Site (ML 1083)		Domain/feature: Domain 4 -Processing infrastructure
Earthwork's area	Processing infrastructure areas will be rehabilitated at end of operations. There is no progressive rehabilitation proposed	Q3 2034
Topsoil	Quantity of topsoil to be confirmed	Q3 2034
Seeding	Seeding utilising provenance selection or local seed suited to the new local conditions such as topography, soil structure, aspect. Purchase seed either from a local supplier or collection inhouse through structured seed collection programmes.	Q1 2035 3 wks of first rains (January)
Activity	Availability and management of closure material sources/resource	Schedule
Earthwork's area	Area requiring land forming and contouring based on surface. Other areas requiring minor earthworks/landscaping (i.e., soil stockpile areas).	2032
Topsoil	Areas requiring fills and cover will be sourced from the oxide material from the Main Pit, Annie's Dam or Annie Oakley dam pits . material may be sourced from the ROM pad. Spread to areas as required at >100 mm. Total quantities of topsoil will be confirmed during TSF design phase. Hi degree of certainty there will be enough material for rehabilitation.	2032
Aspects	Information gap/uncertainty	Schedule
Landform and rehabilitation Design	Design thickness of cover material for disturbed areas that do not have suitable insitu material for rehabilitation success. Material characterisation to be confirmed through, structural stability or material, physical and chemical and microbiological properties of material and suitable minimum requirements for plant root zone development.	2022-2031
Vegetation covers	Lack of understanding of select plants to demonstrate their capacity for establishment, survival and propagation post mining. Suitable vegetation covers utilising provenance selection or local seed for rehabilitation suited to the new local conditions such as topography, soil structure, aspect.	2022-2031
Aspects	Performance monitoring and maintenance tasks	Schedule

Project Site (location of domain 4): Rustlers Roost Site (ML 1083)		Domain/feature: Domain 4 -Processing infrastructure
Post Closure monitoring	<p>Post closure monitoring programme (against objective and completion criteria):</p> <p>Surface and ground water monitoring up and downstream of disturbance areas, where available.</p> <p>Key stakeholder engagement</p> <p>Public safety assessment</p> <p>Landscape/vegetation monitoring using Ecosystem Function Analysis (EFA)</p> <p>Water monitoring at sediment basins located downstream of disturbed areas</p> <p>Land management and remediation (fire, weeds and pests, soil, and landform)</p>	2032-2041

9.2.7 Domain 5 Support Infrastructure

Table 59 Domain 5 - Support infrastructure closure implementation

Project Site (location of domain 5): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783), Accommodation camp (ML 29814)	Domain/feature: Domain 5 -Support infrastructure
<p>Description of Domain/Feature: Support Infrastructure include Rustlers Roost site- Mine Contractor Facility, Explosive magazine, Mining area laydown/workshop/crib, Main offices/front gate/helipad (administration, management, safety, first aid, environment), Infrastructure (gas connections, power lines, pumps, pipes etc...), landfill, fences/gates. Quest 29 site - Fuel storage and dispensing, Infrastructure (power lines, pumps, pipes etc...), Go line/crib, fences/gates. Accommodation camp area - Accommodation camp, Infrastructure (power lines, pumps, pipes etc...).</p> <p>Final ore haul will be in Q3-4 2031. Processing will continue for another 6-8 months, depending on ore quantities, after cessation of mining, decommissioning of the process plant and TSF will commence in Q3 2033. Accommodation camp, administration offices, first aid, maintenance, helipad, workshop area refuelling station, will remain on site until all the domains have been rehabilitated. Then buildings etc... will be removed as necessary through closure/post closure until all removed. Some infrastructure will be reused where practical and safely. Engagement with key stakeholders as to what to retain onsite.</p>	

Project Site (location of domain 5): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783), Accommodation camp (ML 29814)		Domain/feature: Domain 5 -Support infrastructure
Land Use Information		
Post Mining land use	Support Infrastructure areas will be stable, non-polluting which supports stable natural habitats compatible with pastoral use.	
Activity	Domain 5 -Closure work tasks	Schedule
Decommission	Disconnected services (gas, power, and water) and make safe. Mobile generators will be brought to site while in closure and post closure activities are occurring and removed once all staff depart site.	2032-2034
Demolish	<p>Removal of all infrastructure (unless appropriate stewardship can be established) including buildings above services and structures.</p> <p>Concrete pathways, pads and footings to be broken up and disposed to pit.</p> <p>Administration offices, first aid, maintenance, helipad, workshop area refuelling station, will remain on site until all the domains have been rehabilitated. Then demountable will be removed as necessary through closure/post closure until all removed. Some infrastructure will be reused where practical and safely. Engagement with key stakeholders as to what to retain onsite.</p> <p>Remove water supply and management infrastructure from surface.</p> <p>Remove pumps and standpipes once dust management is no longer required.</p>	2032-2033

Project Site (location of domain 5): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783), Accommodation camp (ML 29814)		Domain/feature: Domain 5 -Support infrastructure
Site landform and drainage reconstruction	<p>Reshape/re-contour area consistent to the surrounding landform and drainage and remove any erosion prone features.</p> <p>Fill depressions, holes and spread available topsoil at >100 mm where required and rip on contour.</p> <p>Reinstatement of surface drainage patterns consistent with the regional drainage patterns.</p> <p>Install erosion and sediment controls where erosion is evident or likely to occur (ESCP)</p> <p>Deep rip parking areas/roads not required by the post-closure land user.</p> <p>Remove weeds/exotic plant species as required.</p>	2032-2033
Clean-up and dispose	<p>Remove all domestic rubbish to landfill. All hazardous wastes (oily rags, waste oil, oil filters, batteries), remaining /spent chemicals and containers to be removed from site by licensed waste contractor and to an approved waste management /recycling facility.</p> <p>Any remaining explosives to be removed from site and disposed of in accordance with guidelines. The magazine structure to be disassembled and either disposed on to pit or removed from site</p>	2032-2033
Rehabilitation and revegetation	<p>Seeding with local pioneer species which reflect the surrounding vegetation, topography, and surrounding land use.</p> <p>Create fauna habitats (e.g., using rocks and available vegetation detritus).</p>	Q1 2032/34
Security and signage	<p>Stock fencing put in place around rehabilitated areas keep cattle off , particularly during the early growth years immediately post closure. Fencing will be maintained by post-closure landowner/pastoralist if required to be maintained in the long term.</p> <p>Install clear and visible signage at gates displaying the company name and the area is under rehabilitation and no unauthorised access</p>	2032-2034

Project Site (location of domain 5): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783), Accommodation camp (ML 29814)		Domain/feature: Domain 5 -Support infrastructure
Schedule of Work for Research, Investigations and Trials Tasks		Schedule
Undertake further details materials characterisation for available rehabilitation cover materials. Document and use learnings from existing site rehabilitation.		2022-2032
Using monitoring results, research, investigation, and trials, refine criteria that are specific to the closure domains.		2022-2032
Develop specific, quantitative performance indicators for the measurements of success that are based on research and monitoring outcomes.		2022-2032
Continue with progressive rehabilitation trials and subsequent vegetation performance monitoring to inform closure design.		2022-2032
Conduct ongoing trials and investigations that will inform the success of seeding.		2022-2032
Activity	Schedule of Work for Progressive Rehabilitation	Schedule
Earthwork's area	Support infrastructure areas will be rehabilitated at end of operations. There is no progressive rehabilitation proposed	Q3 2033-2034
Topsoil	Quantity of topsoil to be confirmed	Q3 2033-2034
Seeding	Seeding utilising provenance selection or local seed suited to the new local conditions such as topography, soil structure, aspect. Purchase seed either from a local supplier or collection inhouse through structured seed collection programmes.	Q1 2034 3 wks of first rains (January)
Activity	Availability and management of closure material Sources/resource	Schedule
Earthwork's area	Area requiring land forming and contouring based on surface. Other areas requiring minor earthworks/landscaping (i.e., soil stockpile areas).	2032-2034

Project Site (location of domain 5): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783), Accommodation camp (ML 29814)		Domain/feature: Domain 5 -Support infrastructure
Topsoil	Areas requiring fills and cover will be sourced from the oxide material from the Main Pit, Annie's Dam or Annie Oakley pits . material may be sourced from the ROM pad. Spread to areas as required at >100 mm. Total quantities of topsoil will be confirmed during TSF design phase. Hi degree of certainty there will be enough material for rehabilitation.	2032-2034
Aspects	Information gap/uncertainty	Schedule
Landform and rehabilitation Design	Design thickness of cover material for disturbed areas that do not have suitable insitu material for rehabilitation success. Material characterisation to be confirmed through, structural stability or material, physical and chemical and microbiological properties of material and suitable minimum requirements for plant root zone development.	2022-2031
Vegetation covers	Lack of understanding of select plants to demonstrate their capacity for establishment, survival and propagation post mining. Suitable vegetation covers utilising provenance selection or local seed for rehabilitation suited to the new local conditions such as topography, soil structure, aspect.	2022-2031
Aspects	Performance monitoring and maintenance tasks	Schedule

Project Site (location of domain 5): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783), Accommodation camp (ML 29814)		Domain/feature: Domain 5 -Support infrastructure
Post Closure monitoring	<p>Post closure monitoring programme (against objective and completion criteria):</p> <p>Surface and ground water monitoring up and downstream of disturbance areas, where available.</p> <p>Key stakeholder engagement</p> <p>Public safety assessment</p> <p>Landscape/vegetation monitoring using Ecosystem Function Analysis (EFA)</p> <p>Water monitoring at sediment basins located downstream of disturbed areas</p> <p>Land management and remediation (fire, weeds and pests, soil, and landform)</p>	2032-2041

9.2.8 Domain 6 -Haul Road and access roads

Table 60 Domain 6 - Haul roads and access roads closure implementation

Project Site (location of domain 6): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783), Toms Gully (ML 29814)		Domain/feature: Domain 6 - Haul Road and access roads
<p>Description of Domain/Feature: Haul roads and access tracks include Rustlers Roost site, Quest 29 site and Accommodation camp site access tracks.</p> <p>There is approximately 11km x 20m width (or 26 ha) of haul road on and off tenements between and on Quest 29 and Rustlers Roost sites. There are three mapped drainage features along the Haul Road alignment from Quest 29 to Rustlers Roost. The drainage feature nearest to Rustlers Roost site has a newly constructed engineered designed and constructed bridge crossing for haul trucks including other heavy vehicles (HV's). The pastoral lease holder has approved the bridge upgrade for operations and retained post closure.</p> <p>Both sites have existing access tracks development and maintained as part of care and maintenance activities. These tracks will remain, and new tracks created as part of operations for light vehicle (LV's), Off tenement, there are existing access roads located between Quest 29 and Rustlers Roost (Haul Road alignment) the accommodation camp area and Arnhem Highway. These tracks are used regularly for pastoral activities. In total there is 30km x 5m (or 6.5 ha) of on and off tenement access roads. Engagement with the Pastoral Lease holder and other key stakeholder will confirm access roads to be retained for pastoral use and post closure monitoring activities.</p> <p>Final ore haul will be in Q3-4 2031. Processing will continue for another 6-8 months, depending on ore quantities, after cessation of mining, decommissioning of the process plant and TSF will commence in Q3 2033. The Haul Road will remain until all support infrastructure and processing infrastructure is removed from site and large earth moving machinery are demobilised from site. Progressive rehabilitation is proposed to commence in 2033.</p>		
Land Use Information		
Post Mining land use	Hauls roads and access roads will be stable, non-polluting which supports stable natural habitats compatible with pastoral use.	
Activity	Domain 6 Haul roads and access roads- Closure Work Tasks	Schedule
Development	Stockpile soil for areas required for haul road.	Q2 2032-2035
Decommission	Deep rip access tracks not required for closure monitoring and post-closure land user.	2033
Demolish	Remove and demolish infrastructure/operational signage along haul road and access roads used for operations.	Q2 2033
Clean-up and dispose	Remove all waste rock used in construction of haul road and/or access tracks that are leaching and dispose to pit.	Q2, Q3, Q4 2033

Project Site (location of domain 6): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783), Toms Gully (ML 29814)		Domain/feature: Domain 6 - Haul Road and access roads
Site landform and drainage reconstruction	<p>Fill depressions, holes, and deep rip.</p> <p>Reshape/re-contour road area consistent to the surrounding landform and drainage and remove any erosion prone features.</p> <p>Push to construct contour banks and division drains where necessary.</p> <p>Push in all windrows, and edges battered.</p> <p>Install erosion and sediment controls where erosion is evident or likely to occur (ESCP)</p> <p>Deep rip parking areas not required by the post-closure land user.</p> <p>Access through water courses (i.e., culverts) removed and banks restored, unless otherwise agreed to key stakeholders or appropriate third party.</p>	Q2, Q3, Q4 2034
Rehabilitation and revegetation	<p>Seeding with local pioneer species which reflect the surrounding vegetation, topography, and surrounding land use.</p> <p>Create fauna habitats (e.g., using rocks and available vegetation detritus).</p>	Q4 2032, Q4 2035
Security and signage	<p>Install gates and fencing in consultation with pastoral lease holder as they will be maintained by post-closure if required to be maintained in the long term.</p> <p>Clear and visible signage at main gates displaying company name and no unauthorised access.</p> <p>Placement of clear and visible signage on main access roads indicating speed, road curves</p>	Q2, Q3, Q4 2035
Activity	Schedule of work for research, investigations and trials	Schedule
Site landform and drainage reconstruction	<p>Assess haul road drainage requiring structure controls for closure (concrete culverts).</p> <p>Bridge crossing engineering structural assessment of bridge structural integrity for closure.</p>	2022-2034

Project Site (location of domain 6): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783), Toms Gully (ML 29814)		Domain/feature: Domain 6 - Haul Road and access roads
Rehabilitation and revegetation	<p>Continue with progressive rehabilitation and/or rehabilitation trials and subsequent vegetation performance monitoring to inform closure design .</p> <p>Using monitoring results ,research, investigation and trails, refine criteria that are specific to the closure domains</p> <p>Develop specific, quantitative performance indicators for the measurements of success that are based on research and monitoring outcomes.</p> <p>Conduct ongoing trials and investigations that will inform the success of seeding</p>	2022-2035
Activity	Schedule of work for progressive rehabilitation	Schedule
Earthwork's area	Haul road and access roads are unlikely to be progressively rehabilitated. Area requiring land forming and contouring based on surface area of haul road. Other areas requiring minor earthworks/landscaping (i.e., soil stockpile areas).	Q2, Q3, Q4 2034
Topsoil	Spread to areas as required at >100 mm. Topsoil stockpiled adjacent to haul road. Spread topsoil to other disturbed areas.	Q2, Q3, Q4 2033
Seeding	<p>Seeding utilising provenance selection or local seed suited to the new local conditions such as topography, soil structure, aspect.</p> <p>Purchase seed either from a local supplier or collection inhouse through structured seed collection programmes.</p>	Q1 2034/35 3 wks of first rains (January)
Activity	Availability and management of closure material sources/resource	Schedule
Earthwork's area	Area requiring land forming and contouring based on surface. Other areas requiring minor earthworks/landscaping (i.e., soil stockpile areas).	2032-2033
Topsoil	<p>Areas requiring fills and cover will be sourced from the oxide material from the Main Pit, Annie's Dam or Annie Oakley pits .</p> <p>Material may be sourced from the ROM pad. Spread to areas as required at >100 mm. Total quantities of topsoil will be confirmed during TSF design phase. Hi degree of certainty there will be enough material for rehabilitation.</p>	2032-2034

Project Site (location of domain 6): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783), Toms Gully (ML 29814)		Domain/feature: Domain 6 - Haul Road and access roads
Aspects	Information gap/uncertainty	Schedule
	There is uncertainty around haul roads and access roads to be retained by Pastoral Lease Holders. Continual engagement throughout operations will assist to confirm decisions and provide positive outcomes to Lease holders and PGL.	2021-2032
Aspects	Performance monitoring and maintenance tasks	Schedule
Post Closure monitoring	<p>Post closure monitoring programme (against objective and completion criteria):</p> <p>Surface and ground water monitoring up and downstream of disturbance areas, where available.</p> <p>Key stakeholder engagement</p> <p>Public safety assessment</p> <p>Landscape/vegetation monitoring using Ecosystem Function Analysis (EFA)</p> <p>Water monitoring at sediment basins located downstream of disturbed areas</p> <p>Land management and remediation (fire, weeds and pests, soil, and landform)</p>	2032-2041

9.2.9 Domain 7 – Existing Disturbances

Table 61 Domain 7 - Existing disturbance features closure implementation

Project Site (location of domain 7): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)		Domain/feature: Domain 7 -Existing Disturbance features
<p>Description of Domain/Feature: The existing disturbance features at Rustlers Roost site: Leach pad x 2, leach ponds x3, CIL/RIL steel tanks x 3, CIL plant and footings, concrete footings (administration office, Process Plant, magazine, crusher area), south WRD, main pit, Annie’s dam, waste rock area, ROM silt trap. Quest 20 site: Leach pad x 2, leach ponds x 3, BHS pit, Zamu pit, North Koolpin pit, South Koolpin pit, Taipan pit, CIL plant and footings, Zamu WRD, North Koolpin WRD, South Koolpin WRD, Taipan WRD.</p> <p>Existing disturbances will be removed and areas rehabilitated throughout all stages of operations. Extended pits will be incorporated into the closure of the Domain 3a and b. The extended North WRD will be incorporated into the closure for domain 1 WRD’s. Heap leach and ponds at Rustlers Roost and Annie’s Dam will be incorporated into the TSF footprint which will occur during operations. The heap leach and ponds at Q29 will be rehabilitated during the end of operations once the BHS pit is mined in Q2/Q4 2031. Old footings, infrastructure is likely to be removed during operations as required to clear the area.</p>		
Land Use Information		
Post Mining land use	Existing disturbance areas will be stable, non-polluting which supports stable natural habitats compatible with pastoral use.	
Sub Domain	Rehabilitation activity	Applicable objectives/closure criteria.
Heap leach pads at Rustlers Roost	Backfilled into Rustlers Roost main pit. Area to be included into the TSF footprint.	Refer to Domain 3b Backfilled mine pits closure criteria Table 23
Heap leach ponds at Rustlers Roost	Liners removed, backfilled with oxide waste to surface and area rehabilitated. Area to be included into the TSF footprint	Refer to Domain 5 Support Infrastructure Table 23
Heap leach pads Q29	Backfilled into Q29 BHS pit. (Another option is to cap the heap leach with oxide material from the BHS pit. Options will be confirmed during operations)	Refer to Domain 3b Backfilled mine pits closure criteria Table 23.

Project Site (location of domain 7): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)		Domain/feature: Domain 7 -Existing Disturbance features
Heap leach ponds at Q29	Liners removed, backfilled with oxide waste to surface and area rehabilitated.	Refer to Domain 5 Support Infrastructure closure criteria Table 23
CIL/RIL tanks at Rustlers Roost and Quest 29	Removed and area rehabilitated.	Refer to Domain 5 Support infrastructure closure criteria Table 23
Rustlers Roost WRD (south)	Extended as part of Project activities.	Refer to Domain 1 WRD closure criteria Table 23
Rustlers Roost main pit	Extended as part of Project activities .	Refer to Domain 3a Mine pits closure criteria Table 23
Annie's dam	Incorporated in TSF footprint as part of Project activities .	Refer to Domain 3b Backfilled mine pits closure criteria Table 23
Rustlers Roost and Quest 29 Concrete footings	Removed and area rehabilitated.	Refer to Domain 5 Support infrastructure closure criteria Table 23
Rustlers Roost waste rock area	Removed and placed in pit and area rehabilitated.	Refer to Domain 5 Support infrastructure closure criteria Table 23
Rustlers Roost silt trap	Backfilled and rehabilitated.	Refer to Domain 5 Support infrastructure closure criteria Table 23
Q29 BHS pit	Extended as part of Project activities and backfilled with Q29 heap leach material.	Refer to Domain 3b Backfilled pits closure criteria Table 23
Zamu WRD, North Koolpin WRD, South Koolpin WRD, Taipan WRD.	Remain closed.	NA
North Koolpin pit, South Koolpin pit, Taipan pit.	Extended as part of Project activities .	Refer to Domain 3a open pits closure criteria Table 23

Project Site (location of domain 7): Rustlers Roost Site (ML 1083), Quest 29 site (ML 29783)		Domain/feature: Domain 7 -Existing Disturbance features	
Zamu oxide pit.	Extended as part of Project activities and backfilled with waste rock from Q29 pits.	Refer to Domain 3b Backfilled pits closure criteria Table 23	
Access roads.	Extended as part of Project activities .	Refer to Domain 6 Haul roads and access roads closure criteria Table 23	
Activity	Schedule of work for research, investigations, and trials		Schedule
Development	Confirm Q29 heap leach pad and pond to be backfilled into BHS pit or capped and covered with BHS oxide waste.		2022-2023

9.3 Contingencies for unplanned closure

In the event of suspended operations, all operations or areas of the Project are suspended and placed into a care and maintenance, infrastructure would remain intact, and the site would continue to be managed, maintained, and monitored under a care and maintenance phase. Monitoring during a care and maintenance phase is discussed in Section 10 'Closure Monitoring and Maintenance.'

Under a suspension of operations, the care and maintenance plan would include , but not limited to, the following:

- PGL Project area is safe.
- Notify key stakeholders (DITT, DEPWS, Pastoral Lease holders)
- Install signage and security functions.
- Maintain the structure and function of all sediment and water management controls.
- Stabilize all landforms particularly the WRD's and TSF.
- Install additional bunding and/or fencing to prevent public access to site and TSF, Pits/ponds.
- Remove all ore stockpiles from ROM pad
- All infrastructure will be shut down and made secure.
- A contingency of staff who are experienced and understand the Project and sites functions and management, process plant maintenance (electrical, water management) and environmental and safety.

Planning for premature closure will be addressed in a Decommissioning Plan. Financial provisioning for premature closure is discussed in Section 11 Financial provisioning for closure.

If Project suspension or premature/unforeseen closure occurs, DITT will be notified immediately and before any action is taken or staff notified.

On notifying DITT the following information will be provided:

- The basis for suspension/closure
- Report on the existing status operations and all landforms.
- The closure activities to be undertaken and the status of those activities.
- Progress on development of the relevant plans (i.e., care and maintenance plan, decommissioning plan).

This MCP is focused on the recommencement of activity mining operations at the Rustlers Roost site and Q29, and it's considered that the risks of any unplanned closure of operations is low. However, the scenarios under which unplanned closure may occur and the corresponding PGL mitigation Measures are outlined in Table 62.

Table 62 Unplanned closure and mitigation measures

Unplanned Closure Scenarios	Mitigation Measures
<p>Significant Gold Price Drop</p> <p>Operations suspended and placed into care and maintenance until economic mining and processing could resume.</p>	<ul style="list-style-type: none"> • Development of a robust Business Case. • Operational approval by President/CEO and Board. • Annual budgets with actual and forecast expenditure. • Extensive management and operation expertise.
<p>Major Infrastructure Failure or Incident</p> <p>Operations suspended until the infrastructure failure or incident is addressed, and mining and processing can resume.</p>	<ul style="list-style-type: none"> • Routine maintenance and inspections of infrastructure. • Risk assessments and management plans. • Emergency Response Team and Plans. • Established company insurance policies. Instructed to Close by a Government Agency Operations suspended until any non-conformance with regulatory requirements is addressed and mining and processing can resume.
<p>Instructed to Close by a Government Agency</p> <p>Operations suspended until any nonconformance with regulatory requirements is addressed and mining and processing can resume</p>	<ul style="list-style-type: none"> • Approved Mining and Risk Management Plans. • Routine reporting of monitoring and performance. • Regular consultation to provide updates on activities, clarify expectations and management of risks.
<p>Owner Financial Bankruptcy</p> <p>Operations suspended and placed into care and maintenance until assets sold by administrators.</p>	<ul style="list-style-type: none"> • Strong financial position with quarterly public reporting. • JORC compliant indicated gold resources. • Mid-tier gold producer with a solid base of quality assets

The PGL has identified JORC compliant indicated gold resources. Based on this and in the event of any unplanned closure, the site would be placed into care and maintenance and mining and/or mineral processing operations would resume in the foreseeable future. If no foreseeable plan for future operations is possible, then the broader, updated Mine Closure Plan would be implemented. This would dramatically increase the cost of re-opening operations in the future but would reduce the on-going closure liabilities.

Section 10 Closure Monitoring and Maintenance

10.1 Closure monitoring

Once final rehabilitation and closure works have been completed, a post-closure monitoring programme will commence, with the aim of confirming that rehabilitation has been effective and closure outcomes are met. In general terms, closure and post-closure monitoring will include:

- Rehabilitation compliance audit: Confirm that rehabilitated areas are in line with the legal obligations and closure designs.
- Landform Construction Audit: Confirm the WRD's, TSF, open cut pits and backfilled pits have been rehabilitated in accordance with approved design parameters and identify if any remediation as required.
- Geotechnical Audit
 - Geotechnical stability: Confirm that earthworks have been completed as per design, and there is no significant subsidence or slumping; and
 - Physical stability: Confirm that no significant erosion is occurring and no undermining of material by wind or water.
- Water quality/sediment and aquatic ecology: Confirm that water quality and sediments are consistent with ANZECC guideline values/SSTV's, aquatic ecology – macro invertebrate and fish health.
- Rehabilitation (EFA): Confirm that rehabilitated areas are likely to become comparable to similar areas that have not been disturbed by mining.
- Landforms management and remediation programmes/inspections soil, and landforms): confirm that landforms and soils are structurally and geotechnical safe, stable, non-polluting erosion(resistant landforms.
- Landforms management programmes (weed/pests/grazing and fire): confirm key threats to rehabilitation success and resilience is managed.
- Public safety/security: Confirm that vehicle access to mine landforms has been effectively prevented.

It is expected that the closure work programs will span a period of approximately 36 months to consider wet season and accessibility and tailings settlement. This will be followed by a period of post-closure monitoring and maintenance. Closure and post closure monitoring is envisaged to continue for a minimum of ten years post-closure but may extend longer depending on performance against completion criteria and whether additional issues are identified that require management. The frequency of monitoring may decrease as closure progresses and will cease when project closure outcomes and completion criteria have been met. Details of the performance monitoring programme is outlined in Table 63.

Table 63 Decommissioning, closure, and post closure performance monitoring programme

Performance monitoring programme	Operations/closure	Decommissioning/ Closure		Post Closure							
	2022-2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Rehabilitation compliance audit			A	A	A	A	A	A	A	A	A
Landform construction audit/inspections			A	A	A	A	A	A	A	A	A
TSF routine monitoring and tailings performance monitoring	W/M/Q	W/M/Q	W/M/Q								
Geotechnical audit			A	A		A		A			A
Contaminated site assessment (petroleum hydrocarbons, AMD, heavy metals, NORMS)			A	-		-	A	-	-	-	A
Surface and groundwater monitoring	Q/M	Q/M	Q/M	Q/M	Q/M	Q/M	Q/M	Q/M	Q/M	Q/M	Q/M
Sediment and aquatic ecology monitoring	Q/M	Q/M	Q/M	Q/M	Q/M	Q/M	Q/M	Q/M	Q/M	Q/M	Q/M
Ecosystem Function Analysis (EFA)	Q/M	Q/M	Q/M	Q	Q	Q	Q	Q	Q	Q	Q
Landforms management and remediation programmes/inspections soil, and landforms	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Landforms management programmes (weed/pests/grazing and fire)	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
Public Safety/security assessment	A	-	A	-	A	-	A	-	-	-	A
Stakeholder Engagement	C	C	C	C	C	C	C	C	C	C	C

W=Weekly, M=monthly, Q=quarterly, A -Annual; C=continual and as required

10.2 Rehabilitation/compliance audit

A Rehabilitation/Compliance Audit will be conducted annually (commissioned post closure) for each disturbance area. All areas of disturbance will be inspected, and the following will be recorded:

- Description and total area of each disturbance.
- Review of the status and applicability of legal obligations/commitments.
- Total area rehabilitated and a description of rehabilitation progress.
- Remaining rehabilitation/closure tasks required; and
- Any required remediation works.

Rehabilitation will be assessed based on its compliance with the Legal Obligations Register and Closure Designs. Rehabilitation/Compliance Audits will continue until Completion Criteria are met including:

- All requirements in the Legal Obligations Register are 100% completed.
- Closure Outcomes and Completion Criteria and post-mining land use are agreed with stakeholders at least 6 months prior to commencing planned closure.
- No mine infrastructure remaining on site (unless formally agreed) with all disturbed areas scarified, seeded, and natural drainage patterns reinstated.
- Post-mining land use achieved in accordance with the MCP Closure Outcomes and Completion Criteria and to the written satisfaction of the post-mining landholder and DITT.
- All waste removed and disposed of post- rehabilitation in accordance with legal obligations.
- No evidence of significant erosion, settling or water ponding in rehabilitation areas for ten consecutive post closure monitoring periods; and
- No visible increase in sediment or salinity in the drainage channel downstream of the Rustlers Roost site and Q29 for ten consecutive post closure monitoring periods.

The Rehabilitation/Compliance Audit will be used to further develop the task register for closure reported in the MCP until all areas are fully rehabilitated. Details of any non-compliance or areas requiring remedial work identified during the Audit will be reported and appropriate management measures identified and implemented. Any identified action items and planned management measures will be reported to the DITT in the MMP.

A final Rehabilitation/Compliance Audit will be prepared and submitted to the DITT as part of the Application for a Certificate of Closure. In accordance with Section 46(1) and Section 46(3) of the *Mining Management Act* the application for a Certificate of Closure requires the submission of evidence supporting the attainment of Closure Criteria specified in the MCP for the site.

10.2.1 Landform Construction Audit

A Landform Construction Audit will be commissioned post closure. This Audit will be used to Confirm the WRD's, TSF , open cut pits and backfilled pits have been rehabilitated in accordance with approved design parameters and identify if any remediation as required.

Landform construction will be assessed based on its compliance with the Legal Obligations Register and Closure Designs. Landform construction will continue until Completion Criteria are met including:

- Rehabilitation of the WRD's, TSF and open pits have been completed in accordance approved design parameters.

Findings from the Audit will be incorporated into the Rehabilitation/Compliance Audit. If required, a final Landform Construction Audit will be conducted at the end of closure to confirm that remediation work has effectively been completed.

10.2.2 Geotechnical Audit

A Geotechnical Audit will be commissioned post closure at the following domains

- Open Cut Pits (Rustlers Roost main pit, North Koolpin Pit, South Koolpin Pit, Taipan Pit)
- Tailings Storage Facility (TSF)
- Waste rock Dumps (North WRD, South WRD, East Koolpin WRD)

Findings from the Audit will be incorporated into the Rehabilitation/Compliance Audit. If required, a final Geotechnical Audit will be conducted at the end of closure to confirm that remediation work has effectively been completed.

10.3 Landscape/vegetation monitoring

Landscape/Vegetation Monitoring using Ecosystem Function Analysis (EFA) will be conducted on an annual/bi-annual basis at permanent sites established on the:

- Constructed landforms including WRD's, and TSF, open cut pits perimeter (outside abandonment bund).
- Existing landforms cleared for mining including ROM pad, haul road, and general areas (mining camp, process plant, workshops, and auxiliary areas) post infrastructure removal; and
- Analogue site(s) in the target ecosystems.

Monitoring will be conducted in accordance with methods developed by Tongway and Hindley (2003) to measure landscape stability and ecosystem function.

EFA has two major components; the measurement of landscape zones such as "bare patches" and "vegetation patches" which are recorded along the transect and the assessment of the soil surface condition for the major landscape zones identified along the slope. Vegetation patches play an important role in regulating the flow of landscape resources down the slope (rainfall, litter, soil etc). Bare patches usually are the source of the resources deposited at vegetation patches after a period.

The second component of EFA assesses the soil surface condition and is conducted for the major landscape zones identified in the initial assessment of the slope. Three replicates of the soil assessments are obtained for each landscape zone, randomly selected along each transect. Depending on which feature is assessed, a value of 1 may indicate the poorest condition for each indicator assessed and the highest score may reflect the best condition.

The Landscape/Vegetation monitoring programme will be used to:

- Measure Landscape Function at each transect.
- Monitor the established analogue site(s).
- Record plant taxa present including introduced taxa.
- Measure the plant density for each species.
- Measure the percentage canopy cover for each transect.
- Statistically analyse the data and provide tabulated summaries of the findings.
- Identify rehabilitation which complies with the site Completion Criteria; and
- Identify any areas where vegetation establishment is not progressing and where remedial treatment may be necessary.

LFA monitoring data will be used to determine whether the rehabilitated areas are showing a similar trend to the natural areas and will continue until Completion Criteria are met including:

- Foliage cover (total percentage cover of live vegetation), species diversity (total no. perennial species) and species density (total no. perennial plants) $\geq 50\%$ of the value from the analogue / reference site(s) for ten consecutive closure/post closure monitoring periods; and

Mean LFA stability, infiltration, and nutrient cycling rating of $\geq 50\%$ of the value of the analogue / reference site(s) over ten consecutive (for annual monitoring) or two consecutive (for biennial monitoring) post closure monitoring periods.

Landscape/Vegetation Monitoring will also include an assessment of weed species on the rehabilitated areas (identification/ density) and erosion which will be classified using an erosion severity scale (0 = none, 3 = no gullies $>0.5\text{m}$ and 6 = severe, i.e., $>2\text{m}$ deep). Assessments will continue until Completion Criteria are met including:

- No evidence of any new Weeds of National Significance or Declared Plants for ten consecutive post closure monitoring periods: and
- Level of erosion no greater than 3 which indicates no gully formation $>0.5\text{m}$ depth for ten consecutive post closure monitoring periods.

Monitoring results will be compared against applicable Completion Criteria and reported annually in the MMP. Should monitoring indicate that rehabilitation is not trending towards applicable Completion Criteria (for ten consecutive post closure monitoring periods), a Rehabilitation Assessment will be undertaken prior to the next monitoring period and will determine any required remedial work. Any identified action items and planned management measures will be reported to the DITT in the MMP.

10.4 Water monitoring

Surface and groundwater monitoring will be conducted in accordance with the locations, schedule, and parameters in the approved MMP. Water monitoring is undertaken to obtain quantitative information on the physical, chemical, and biological characteristics of surface and groundwater. Water quality data is used to determine whether additional site water management strategies are required to ensure that the surrounding water beneficial uses are protected.

Water monitoring will continue until Completion Criteria are met including:

- Passively discharged surface water will meet the applicable 95% species protection GVs, SSTV and SWGs for ten consecutive years post closure (outside of seasonal or natural fluctuations).
- Groundwater and the pit lake will meet the applicable 80% ecosystem protection GVs, SSTV and SWGs for ten consecutive years post closure (outside of seasonal or natural fluctuations).

Water monitoring results will be compared against the applicable Completion Criteria and reported annually in the MMP. Should monitoring identify that water quality is not trending towards the applicable Completion Criteria, a Hydrological Assessment will be undertaken. The Hydrological Assessment will aim to determine the likely sources of potential contaminants and any appropriate management strategies. The findings of the Hydrological Assessment will be reported in the MMP and next MCP.

10.5 Contaminated site assessment

The purpose of a Contaminated Site Assessment is to determine whether site contamination poses an actual or potential risk to human health and/or the environment, either on or off the site, of sufficient magnitude to warrant remediation appropriate to the current or proposed land use. Landowners or occupiers can commission assessments for purposes including due diligence, transfer of liability, lease hand back, insurance/financial purposes for land acquisition, or divestment and corporate requirements.

The first stage of contaminated site assessment is the Preliminary Site Investigation (PSI). The PSI is undertaken to identify the characteristics of the site and investigate the site history to establish whether there is the potential for the site to be contaminated. The PSI will be conducted by a suitably qualified and experienced consultant. The PSI will include:

- a desktop study to identify the site characteristics (site location, site layout, building construction, geological setting, historical/current land uses and activities at the site and on adjacent sites).
- a site inspection.
- interviews with site representatives; and
- identification of potential risks and any uncertainties or limitations (NTEPA, 2017).

It is important that a PSI includes a site history review to identify if the site is likely to be contaminated by any potentially contaminating activities which occurred on site, or adjacent to the site. A site history should collate information, from various sources, to determine if the site is hosting or may have hosted a potentially contaminating activity. An integrity assessment of the information should be undertaken and any gaps in site history or information should be clearly documented and clearly identified in the report (NTEPA, 2017).

Prior to planned closure, a PSI will be undertaken to identify and investigate any residual potentially contaminated sites and determine whether further investigation or remediation is required in accordance with the Northern Territory Contaminated Land Guideline. Contaminated Site Assessments will continue until Completion Criteria are met including:

All confirmed contaminated sites are removed, remediated, or encapsulated and do not pose a long-term risk.

A final Contaminated Sites Assessment may also be conducted at the end of closure (if contamination identified during the PSI) to confirm that remediation work has effectively removed any contaminated material. Results of the Contaminated Sites Assessment will be reported to the DITT in the Application for a Certificate of Closure to obtain approval for the final closure of the Project.

Section 11 Financial provisioning for closure

PGL understands its obligations under the NT Mining Management Act 2001 (MMA) to ensure sufficient funds and resources are available to conduct rehabilitation, maintenance and monitoring throughout the LOM. PGL is committed to provisioning for closure to ensure adequate funds are available to rehabilitate the site, conduct post closure monitoring and fund any required remediation activities.

11.1 Costing methodology

The costing methodology will be based on the total area of disturbance for the Project. The costing will consider the estimated volumes of material requiring earthworks, closure materials required (e.g., seeds for revegetation, fencing, drainage control, etc.), hours of equipment usage and man hours required to complete closure activities. Initially, the costing methodology will be simple and high level and it will become progressively more detailed as the mine approaches operation and then closure.

11.2 Review of financial provision

The financial provision estimate for closure will be reviewed annually along using the authorized MMP Security Calculation. The first calculation will be based on current information including the conceptual closure designs and modelling information presented in this MCP. As new information/knowledge gaps/stakeholder feedback and new technical information is filled during operations and/or when there are significant changes to the MCP i.e., revised completion criteria, closure costing methodology will be updated.

The current securities held for the Rustlers Roost Project Area (Authorisation 0738-01 (V3)) is \$303,616 and Quest 29 (Authorisation 0739-01 (V5)) is \$449,800. These securities are held for rehabilitation activities and post closure monitoring and management and for the remediation of existing my disturbances. Historical mining infrastructure will form part of the future mining operations and a full closure and rehabilitation security will be assured for these areas in accordance with the Mining Management Act.

Section 12 Management of information and data

This MCP captures a summary of data relevant to closure planning and will be progressively updated to capture and summarise current closure planning information. Given the 10-year mine life for the Rustlers Roost site and Q29 open cut operation, A regional office will be in Darwin and the head office in Perth. The regional office will have access to the stored information through the main server and ability to provide information to the DITT at any time.

Information generated during operations of relevance to closure will be stored electronically at the Perth Corporate office internal company networks and will be made available to regulators when required. In addition to this MCP, Primary will capture the following information during both the operational phase and post-mining phase:

- Results of any rehabilitation monitoring or trials
- The digital mapping of the area rehabilitated and status of rehabilitation
- Record keeping requirements for the mining and placement of AMD materials mined or processed by the Project as per the AMD Management Plan
- A survey of the open pits will be conducted to provide an accurate record of the mining extents for use by future operators with a copy to be provided to DITT.
- TSF survey information, construction details, cover material, design, monitoring instrumentation

All key approvals, technical reports and electronic data will be stored in PGL's server in its corporate office to ensure it is available for future reference. More detail regarding the information management systems to be adopted and developed by PGL will be available in subsequent revisions of this MCP.

Section 13 Reviewed mine closure plans

This MCP is the first developed for this Project. As future revisions of the MCP are done, PGL will ensure; the MCP will include a summary table clearly outlining all changes to the existing MCP; a summary table documenting how the aspects identified by DITT for improvement in previous revision of the MCP has been addressed; and a table documenting how knowledge gaps identified in the prior MCP have been addressed as well as any new gaps identified.

Section 14 Glossary

Glossary

Abbreviations	Definitions
DITT	Department of Industry, Tourism and Trade
Domain	A group of landform(s) or infrastructure that has similar rehabilitation and closure requirements and outcomes
EIS	Environment Impact Statement
Earthworks	Reshaping, landscaping, capping, water/wind erosion control, rock armouring, ripping
ESCP	Erosion, sediment control plan
EFA	Ecosystem Function Analysis
EMP	Environmental Management Plan
GV	Guideline Value
Environmental Value	A beneficial use and/or an ecosystem health condition
MBGL	Metres Blow Ground Level
LOM	Life of Mine, expected duration of mining and processing operations and closure
NT EPA	Northern Territory Environment Protection Authority
PAF	Potentially Acid Forming
PL	Pastoral Lease
PPL	Perpetual Pastoral Lease
Rustlers Roost	Rustlers Roost Project Area
Q29	Quest 29 Project Area
sp	Species Protection
SSTV	Site Specific Trigger Value
TOR	Terms of Reference
Project development envelope	Is defined as the maximum area within which the activity could occur.
TSF	Tailing Storage Facility
TPWC	<i>Territory Parks and Wildlife Conservation Act 1976 (NT)</i>
WM Act	<i>Weeds Management Act 2001 (NT)</i>
MMA	<i>Mining Management Act 2001 (NT)</i>
MTA	<i>Mineral Titles Act 2010</i>
WRD	Waste Rock Dump

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Appendix A Stakeholder consultation register

Date	Description of Engagement	Stakeholders	Stakeholder Comments / Issues	Proponent Response and/or Resolution	Stakeholder Response
6 Feb 2014	Pastoralist and Miner Agreement.	Old Mt Bunday Station Owner (B Coulter)	Agreement accepted and signed.	Execution of agreement as required.	Acceptable
17 Feb 2013	RRPA MMP 2012-2013 Submission.	DPIR	Documentation unavailable.	Documentation unavailable.	Approved
28 May 2013	Authorisation 0738-01	DPIR	Authorisation granted.	-	Approved
7 February 2014	Authorisation 0738-01 (Variation 1)	DPIR	Authorisation granted.	-	Approved
28 May 2014	RRPA MMP 2013-2014 Submission.	DPIR	Documentation unavailable.	Documentation unavailable.	-
10 Dec 2014	Location of Sacred Sites of Restricted Work Areas.	AAPA	No sites in or around the RRPA.	Not required.	-
21 Jul 2015	RRPA MMP 2014-2015 Submission.	DPIR	Documentation unavailable.	Documentation unavailable.	-
3 Dec 2015	RRPA MMP 2014-2015 Amendment Submission.	DPIR	Documentation unavailable.	Documentation unavailable.	-
22 Mar 2016	Site Inspection	DPIR	Concerns regarding cattle accessing poor quality water, management of declared weeds, overtopping of Toms Gully Pit and rehabilitation of old drill holes.	Water quality assessed against livestock guidelines, only Toms Gully above. Discussed with Pastoralist to keep stock out of area. Ongoing weed spraying undertaken. Sufficient freeboard at Toms Gully Pit. Drill hole list compiled, and rehabilitation status being assessed.	-
24 Jun 2016	RRPA MMP 2015-2016 Submission.	DPIR	Request for additional information and resubmission.	Response provided.	-

Date	Description of Engagement	Stakeholders	Stakeholder Comments / Issues	Proponent Response and/or Resolution	Stakeholder Response
10 Aug 2016	Proposed exploration drilling, future plans for Toms Gully and RRPA evaluation.	Old Mt Bunday Station Owner (T Harrower)	Requested not to use RRPA access bridge for heavy vehicles as repairs required.	Contract pastoralist to undertake water monitoring. Bridge not used as requested.	Acceptable
15 Aug 2016	Livestock access to Toms Gully Oxbow area at Mt Bunday Creek. Water quality at RRPA meets livestock drinking quality.	Old Mt Bunday Station Owner (T Harrower)	Confirmed livestock contained by fencing at Toms Gully and Oxbow area paddock not used as vegetation made stock mustering and management difficult.	Ongoing stock exclusion at Toms Gully.	-
19 Aug 2016	Proposed exploration drilling, future plans for Toms Gully and RRPA evaluation.	McKinlay River Station Owner (P Maley)	Supportive of drilling and projects and no concerns regarding existing mine site areas.	Ongoing communication as project develops.	Acceptable
23 Aug 2016	Proposed exploration drilling.	Old Mt Bunday Station Owner (T Harrower)	Approval letter for drilling provided. Access agreement to be formalised in the longer term.	Formal access agreement to be developed.	Acceptable
29 Aug 2016	Advice on Threatened Species Management.	DLRM (now DENR)	Proposal ok with additional listed management strategies.	Incorporated into MMP Amendment.	-
13 Oct 2016	RRPA MMP 2015-2016 Resubmission.	DPIR	Request for additional security prior to approval.	Security provided.	Approved
7 Dec 2016	Authority Certificate Issued.	AAPA	AAPA Authority Certificate 2016/790 (Doc:201608611).	Not required.	Approved
7 Dec 2016	Application for Variation of Authorisation	DPIR	Documentation unavailable.	Not required.	-

Date	Description of Engagement	Stakeholders	Stakeholder Comments / Issues	Proponent Response and/or Resolution	Stakeholder Response
7 Dec 2016	RRPA MMP 2015-2016 Amendment.	DPIR	Request for additional security prior to approval.	Security provided.	Approved
13 Dec 2016	Concerns regarding vegetation across Toms Gully and near infrastructure.	Old Mt Bunday Station Owner (T Harrower)	Concerns regarding vegetation across Toms Gully and near infrastructure.	Pastoralist contracted to spray vegetation, maintain firebreaks and controlled burning during cooler months.	-
25 January 2017	Authorisation 0738-01 (Variation 2)	DPIR	Authorisation granted.	-	Approved
24 Mar 2017	Introductory meeting regarding project approvals, studies, and development.	McKinlay River Station Owner (R Anictomatis)	Supportive of project. Discussed access of cattle around Quest 29. A fence was erected and no current concerns. Any additional concerns would be raised immediately and directly with Primary Gold.	Commitment to ongoing dialogue.	-
27 Jun 2017	Toms Gully water quality.	Landowner north of Arnhem Highway and downstream of Mt Bunday Creek.	Concerns that gates are rusting due to being downstream of Toms Gully.	Provided details of activities and studies at Toms Gully, Quest 29 and RRPA. No permitted water releases since operations ceased and excess water from evaporation pond pumped to Toms Gully Pit. Contact details provided to discuss any further concerns.	-
28 Jun 2017	Proposed AMD baseline testing (WRL and TSF) and water quality at Toms Gully.	Old Mt Bunday Station Owner (T Harrower)	General discussion on sampling and reasons why it was required.	Ongoing consultation on site AMD conditions and work undertaken.	-

Date	Description of Engagement	Stakeholders	Stakeholder Comments / Issues	Proponent Response and/or Resolution	Stakeholder Response
23 Jul 2017	RRPA MMP 2016/2017 Submission	DPIR	Request for additional information and resubmission.	Response provided.	-
29 Oct 2017	Planned exploration drilling.	McKinlay River Station Owner (R Anictomatis)	Supportive of drilling but requested that it be undertaken after the wet season, gates and fences left how they were found, remove rubbish, no shooting and give prior notice when personnel were accessing the area.	Committed to requests associated with the drill program and not commenced until after wet season.	Acceptable
8 Nov 2017	Details on project progress, intended future work programs and gold find by prospector.	McKinlay River Station Owner (R Anictomatis)	Keep informed of ongoing activities and any issues with the old mining area would be raised if required.	Ongoing communications with information to be provided.	-
9 Nov 2017	Prospector Fossicking, Toms Gully approvals and wet season maintenance requirements, Toms Gully water treatment and disposal options.	Old Mt Bunday Station Owner (T Harrower)	Concerned about unauthorised prospector fossicking. Interested in potential water use but needs to be of a suitable quality.	Keep Pastoralist informed regarding fossicking permits. Water treatment needs to deliver suitable outcomes. Pastoralist to continue water management to prevent overtopping at Toms Gully, Quest 29 and RRPA.	-
30 Nov 2017	Planned exploration drilling.	McKinlay River Station Owner (R Anictomatis)	-	Exploration approval letter provided.	-
15 Dec 2017	Water use for pasture irrigation and mango production.	Old Mt Bunday Station Owner (T Harrower)	Pastoralist interested in using treated water for pasture irrigation and mango production provided it is of suitable quality.	Ongoing discussion as water treatment option is developed.	-
22 Jan 2018	RRPA MMP 2016-2017 Resubmission	DPIR	MMP approved and comments to be addressed in next MMP submission.	Comments addressed in 2018-2019 submission.	Approved

Date	Description of Engagement	Stakeholders	Stakeholder Comments / Issues	Proponent Response and/or Resolution	Stakeholder Response
11 May 2018	Planned exploration drilling.	McKinlay River Station Owners (R Anictomatis and P Maley)	No objections to Primary Gold access to undertake drilling provided gates and fences left how found, rubbish removed, no fires or shooting.	Not required.	Acceptable
14 May 2018	Planned exploration drilling.	Old Mt Bunday Station Owner (T Harrower)	No objections to Primary Gold access to undertake drilling.	Not required.	Acceptable
16 May 2018	Advice on Declared Weed Management	DNER	Proposal ok with additional listed management strategies.	Incorporated into Exploration MMP.	-
6 August 2018	Drilling at TGPA and RRPA	Old Mt Bunday Station Owner (T Harrower)	Can assist with drill pad preparation and ok to drill at TGPA and RRPA.	Will inform 10 days prior to drilling to prepare drill pads.	Acceptable
27 May 2019	RRPA MMP 2018-2019 Submission	DPIR	Request for additional information and resubmission.	Response being prepared.	-

Appendix B Closure Risk Register

Closure Domain	activity	Source	Consequence	Likelihood	Consequence	Risk	Risk	Mitigation & Management	Likelihood	Consequence	Risk	Risk	Level of Certainty	Justification of Certainty and Residual Risk
				C	2	18			C	2	21	Low		
All Domains	Closure and post closure management	Inappropriate management of the decommissioned site, post closure landform.	<p>Direct -Lack of management and controls put in place to prevent unauthorised access to the site by externals (including public, leaseholders and livestock) negatively affecting rehabilitation potential. Loss of visual amenity with degrading landforms. Potential scouring, soil erosion, loss of topsoil and sedimentation resulting in the alteration of water quality on and off site drainage features impacting the downstream receptors.</p> <p>Indirect or Cumulative - Increased disturbance in the wider Mount Bunday locality, resulting in reduced local capacity of water features to perform ecological functions and a cumulative increase in erosion contributing to waterway sedimentation and decreased aquatic ecological functionality.</p>	C	2	18	Moderate	<p>Implement fencing and access restriction to prevent vehicle and livestock accessing rehabilitation areas.</p> <p>Signage on gates with no-unauthorised entry.</p> <p>Key stakeholder engagement Ongoing rehabilitation monitoring/remediation of domain features.</p> <p>Financial provisioning for closure implementation.</p> <p>Post Closure environmental monitoring programmes (land, water, flora and fauna, heritage, weeds and pests)</p> <p>Annual review of management plans a knowledge gaps. Strategy developed and financial provisioning to address knowledge gaps</p>	D	2	21	Low	C2	Other sites in Mount Bunday region currently managed appropriately by PGO.
				C	2	18			D	2	21		C3	
				C	2	18			D	2	21		C4	
				C	2	18			D	2	21		C5	
				C	2	18			D	2	21		C6	
				C	2	18			D	2	21		C7	
All Domains	Waste Rock Management	Lack of or incorrect (physical and chemical) rehabilitation capping and cover materials leading to unsuccessful site rehabilitation .	<p>Direct - Completion criteria and environmental outcomes unable to be met. Contamination of surface water, sediment, and groundwater quality and associated ecosystems. Potential soil erosion with loss of topsoil and sedimentation on and offsite though both water and wind erosive forces).</p> <p>Indirect - Erosion of exposed cover surface leads to destabilised surfaces and exposure of capping materials resulting in transportation of contaminated sediments on and offsite via surface water and wind erosive forces to the Mary River and Adelaide River catchments.</p>	B	3	9	High	<p>Development and implementation of a waste geochemical block model.</p> <p>Financial provisioning for closure implementation.</p> <p>Final closure design to account for rehabilitation potential.</p> <p>Calculation of material requirements and identification of extraction areas.</p> <p>Daily monitoring of waste rock handling and tailings disposal.</p> <p>Tailings and Waste Rock will be managed in accordance with the Tailings Management Plan.</p> <p>Regular surveys to measure the tailings and waste rock deposition and water depths</p> <p>Groundwater / surface water quality monitoring.</p> <p>Implementation of AMDMP.</p> <p>Temporary and/or final capping of the waste rock and tailings to reduce ongoing water infiltration and seepage</p> <p>Rehabilitation trials to determine effective methods rehabilitation monitoring.</p> <p>Construction of final profile prior to onset of wet season rainfall events (no later than September)</p> <p>Rehabilitation management plan - seeding to commence in December/January to maximise germination.</p> <p>Selected native plant species to be confirmed during rehabilitation trials and seed selection to be representative of local species.</p> <p>Planning and allocation of appropriate rehabilitation media (topsoil and organic matter).</p> <p>Establishment of a fire regime that promotes native vegetation.</p> <p>Implement active weed control.</p>	D	2	21	Low	C2	Moderate level of certainty as the site contains soils that are dispersive and are susceptible to erosion where using for construction of onsite infrastructure. Implement management of rehabilitation resources as part of mine scheduling. Volumes of tailings and waste rock and the material estimates for capping have been produced and included in the Project Description. Based on these there is confidence that sufficient material is available.
				B	3	9			D	2	21		C2	
				B	3	9			D	2	21		C2	
All Domains	Hydrological engineering for closure	Re-created creeks and drainage alignments do not conform to the surrounding drainage features and catchment area.	<p>Direct - Diversion of existing runoff pathways including overland flow within drainage lines. Resulting in scouring and incision causing altered flow paths leading to loss of topsoil, sedimentation of waterways and altered upper-catchment hydrological regime. This would adversely affect the biological processes that depend on water quality.</p> <p>Indirect or Cumulative - Increased disturbance and lost productivity of surface water features in the wider Mount Bunday locality. Resulting in reduced local capacity of surface water features to perform ecological functions and a cumulative increase in erosion contributing to waterway sedimentation.</p>	C	3	13	High	<p>Planning domain land form design and drainage control structures conform to local and catchment drainage patterns and extreme rainfall events</p> <p>Implementation of the ESCP addressing post closure drainage</p> <p>Progressively rehabilitating the mine.</p> <p>Clearing and Topsoil Procedures Implementation of Mine Closure</p>	E	2	23	Low	C3	Progressive rehabilitation will assist the site being established for closure prior to decommissioning. Implement closure planning into mine plan.
				C	3	13			E	2	23		C3	
All Domains	waste management	Inadequate clean-up of wastes	<p>Direct - Contamination of surface water and groundwater in the area proximal to the domestic waste receptacle where inappropriate storage vessels and management is used. Fauna interaction and entrapment leading to injury/death.</p> <p>Indirect and/or cumulative- Visual amenity of wind blown rubbish, rubbish mishandling and illegal dumping.</p>	C	2	18	Moderate	<p>All staff are informed of waste management procedures for decommissioning and closure</p> <p>Ensure all mine domain areas have suitable domestic and hydrocarbon waste rubbish bins</p> <p>Decommissioning, inspections and Mine Manager sign off contractor areas pre and post decommissioning to ensure all hazardous and general wastes and recycling are appropriately managed in accordance with the waste management plan.</p> <p>Burial of landfill (non-contaminating) waste is managed to ensure no hazardous materials are disposed during decommissioning.</p> <p>All hazardous wastes removed from site by a licensed waste contractor/agent working on behalf of waste contractor to an approved hazardous waste facility.</p> <p>Segregation of wastes and recycling of wastes where possible.</p>	D	1	24	Low	C3	<p>Low probability as inert rubbish continually managed and areas of waste will be small/contained.</p> <p>Waste area for the accommodation camp will be impervious.</p> <p>Standard lining and capping will be employed for the small site landfill.</p>
				C	2	18			D	1	24		C3	
				B	2	18			D	1	24		C3	

Closure Domain	activity	Source	Consequence	Likelihood	Consequence	Risk	Risk	Mitigation & Management	Likelihood	Consequence	Risk	Risk	Level of Certainty	Justification of Certainty and Residual Risk
All Domains	Fire Management	Use of project machinery, equipment, vehicles and activities causing fire through sparks or heat ignition source.	Direct - Vegetation loss and damage to topsoil composition and vegetation binding soils. Wildfires leading to extensive vegetation loss and damage/destroy assets on and site. Human safety. Threat to riparian areas. Lack of vegetation covers causing potential for soil erosion. Indirect or Cumulative - Sedimentation to waterways as a result of vegetation loss.	C	3	13	High	Liaise with Bushfires NT regarding regional (and site) fire break Establish hot work procedures Vehicles not to park on vegetation areas (to prevent hot engines causing wildfire). Regular inspections of generators and other sources of heat/power. Fire extinguishers available around site and on all vehicles and machinery. Training and inductions include Emergency Response Plan. Establish and implement routine hazard reduction burns for area in the MLs.	D	2	21	Low	C3	Moderate. Based on similar conditions. Adherence to the hot Works procedures and implementation of the Fire Management Plan are standard arrangements for preventing fires.
All Domains	Dust Management	Dust generation from closure activities such as vehicular movements and earthworks.	Direct - Dust emissions impact upon local and nearby water and vegetation features. Loss of productive topsoil inhibiting growth potential of retained media. Characteristics of water, including chemical, physical, biological and aesthetic qualities are degraded by dust emission, resulting in less productive water ecosystems and potential impacts. Indirect or Cumulative - Potential cumulative dust lift-off and deposition in the wider area in conjunction with these activities including agricultural, horticultural, mining/extractive activities in the region. Potential increase concentration of sediments in the	B	1	19	Moderate	Implementation of air quality MP (incorporating fire and dust management measures). Use of water cart during earth moving activities and haulage, Ground Disturbance Permit (GDP) procedure to be adhered to. Implementation of Dust Management Plan. Progressive rehabilitation.	C	1	22	Low	C3	Controls are industry standards and easily implemented. All mining sites implement such controls.
	B			1	19	C			1	22				
	B			1	19	C			1	22				
All Domains	weed management	Introduction of new declared weeds and spread of existing weeds and their densities.	Direct - Impact of reduced ability for successful revegetation due to weed spread via surface water flows. Impact on native vegetation and particularly around riparian zones and wetlands. Increased fire risk. Reduced foraging and nesting grounds for fauna. Indirect or Cumulative - Increased weed species in the area negatively affecting rehabilitation potential and contributing to rehabilitation failure. Failure to establish appropriate capping and native vegetation. Post Mine Land Use (PMLU) cannot be achieved due to unsuccessful rehabilitation process (e.g. vegetation establishment, weed infestation etc).	B	3	9	High	> Annual weed mapping (by June each year) to understand nature of the spread of weeds and plan weed control activities accordingly. > Conduct seasonal weed control activities in consultation and collaboration with local pastoral lease holders as necessary and in accordance with the site Weed Action Plan (grazing control as option). > Implementation of the Biodiversity MP and Weed MP. > Weed hygiene procedures - including inspection and wash down of all vehicles and machinery entering site. > Establish and implement appropriate control fire regime for area in the MLs with highest priority for human safety and asset protection. > Construction material required for site will be inspected prior to entry to site (e.g. any fill material). > No unauthorised plant or vegetative material to be brought to site.	C	1	22	Low	C3	Certainty high of weed control as mitigation measures have been used successfully for weed management in other owned site in the Mount Bunday area.
				B	3	9			C	1	22			
All Domains	Revegetation Management	Inability to establish native vegetation either by local provenance species/local species with resultant cover comparable to nearby areas	Direct - Completion criteria and environmental outcomes unable to be met. Potential soil erosion, loss of topsoil and sedimentation (through both water and wind erosive forces). Characteristics of soils, including chemical, physical, biological and aesthetic qualities are degraded in the vegetation clearing area. Resulting in less productive soils and potential impacts (through the abovementioned erosion) on adjacent land. Indirect or Cumulative - Increased disturbance and lost productivity of soils in the wider Mount Bunday locality resulting in reduced local capacity of soils to perform ecological functions and a cumulative increase in erosion contributing to dust and waterway sedimentation	C	3	13	High	Financial provisioning for closure implementation Rehabilitation trials to determine effective methods Rehabilitation monitoring. Final closure design to account for rehabilitation potential Seed selection to be representative of local species Planning and allocation of appropriate rehabilitation media (topsoil and organic matter) Establishment of a fire regime that promotes native vegetation Implement active weed control Implement fencing/barricades and signage and access restriction to prevent livestock accessing rehabilitation areas. Topsoil stockpiling	D	2	21	Low	C3	Effective use of topsoil and growth mediums.
				C	3	13			D	2	21			
				C	3	13			D	2	21			
All Domains	Waste Rock Management	Indiscriminate use of existing waste rock for closure. Storage of waste rock outside of pit footprint for too long.	Direct -Contamination of soil surfaces, surface water, sediment, and groundwater quality and associated ecosystems. Increased quantity of AMD to manage than expected. Indirect or Cumulative - Aquatic ecosystems affected by AMD. Increased disturbance to soil resulting in lack of vegetative growth resulting in erosion and sedimentation to Mary River and Adelaide River catchments.	C	3	13	High	Development and implementation of a geochemical block model Tracking of the waste rock and dumping locations Waste rock dump plan ESCP to prevent mobilisation Hydrological studies to ensure WRDs are outside flood affected areas Maximisation of placement within pits Testing of waste rock for AMD, heavy metals and radioactivity prior to use as on or offsite construction material Groundwater / surface water quality monitoring Implementation of AMDMP and WMP	D	2	21	Low	C2	Implement closure planning into mine plan. Implement management of rehabilitation resources as part of mine scheduling.
				C	3	13			D	2	21			
				C	3	13			D	2	21			
Whole of Project	Aboriginal Heritage	Disturbance of sites/objects of heritage significance heritage items or places and sacred sites.	Direct - Damage, destruction or removal of an unknown heritage item, place or sacred site.	D	4	12	High	Survey over the Project area with the AAPA regarding Aboriginal Sacred Sites. Undertake consultation with the NTG Heritage Branch with regards to potential heritage sites in the area. Cultural Heritage Management Plan and Chance/Find procedure Adherence to ground disturbance/clearing procedures.	E	2	23	Low	C3	High certainty. Based on database searches, and AAPA certificate.
	Environmental Management systems and	Ineffective implementation of site environmental management system, plans and procedures.	Direct - Regulatory commitments for closure not checked for compliance. Poor or lack of detailed environmental monitoring data, lack of interpretation of data trends and reporting/ action to meet compliance. Incident response and reporting ineffectively managed and at risk of corporate negligence. Lack of	C	4	8	High	Corporate commitment to EMS implementation via policy Environmental Management System and various management plans (EMP, WMP, MMP etc.). All events/incidents to be reported and managed through to resolution via event/incident reporting procedures. All personnel will be inducted into the area and informed of the hazards and relevant	D	2	21	Low	C3	Moderate. Based on similar conditions. Closure activities will be undertaken according to relevant management
				C	4	8			D	2	21			

Closure Domain	activity	Source	Consequence	Likelihood	Consequence	Risk	Risk	Mitigation & Management	Likelihood	Consequence	Risk	Risk	Level of Certainty	Justification of Certainty and Residual Risk
				C	4	8			C	2	21	Low		
Whole of Project			environmental management guidance to management and corporate. key stakeholder concerns not addressed. Staff and contractors not trained/educated in environmental awareness and procedures. Indirect or Cumulative - Rehabilitation success is affected by inappropriate operational procedures which results in decreased likelihood of achieving rehabilitation goals and closure requirements following decommissioning. Agreed Post Mine Land Use (PMLU) cannot be achieved .	C	4	8	Extreme	management protocols of the areas.	D	2	21	Low	C3	plans and appropriate procedures. Environmental Management Plan structures and inclusive are well established.
				C	4	8								
				C	4	8								
				C	4	8								
Whole of Project	Fauna Management	Vehicle/machinery for closure interaction with threatened fauna	Direct - Loss of life or injury to threatened fauna species. Indirect and Cumulative - Potential increase in cumulative impact on fauna in conjunction with other agricultural, horticultural, mining/extractive activities in the region.	C	2	18	Moderate	Vehicles to remain on designated tracks. Speed limit to be implemented across the Project area. Inductions/regularly internal notices to include information regarding fauna species detections onsite. Vehicles to drive to conditions (e.g. dawn and dusk).	D	2	21	Low	C3	High certainty that project will not greatly effect threatened species in the localised area. Driving behaviour enforced.
Whole of Project	Social Management and Human Resources	Reduction in workers at early/temporary/final closure affecting the local community economy.	Direct - Loss of job opportunities and unemployment. Decrease in demand for accommodation, increase in rentals, housing deflation and increased vacancy impacting the local community. Indirect and Cumulative - Potential cumulative economic and social impact to nearby mines and quarries.	C	3	13	High	Recruit locally for closure activities and within existing labour pool. Re-skilling potential (i.e. environmental, maintenance) for decommissioning and closure phase Support employee transfer to other nearby mines and quarries, horticultural and agricultural activities Maintain the camp for decommissioning and closure. Maintain complaints and feedback register. Maintain stakeholder engagement.	D	2	21	Low	C3	High certainty. Based on data. Administrative Controls.
Whole of Project	Key stakeholder Management	Stakeholder expectations at closure not met	Direct - Delays in relinquishment of the site, increased closure costs. Indirect or Cumulative - Impact on closure criteria not being met	C	3	13	High	Maintain effective complaints and feedback register. Completion criteria and post-mining land uses developed in conjunction with relevant stakeholders. Maintain effective stakeholder engagement plan and ensure concerns are addressed. Maintain effective Corporate Governance throughout all of PGO . Provide appropriate resources for regulatory reporting and on ground management and staff support. Monitoring rehabilitation success and implementing corrective actions where necessary to ensure completion criteria and objectives are met.	D	2	21	Low	C2	Moderate. Corporate Governance managed at CEO level
Whole of Project	Water Management	Poor water quality released from closed site during wet season (stormwater)	Direct - Primary contaminants of concern in wet season stormwater release is acidity and sediment, thus resulting in increased turbidity of waterways. This could result in poor quality drinking water for fauna and sedimentation of riparian environments for which terrestrial fauna inhabit. Habitat modification and/or lifecycle disruption and/or impact on the size of a population (flora and/or terrestrial fauna). Depending on geochemistry of the waste rock material to be exposed in the new pits and the placement on site, runoff may also contain heavy metals and NORMS. These would have direct terrestrial fauna health implications should this water be ingested. Indirect or Cumulative - Decrease in fish populations and species richness resulting in decreased suitability of the environment for	C	3	13	High	Compliance with a Waste Discharge Licence, if required. Implementation of Acid Mine Drainage Management Plan and Water Management Plan. All operational water storage dams/basins to be decommissioned and rehabilitated at closure Current water balance including survey of pit heights and contingency planning in the event of an overtop TSF and WRD seepage management Groundwater / surface water quality monitoring Fish surveys, macro invertebrate and sediment sampling	D	2	21	Low	C3	Highly unlikely as PGO are effectively managing water at other Mount Bunday sites.
				C	3	13								
				C	3	13								
Whole of Project	Disaster Management	Unexpected early/temporary closure i.e. inadequate funds, catastrophic weather event, low grade recovery, drop in gold price	Direct - Site not rehabilitated to required standards/incomplete and unstable and potentially polluting affecting onsite and downstream receptors. Site safety posing a hazard to externals (including public, leaseholders and livestock), visual amenity of the area not meeting desired completion criteria. Public perception and key stakeholders concerns not met. Indirect or Cumulative - Impact on local services and employment.	C	4	8	Extreme	Target Opex costs in lower quartile of Australian production costs combined with a forward gold price hedging strategy. Target Opex costs in lower quartile of Australian production costs. Consider FX hedge. Implement the site decommissioning plan/detailed closure plan/detailed rehabilitation plan/detailed care and maintenance plan/disaster management plan All mine areas made safe, signage put in place and bunding/barricading to prevent unauthorised entry. Early planning and financial provision for closure works. Infrastructure design to withstand extreme events. Ongoing management of levels in water infrastructure and site drainage controls. Progressive rehabilitation of disused disturbed areas .	C	2	18	Moderate	C2	Moderate. Corporate Governance managed at CEO level. Financial management controls. Site operated to accommodate natural disasters.
				C	4	8								
				C	4	8								
				C	4	8								
				C	4	8								
				C	4	8								

Closure Domain	activity	Source	Consequence	Likelihood	Consequence	Risk	Risk	Mitigation & Management	Likelihood	Consequence	Risk	Risk	Level of Certainty	Justification of Certainty and Residual Risk
				C	2	18			C	1	24	Low		
D5 -Support Infrastructure, D4 Processing Infrastructure	Waste Management	Disposal of hazardous and chemical waste/containers to RR landfill resulting in toxic leachate escaping RR landfill	<p>Direct - Leachate contamination in the area proximal to the landfill affecting soil, surface water and groundwater chemical, physical, biological and aesthetic qualities. Adversely affecting the aquatic biodiversity if the contaminants reach drainage lines and leading to decreased aquatic ecological functioning of the surrounding water features.</p> <p>Indirect or Cumulative - Adversely affecting the aquatic biodiversity if the contaminants reach drainage lines and leading to decreased aquatic ecological functioning of the surrounding water features.</p>	C	2	18	Moderate	<p>All staff and informed of waste management procedures for decommissioning and closure. Manage disposal of wastes in accordance with the Project EMP (including banded waste oil bins). Hydrocarbon and hazardous materials removed from site by a licensed waste contractor. Spill kits available around site and spill clean-up procedures implemented. Decommissioning, inspections and Mine Manager sign off of contractor areas pre and post decommissioning to ensure all hazardous and general wastes and recycling are appropriately managed in accordance with the waste management plan. Burial of landfill (non-contaminating) waste is managed to ensure no hazardous materials as deposited during decommissioning. Ground and surface water monitoring throughout LOM.</p>	D	1	24	Low	C3	<p>Low probability of occurrence rubbish continually managed. Standard lining and capping will be employed for the small site landfill.</p>
				C	2	18								
				C	2	18								
				C	2	18								
				C	2	18								
				C	2	18								
D5 -Support Infrastructure, D4 Processing Infrastructure	Waste Management	Un-remediated contaminated soils from the bulk fuel storage area, process plant chemical stores, workshop, camp area, landfill, explosives magazine	<p>Direct - Contamination of surface and groundwater, sediment, soil in the area proximal to unremediated contaminated soils. Alteration of soil characteristics, including chemical, physical, biological and aesthetic qualities locally. Moderate impact to the aquatic ecosystem if the contaminants reach water features leading to decrease of aquatic ecological functioning.</p> <p>Indirect or Cumulative - Moderate impact to the aquatic ecosystem if the contaminants reach water features leading to decrease of aquatic ecological functioning.</p>	C	2	18	Moderate	<p>Design, storage and handling of hazardous materials to Australian Standards and regulations. Specific adherence of the ANFO stored to Dangerous Goods Act 1998 and the NT Work Health and Safety (National Uniform Legislation) Act 2011 Cyanide and chemical handling and clean-up will be aligned to the Commonwealth of Australia Leading Practice Handbook for Sustainable Mining - Cyanide Management (2008) and relevant MSDS. Regular maintenance and inspections of storage facilities during closure as detailed in the Waste MP to minimise clean-up. As areas decommissioned site contamination assessment to validate and clear area of contaminants. Determine suitable location (preferred in pit) for a remediation pad for hydrocarbon contaminated soil to be remediated throughout LOM. Landfill will be buried and capped to prevent production and spread of leachate into the environment. Emergency Response Plan Weekly inspections of storage areas during decommissioning and closure Spill kits remain available for closure around the site and procedures and training for the cleaning up of hazardous spills Monitoring and Inspections, decommissioning, closure, post closure Ground and surface water monitoring throughout LOM</p>	D	1	24	Low	C3	<p>Highly unlikely for major spill as well tested industry standards used.</p> <p>While minor spills that are easily contained and cleaned are possible, there is high certainty that large spills highly unlikely. Based on other mining closure. Weekly inspections will ensure any minor leaks or spills are contained and cleaned up preventing larger spills.</p> <p>Further, the location of chemical storage reduces the likelihood of these receiving at drainage lines and thus impacting the hydrological regime.</p>
				C	2	18								
				C	2	18								
				C	2	18								
				C	2	18								
				C	2	18								
D5 -Support Infrastructure	Waste Management	Remaining Infrastructure and waste, footings, steel, pipework, strewn litter left at Closure.	Direct - Remaining Infrastructure and waste, footings, steel, pipework, strewn litter become an entrapment to fauna and stock with the risk of injury/ or death.	C	2	18	moderate	Decommissioning, inspections and Mine Manager sign off contractor areas pre and post decommissioning to ensure all hazardous and general wastes and recycling are appropriately managed in accordance with the waste management plan. All above ground and below ground infrastructure to be removed and disturbed area	D	2	21	low	C3	Progressive rehabilitation is likely to result in significant areas of the site have highly established vegetation by closure.
D2-Tailing Storage Impoundment	Tailings Dam Management	Overtopping, embankment failure from the new TSF leading to uncontrolled release of tailings material to surrounding environment	<p>Direct -Impact to beneficial uses downstream to the Mary River and Adelaide River catchments and contamination of surface water, sediment, and groundwater quality and associated aquatic and terrestrial ecosystems on and offsite.</p> <p>Indirect -Potential transportation of contaminated sediments and material throughout the Project area and offsite. Biological and human health implications (primary contaminant of concern being cyanide). Groundwater pathways contributing to environmental contaminants mobilised in the surrounding environment. Potential for bioaccumulation of excessive contaminants within native fauna (heavy metals) and risks of consumption of fish.</p>	C	4	8	Extreme	<p>TSF to be planned, designed, constructed and operated in accordance the guideline Tailings Management: Leading Practice Sustainable Development Program for the Mining Industry (DFAT 2016) Design TSF for storm events up to and greater than the required design criteria An operational emergency spillway to be constructed as part of each embankment raise Development of Monitoring Plan / Operational Manual which includes weekly inspections of the TSF, survey pins to monitor the embankment and piezometers to measure pore water pressure Tailings performance monitoring (e.g. TSF water volume, collection efficiency of underground system) Install seepage control and underground drainage including a cut-off trench, compact soil liner, basin underdrainage collection system, underdrain collection sump and embankment tow drain Groundwater and surface water monitoring to check quality and any seepage Implementation of AMDMP and Water Management Plan (WMP) Manage the site water balance to reduce build-up of water</p>	D	3	17	Moderate	C3	<p>High certainty that overtopping will not occur based on strict engineering designs and control strategies and use of open pit as contingency. High certainty that walls will not fail based on using leading industry practice and regular monitoring.</p>
				C	4	8								
				C	4	8								
				C	4	8								
				C	4	8								
				C	3	13	High	Develop Care and maintenance plan and implemented in the event of early closure focusing on site safety, stable and non-polluting domains.	D	2	21	Low	C3	
		Overtopping, embankment failure or seepage from the process water storage leading to uncontrolled release of process water to surrounding environment.	<p>Direct -Impact to beneficial uses downstream to the Mary River and Adelaide River catchments and contamination of surface water, sediment, and groundwater quality and associated aquatic and terrestrial ecosystems on and offsite.</p> <p>Indirect/Cumulative -Potential transportation of contaminated sediments and bioaccumulation of excessive contaminants in</p>	C	4	8	Extreme	<p>Installation of the process water storage facility within the footprint of the TSF to contain any potential for uncontrolled AMD releases Development of Monitoring Plan / Operational Manual which includes weekly inspections of the process water dams Groundwater and surface water monitoring to check quality and any seepage Implementation of AMDMP and WMP</p>	D	3	17	Low	C3	<p>High certainty that overtopping and seepage will not occur based on strict engineering designs and control strategies and use of open pit as contingency.</p>
				C	4	8								

Closure Domain	activity	Source	Consequence	Likelihood	Consequence	Risk	Risk	Mitigation & Management	Likelihood	Consequence	Risk	Risk	Level of Certainty	Justification of Certainty and Residual Risk
				C	4	8			C	3	13	High		
D2-Tailing Storage Impoundment	TSF Management/Water management		aquatic fauna to the Mary River and Adelaide River catchments. Biological and human health implications (primary contaminant of concern being cyanide). Groundwater pathways contributing to environmental contaminants mobilised in the surrounding environment.	C	4	8	Extreme	Manage the site water balance to reduce any build-up of water Storage and management of cyanide in accordance with the Commonwealth of Australia Leading Practice Handbook for Sustainable Mining - Cyanide Management (2008) Design TSF for storm events up to and greater than the required design criteria An operational emergency spillway to be constructed as part of each embankment raise to prevent embankment overtopping	D	3	17	Moderate	C3	
				C	4	8			D	3	17			
				C	4	8			D	3	17			
				C	3	13	High		D	2	21	Low	C3	
D2-Tailing Storage Impoundment	Rehabilitation Management Plan/ Waste Rock Management	Lack of or incorrect (physical and chemical) rehabilitation capping and cover materials leading to unsuccessful site rehabilitation and inadequate tailings closure.	Direct - Completion criteria and environmental outcomes unable to be met. Potential soil erosion with loss of topsoil and sedimentation on and offsite though both water and wind erosive forces). Indirect - Erosion of exposed TSF cover surface leads to destabilised surfaces and exposure of capping materials or tailings resulting in transportation of contaminated sediments on and offsite via surface water and wind erosive forces to the Mary River and Adelaide River catchments.	B	3	9	High	Development and implementation of a waste geochemical block model. Financial provisioning for closure implementation. Final closure design to account for rehabilitation potential. Calculation of material requirements and identification of extraction areas. Daily monitoring of waste rock handling and tailings disposal. Tailings and Waste Rock will be managed in accordance with the Tailings Management Plan. Regular surveys to measure the tailings and waste rock deposition and water depths Groundwater / surface water quality monitoring. Implementation of AMDMP. Temporary and/or final capping of the waste rock and tailings to reduce ongoing water infiltration and seepage Rehabilitation trials to determine effective methods rehabilitation monitoring. Construction of final profile prior to onset of wet season rainfall events (no later than September) Rehabilitation management plan - seeding to commence in December/January to maximise germination. Selected native plant species to be confirmed during rehabilitation trials and seed selection to be representative of local species. Planning and allocation of appropriate rehabilitation media (topsoil and organic matter)	D	2	21	Low	C2	Moderate level of certainty as the site contains soils that are dispersive and are susceptible to erosion where using for construction of onsite infrastructure. Implement management of rehabilitation resources as part of mine scheduling. Volumes of tailings and waste rock and the material estimates for capping have been produced and included in the Project Description. Based on these there is confidence that sufficient material is available.
				B	3	9			D	2	21			
				B	3	9			D	2	21			
D2-Tailing Storage Impoundment	TSF Management/Water Management	TSF embankment - geotechnically unstable resulting in landform instability, slumping and erosion	Direct - Geotechnical movement of soil or rock material from TSF embankments contributing to exposed surface and erosions, lack of vegetation, loss of topsoils, inability to re-establish vegetation. Indirect - Erosion of exposed TSF cover surface leads to destabilised surfaces and exposure of capping materials or tailings resulting in transportation of contaminated sediments on and offsite via surface water and wind erosive forces to the Mary River and Adelaide River catchments.	B	3	9	High	Implementation of Rehabilitation Management Plan Implementation of Erosion and Sediment Control Plan (ESCP) Adopted downstream slope profile to manage for erosion and drainage control of 3H:1V with 5 m benches at 10m intervals Compact soil liner over the TSF basin will improve geotechnical stability of the embankments. Suitable cover material to be stockpiled (main pit oxide material) Assess alternative erosion control engineered controls i.e. rip rap. Construction of final profile prior to onset of wet season rainfall events (no later than September) Rehabilitation management plan - seeding to commence in December/January to maximise germination. Selected native plant species to be confirmed during rehabilitation trials	D	3	17	Moderate	C3	High level of certainty that TSF embankment is stable based on strict engineering designs and control strategies
				B	3	9			D	3	17			
				B	3	9			D	3	17			
D2-Tailing Storage Impoundment	Tailings Management/Land and Soil Management	Uneven tailings consolidation at closure resulting landform instability and surface erosion	Direct -Landform instability on TSF surfaces leads to surface erosion and surface water infiltration. Loss of topsoils, inability to re-establish vegetation. Indirect or Cumulative - Potential indirect ground or landform instability beyond the initial failure area (unlikely to be widespread).	D	4	12	High	Develop a final TSF closure report at completion of operations to demonstrate how long-term closure objectives will be achieved based on the final status of the TSF and a engineering status report for decommissioning and rehabilitation, conducted by a suitably qualified person to assist in planning for closure. Report and Closure Plan to be submitted to DIT. Monitoring of pore pressure build up from rapid loading using piezometers and monitoring bearing strength of tailings Monitoring of tailings during cover placement to confirm shear strength of tailings (pore pressure) Detailed design and quality assurance/control of TSF, WRD and pit wall designs Geotechnical studies and assessment to ensure structural stability Engineering design to ANCOLD standard - Detailed design and quality assurance/control of TSF Quarterly inspections at closure to check sufficient pit void freeboard and structural integrity against post closure criteria Geotechnical inspections of pit walls, TSF embankment, throughout LOM.	E	2	23	Low	C3	High certainty that TSF operations and monitoring controls and closure plan is adequate to address the risk.
				D	4	12			E	2	23			
D2-Tailing Storage Impoundment	TSF Management/Site Security	Ineffective site security and barriers to prevent unauthorised access (public and livestock) to backfilled TSF rehabilitated areas.	Direct - Lack of management and controls put in place to prevent unauthorised access to TSF surface (including public, leaseholders and livestock) resulting in unsuccessful rehabilitation and risks of injury or death causing risk of injury or death. Indirect or Cumulative - Increased unauthorised accessed via word-or-mouth, resulting in increased threatened to the safety and health of externals (including public, leaseholders and livestock) causing risk of injury or death.	C	4	8	Extreme	Implement fencing/barricades and signage and access restriction to prevent vehicle and livestock accessing rehabilitation areas. Remove access roads on the TSF surface if not required for post closure monitoring Engineered design and earthworks of TSF for closure, earthwork to a stable angle and support. Landforms geotechnical and safety inspections through LOM. Ongoing monitoring and remediation throughout closure.	C	3	13	High	C3	Progressive rehabilitation is likely to result in significant areas of the site have highly established vegetation by closure. Appropriate rehabilitation is being completed on numerous sites throughout the NT (ERA, South 32) and is expected to be highly achievable in the project setting.

Closure Domain	activity	Source	Consequence	Likelihood	Consequence	Risk	Risk	Mitigation & Management	Likelihood	Consequence	Risk	Risk	Level of Certainty	Justification of Certainty and Residual Risk
				B	3	9			C	2	18	Moderate		
D1-Waste Rock Dumps	WRD Management	WRD construction - poor waste material handling, segregation, placement and compaction allowing for surface and ground water infiltration.	<p>Direct - Release of (AMD, heavy metals and NORMS) and impact to beneficial uses locally downstream to the Mary River and Adelaide River catchments and contamination of surface water, sediment, and groundwater quality and associated aquatic and terrestrial ecosystems on and offsite.</p> <p>Indirect or Cumulative - Biological and human health implications (AMD, heavy metals and NORMS). Groundwater pathways contributing to environmental contaminants mobilised in the surrounding environment.</p>	B	3	9	High	<p>Ongoing waste rock characterisation and site inspections by suitably qualified spotters to confirm material geochemistry (PAF, NAF, metals/metalloids).</p> <p>WRD foundation to be constructed from low permeability oxide material</p> <p>Material classified as NAF will be placed at the outer annulus of the WRD</p> <p>NAF material with sufficient ANC will be placed on the natural surface, lining the drainage lines</p> <p>Temporary and/or final cover systems over waste rock will be designed to limit infiltration to the extent needed based on the propensity for the material to generate AMD</p> <p>PAF material will be encapsulated with the central areas of the dump, not near the outer slopes or toe areas and covered with NAF waste material from the outer perimeter</p> <p>Hydrological studies to ensure WRDs are outside flood affected areas</p> <p>Development of Monitoring Plan / Operational Manual which includes weekly inspections and maintenance of bunds and run-on/runoff control structures associated with WRDs</p> <p>Groundwater / surface water quality monitoring</p> <p>Implementation of AMDMP</p>	C	2	18	Moderate	C3	High certainty that the seepage and runoff can be contained and treated based on the water balance model.
				B	3	9			C	2	18			
				B	3	9			C	2	18			
				B	3	9			C	2	18			
				B	3	9			C	2	18			
				B	3	9			C	2	18			
D1-Waste Rock Dumps	WRD Management/Land Soil Management	WRD Construction – unstable batter angle causing geotechnical movement instability resulting in failure (instability, slumping and erosion)	<p>Direct - Geotechnical movement of soil or rock material from WRD contributing to exposed surface and erosion and exposure of capping materials resulting in transportation of contaminated sediments on and offsite via surface water and wind erosive forces to the Mary River and Adelaide River catchments. Lack of vegetation, loss of topsoils, inability to re-establish vegetation. Alteration of the hydrological regime from increased sediment loads that causes destruction to ecological functions in waterways.</p> <p>Indirect or Cumulative - Contribution to exposed ground in the project area and general locality. Diminished complexity and biological integrity of project area and located soils. Potential indirect structure stability issues.</p>	B	3	9	High	<p>Ongoing waste rock characterisation to confirm material geochemistry (PAF, NAF, metals/metalloids).</p> <p>WRD landform design geotechnical stability and water shedding for all surface WRDs will have a maximum of 17-degree slope (approximately 3:1 horizontal to vertical).</p> <p>WRD foundation to be constructed from low permeability oxide material</p> <p>Hydrological studies to ensure WRDs are outside flood affected areas</p> <p>Waste rock dump plan</p> <p>Implementation of Rehabilitation Management Plan</p> <p>Implementation of Erosion and Sediment Control Plan (ESCP)</p> <p>Adopted downstream slope profile to manage for erosion and drainage control of 3H:1V with 5 m benches at 10m intervals</p> <p>Compact soil liner over the TSF basin will improve geotechnical stability of the embankments.</p> <p>Suitable cover material to be stockpiled (main pit oxide material)</p> <p>Assess alternative erosion control engineered controls i.e. rip rap.</p> <p>Construction of final profile prior to onset of wet season rainfall events (no later than September)</p>	C	2	18	Moderate	C2	Moderate level of certainty as the site contains soils that are dispersive and are susceptible to erosion where using for construction of onsite infrastructure.
				B	3	9			C	2	18			
				B	3	9			C	2	18			
D1-Waste Rock Dumps	WRD Management/Rehabilitation Management	Lack of/or incorrect (physical and chemical) capping and cover materials, resulting in unsuccessful site rehabilitation and inadequate WRD closure.	<p>Direct - Completion criteria and environmental outcomes unable to be met. Potential soil erosion with loss of topsoil and sedimentation on and offsite though both water and wind erosive forces.</p> <p>Indirect - Erosion of exposed WRD surface leads to destabilised surfaces and exposure of capping materials or waste rock resulting in transportation of contaminated sediments on and offsite via surface water and wind erosive forces to the Mary River and Adelaide River catchments.</p>	B	3	9	High	<p>Development and implementation of a waste geochemical block model.</p> <p>Financial provisioning for closure implementation</p> <p>Final closure design to account for rehabilitation potential.</p> <p>Calculation of material requirements and identification of extraction areas and confirm final depth of capping and cover requirements</p> <p>Daily monitoring of waste rock handling</p> <p>Operational Manual (including inspections)</p> <p>Ongoing waste rock characterisation to confirm material classified as NAF of low permeability and to be placed at the outer annulus of the WRD</p> <p>Placement of NAF material with sufficient ANC will be placed on the natural surface, lining the drainage lines</p> <p>Temporary and/or final cover systems over waste rock will be designed to limit infiltration to the extent needed based on the propensity for the material to generate AMD</p> <p>PAF material will be encapsulated with the central areas of the dump, not near the outer slopes or toe areas and covered with NAF waste material from the outer perimeter</p> <p>Construction of final profile prior to onset of wet season rainfall events (no later than September)</p> <p>Rehabilitation trials to determine effective methods rehabilitation monitoring.</p> <p>Rehabilitation management plan - seeding to commence in December/January to maximise germination.</p> <p>Selected native plant species to be confirmed during rehabilitation trials.</p> <p>Planning and allocation of appropriate rehabilitation media (topsoil and organic matter).</p> <p>Establishment of a fire regime that promotes native vegetation.</p> <p>Implement active weed control.</p>	D	2	21	Low	C2	Moderate level of certainty as the site contains soils that are dispersive and are susceptible to erosion where using for construction of onsite infrastructure. Implement management of rehabilitation resources as part of mine scheduling. Volumes of waste rock and the material estimates for capping have been produced and included in the Project Description. Based on these there is confidence that sufficient material is available.
				B	3	9			D	2	21			
				B	3	9			D	2	21			
D1-Waste Rock	WRD Management/Rehab	Unexpected early closure leading to incomplete rehabilitation or unsafe WRD landform' s	<p>Direct - Lack of management and controls put in place to prevent unauthorised access to landforms (including public, leaseholders and livestock) causing risk of injury or death. Impact to beneficial uses downstream to the Mary River and Adelaide River catchments and contamination of surface water, sediment, and groundwater quality and associated aquatic and terrestrial ecosystems on and offsite.</p> <p>Indirect or Cumulative - Increased unauthorised accessed via word or-mouth, resulting in increased threatened to the safety and health</p>	C	3	13	High	<p>Development of Monitoring Plan / Operational Manual which includes weekly inspections of the TSF, survey pins to monitor the embankment and piezometers to measure pore water pressure.</p> <p>Temporary and/or final cover systems over waste rock will be designed to limit infiltration to the extent needed based on the propensity for the material to generate AMD.</p> <p>Groundwater and surface water monitoring to check water quality and any seepage.</p> <p>Implementation of AMDMP .</p> <p>Care and maintenance plan to have procedures for site safety, stable and non-polluting domains in the event of early closure.</p> <p>Adequate security bonds for rehabilitation.</p>	D	2	21	Low	C2	Implement closure planning into mine plan. Implement management of rehabilitation resources as part of mine scheduling. Site operated to accommodate natural/unforeseen disasters. MMP obligates provision of financial security for approval.

Closure Domain	activity	Source	Consequence	Likelihood	Consequence	Risk	Risk	Mitigation & Management	Likelihood	Consequence	Risk	Risk	Level of Certainty	Justification of Certainty and Residual Risk
Dumps	Rehabilitation Management		of externals (including public, leaseholders and livestock) causing risk of injury or death. Potential transportation of contaminated sediments and material offsite. Biological and human health implications. Groundwater pathways contributing to environmental contaminants mobilised in the surrounding environment.				High	Implement fencing/barricades and signage and access restriction to prevent livestock accessing rehabilitation areas. Development of Monitoring Plan / Operational Manual which includes weekly inspections and maintenance of bunds and run-on/runoff control structures associated with WRDs.				Low		
D1-Waste Rock Dumps	WRD Management/Site Security Management	Ineffective site security and barriers to prevent unauthorised access (public and livestock) to WRD rehabilitated areas.	Direct - Lack of management and controls put in place to prevent unauthorised access to WRD's for recreational activities (including public, leaseholders and livestock) causing risk of injury or death. Indirect or Cumulative - Increased unauthorised accessed via word-or-mouth, resulting in increased threatened to the safety and health of externals (including public, leaseholders and livestock) causing risk of injury or death.	C	4	8	Extreme	Implement fencing/barricades and signage and access restriction to prevent vehicle and livestock accessing rehabilitation areas. Remove access roads to top of WRD's if not required for post closure monitoring Engineered design and earthworks of WRD for closure, earthwork to a stable angle and support. Landforms geotechnical and safety inspections through LOM. Ongoing monitoring and remediation throughout closure.	C	2	18	Moderate	C3	Progressive rehabilitation is likely to result in significant areas of the site have highly established vegetation by closure. Appropriate rehabilitation is being completed on numerous sites
D3a -Open Pit Voids	Open Pit Management/Water Management	Seasonal overtopping/planned overtopping of pit (s) during extreme rainfall and flooding events.	Direct - Contamination of surrounding aquatic ecosystems and surface and groundwater water characteristics, sediment. Human health implications (heavy metals, NORMS) to water consumption. Indirect and Cumulative - Aquatic ecosystems resulting disturbance of ecological integrity and functioning of aquatic ecosystems. Human health implications (heavy metals, NORMS). Groundwater pathways contributing to environmental contaminants mobilised in the surrounding environment.	C	3	13	High	Pit monitoring pits dewatering during early stages of operations to increase certainty of the regional groundwater aquifer hydraulic conductivity for water balance model. Development of Monitoring Plan / Operational Manual which includes weekly inspections of the pits Implementation of Acid Mine Drainage Management Plan and Water Management Plan Manage the site water balance to reduce any build-up of water. Implement drainage diversions as per the ESCP Implementation of AMDMP Groundwater / surface water quality monitoring Manage and update site water balance data to reduce any build-up of water and calibrate Modell Implement clean water diversions in accordance with the ESCP	D	2	21	Low	C3	Pit modelling (CDM ,2021) findings post mining: pit lakes are unlikely to overflow. Recommendation to monitoring pits dewatering during early stages of operations to increase certainty of the regional groundwater aquifer hydraulic conductivity for water balance. The analysis and modelling completed as part of the hydrological assessment has directly informed development of the ESCP and diversions. Thus, significantly increasing confidence.
				C	3	13			D	2	21			
				C	3	13			D	2	21			
D3a -Open Pit Voids	Open Pit Management/Site Security Management	Ineffective site security and barriers to prevent unauthorised access (public and livestock) to WRD rehabilitated areas.	Direct - Lack of management and controls put in place to prevent unauthorised access to open pit voids causing risk of injury or death. Indirect or Cumulative - Increased unauthorised accessed via word-or-mouth, resulting in increased threatened to the safety and health of externals (including public, leaseholders and livestock) causing risk of injury or death.	C	4	8	Extreme	Implement fencing/barricades and signage and access restriction to prevent vehicle and livestock accessing rehabilitation areas. Pit access to be barricaded/trenched and abandonment bund installed (DoIR Safety Bund Walls Guideline) Engineered design and earthworks of pit for closure, earthwork to a stable angle and support. Landforms geotechnical and safety inspections through LOM. Ongoing monitoring and remediation throughout closure.	E	4	16	High	C3	Progressive rehabilitation is likely to result in significant areas of the site have highly established vegetation by closure. Appropriate rehabilitation is being completed on numerous sites throughout the NT (ERA, South 32) and is expected to be highly achievable in the project setting.
D3a -Open Pit Voids	Open Pit Management/Waste Rock Management	Exposed PAF on pit walls affecting pit lake water quality.	Direct - Pit lake water quality may become more acidic and with higher concentration of contaminants which may impact terrestrial fauna species utilising pit water for drinking and the quality of groundwater in the area through seepage. Indirect and Cumulative - Groundwater pathways contributing to environmental contaminants mobilised in the surrounding environment Potential for bioaccumulation of excessive contaminants in environmental pathways. Potential for bioaccumulation of excessive contaminants within native fauna (heavy metals) and risk of consumption of fish.	C	2	18	Moderate	Geochemical assessment and modelling of pit water heights Contingency to manage water chemistry changes. Investigate in pit water treatment options (i.e. use of lime or caustic). Contaminant transport modelling further refined. Limit pit catchment post closure to reduce inflow. Ongoing groundwater monitoring program. Treatment of pit water to within SSTV criteria. Upgrading of site drainage measures. Visual inspection of pit walls to identify locations and volumes of PAF material Groundwater / surface water quality monitoring	C	1	22	Low	C2	Focus to maintain good water quality (monitoring and treatment). Implement closure planning into mine plan.
				C	2	18			C	1	22			
				D	2	21	D		1	24	Low	C2		
				C	2	18	C		1	22	Low	C2		

Closure Domain	activity	Source	Consequence	Likelihood	Consequence	Risk	Risk	Mitigation & Management	Likelihood	Consequence	Risk	Risk	Level of Certainty	Justification of Certainty and Residual Risk
D3a -Open Pit Voids	Open Pit Management/Water Management	Poor water pit water quality becomes a groundwater source.	<p>Direct - Gradual development of plume of contaminated groundwater. Pit lake water quality may become more acidic and with higher concentration of contaminants which may impact fauna species and local vegetation surrounding the landform.</p> <p>Indirect and Cumulative - Groundwater pathways contributing to environmental contaminants mobilised in the surrounding environment through historic mining and quarrying activities. Potential for bioaccumulation of excessive contaminants within native fauna (heavy metals), risks of consumption of fish. Potential for excessive contaminant affecting local ground water uses for human and horticultural activities, i.e. pastoralists</p>	C	2	18	Moderate	<p>Geochemical assessment and modelling of pit water.</p> <p>Contingency to manage water chemistry changes.</p> <p>Investigate in pit water treatment options (i.e. use of lime or caustic).</p> <p>Investigate pump back options</p> <p>Contaminant transport modelling further refined.</p> <p>Investigate options for inflow and outflow (flushing) to manage pit water quality.</p> <p>Ongoing groundwater monitoring program.</p>	C	1	22	Low	C1	<p>Pit water modelling suggest pits will not overtop after closure.</p> <p>Groundwater quality monitoring of other pits in the Mount Bunday suggest pits will not become a groundwater source.</p>
				C	2	18			C	1	22			
D3a -Open Pit Voids	Open Pit Management/Land and Soil Management	Geotechnical instability and failure of pit walls.	<p>Direct - Loss of ground stability in the area surrounding the wall failure resulting in surface erosion movement. Impact on structural integrity of engineered embankments. Ecological impacts of pit wall failure in the immediate area.</p> <p>Indirect or Cumulative - Potential indirect ground or landform instability beyond the initial failure area (unlikely to be widespread).Unstable pit walls and benches result in slope failure and surface erosion creating an unstable land surface affecting local land and soils resulting in erosion and human and stock safety.</p>	D	3	17	Moderate	<p>Detailed design and quality assurance pit wall designs.</p> <p>Geotechnical studies and assessment to ensure structural stability</p> <p>Water Management Plan</p> <p>Quarterly inspections at closure to check sufficient pit void freeboard and structural integrity against post closure criteria</p> <p>Geotechnical inspections of pit walls, throughout LOM</p> <p>Pit access to be barricaded/trenched and abandonment bund installed (DoIR Safety Bund Walls Guideline)</p>	D	1	22	Low	C3	<p>High certainty that walls will not fail based on using leading industry practice and regular monitoring.</p> <p>Geotech studies and engineering design and modelling. Specifically: > Dam break and consequence assessment for TSF (application of ANCOLD) (Knight Piesold, 2021);</p>
				D	4	12			D	3	22			
D3a -Open Pit Voids	Water Management	Long term positive water balance	Potential build-up of water onsite and the need for long term treatment and constant discharges of water. Contamination of surface water, sediment, and groundwater quality and associated ecosystems.	D	4	12	High	<p>Close out structures to be water shedding to reduce water build up across site</p> <p>Reduce and minimise contact water contact with AMD forming material</p> <p>Improve and maintain site drainage infrastructure</p> <p>Implementation of Mine Closure Plan and adherence to commitments</p> <p>Closure Plan updated and refined throughout mining operations including life of mine closure planning and contingency planning</p> <p>Financial provisioning for closure implementation</p>	E	3	20	Moderate	C3	<p>The Water Management Plan has been developed to prevent onsite build-up of water. Pit modelling by (CDM Smith) reported that the pit lakes are unlikely to overflow.</p>
				D	4	12			E	3	20			
				D	4	12			E	3	20			
				D	4	12			E	3	20			
				D	4	12			E	3	20			
				D	4	12			E	3	20			
D3b-Backfilled Pits	Open Pits/ Waste Rock Management	Incorrect PAF waste backfill handling, placement, and compaction.	<p>Direct - Release of (AMD, heavy metals and NORMS) and impact to beneficial uses locally to groundwater quality.</p> <p>Indirect or Cumulative - Potential transportation of contaminated groundwater pathways contributing to environmental contaminants mobilised in the surrounding environment.</p>	B	2	14	High	<p>Ongoing waste rock characterisation and site inspections by suitably qualified spotters to confirm material geochemistry (PAF, NAF, metals/metalloids).</p> <p>Investigate options for PAF waste rock may require liming prior to backfilling</p> <p>Monitoring of waste rock placement and compaction tests at every 5 metre depth intervals.</p> <p>Segregation and selective placement of PAF and NAF materials during pit backfilling to ensure PAF waste is retained permanently submerged and base of backfilled pit.</p> <p>Cover and capping with NAF material of sufficient thickness to limit infiltration and/or use of low permeability cover systems.</p> <p>Reshape/re-contour area consistent to the surrounding landform and drainage and remove any erosion prone features.</p> <p>Backfill foundation constructed from low permeability oxide material</p> <p>Material classified as NAF will be placed over the backfilled waste</p> <p>NAF material with sufficient ANC will be placed on the natural surface, lining the drainage lines</p> <p>Temporary and/or final cover systems over waste rock will be designed to limit infiltration to the extent needed based on the propensity for the material to generate AMD</p> <p>Development of Monitoring Plan / Operational Manual which includes weekly inspections and maintenance of final profile</p> <p>Groundwater / surface water quality monitoring</p> <p>Implementation of AMDMP</p>	D	2	21	Low	C3	<p>High certainty that the seepage and runoff can be minimised with correct placement and compaction of engineered capping and covers</p>

Closure Domain	activity	Source	Consequence	Likelihood	Consequence	Risk	Risk	Mitigation & Management	Likelihood	Consequence	Risk	Risk	Level of Certainty	Justification of Certainty and Residual Risk
3b - Backfill Pits	Open Pit Management/Waste Rock Management	Waste backfill not placed and compacted to structural design criteria.	Direct -Landform instability on backfill pit surfaces leads to surface erosion and surface water infiltration. Loss of topsoils, inability to re-establish vegetation. Indirect or Cumulative - Potential indirect ground or landform instability beyond the initial failure area (unlikely to be widespread).	D	4	12	High	Monitoring of waste rock placement and compaction tests at every 5 metre depth intervals. Detailed design and quality assurance/control of backfill pit designs Geotechnical studies and assessment to ensure structural stability Quarterly inspections at closure to check structural integrity against post closure criteria Ongoing waste rock characterisation and site inspections by suitably qualified spotters to confirm material geochemistry (PAF, NAF, metals/metalloids). Investigate options for PAF waste rock may require liming prior to backfilling Segregation and selective placement of PAF and NAF materials during pit backfilling to ensure PAF waste is retained permanently submerged and base of backfilled pit. Cover and capping with NAF material of sufficient thickness to limit infiltration and/or use of low permeability cover systems. Reshape/re-contour area consistent to the surrounding landform and drainage and remove any erosion prone features. Backfill foundation constructed from low permeability oxide material Material classified as NAF will be placed over the backfilled waste NAF material with sufficient ANC will be placed on the natural surface, lining the drainage lines Temporary and/or final cover systems over waste rock will be designed to limit infiltration to the extent needed based on the propensity for the material to generate AMD Development of Monitoring Plan / Operational Manual which includes weekly inspections and maintenance of final profile Groundwater / surface water quality monitoring Implementation of AMDMP	E	2	23	Low	C3	High certainty that Backfilled pits operations and monitoring controls and closure plan is adequate to address the risk.
D3b-Backfilled Pits	Open Pit Management/Waste Rock Management/Rehabilitation Management	Lack of/or incorrect (physical and chemical) capping and cover materials	Direct - Completion criteria and environmental outcomes unable to be met. Potential soil erosion with loss of topsoil and sedimentation on and offsite though both water and wind erosive forces. Indirect - Erosion of exposed backfill pit cover surface leads to destabilised surfaces and exposure of capping materials or PAF resulting in transportation of contaminated sediments on and offsite via surface water and wind erosive forces to the Mary River and Adelaide River catchments.	B	3	9	High	Development and implementation of a geochemical block model Financial provisioning for closure implementation Calculation of material requirements and identification of extraction areas Daily monitoring of waste rock handling Waste Rock will be managed in accordance with the AMDMP Operational Manual (including inspections) Regular surveys to measure waste rock deposition and compaction Groundwater / surface water quality monitoring Implementation of AMDMP Temporary and/or final capping of the waste rock to reduce ongoing water infiltration and seepage Construction of final profile prior to onset of wet season rainfall events (no later than September) Rehabilitation management plan - seeding to commence in December/January to maximise germination. Selected native plant species to be confirmed during rehabilitation trials	D	2	21	Low	C2	Moderate level of certainty as the site contains soils that are dispersive and are susceptible to erosion where using for construction of onsite infrastructure. Implement management of rehabilitation resources as part of mine scheduling. Volumes of tailings and waste rock and the material estimates for capping have been produced and included in the Project Description. Based on these there is confidence that sufficient material is available.
D3b -Backfilled Pits	Open Pit Management/Site Security Management	Ineffective site security and barriers to prevent unauthorised access (public and livestock) to backfilled pit rehabilitated areas.	Direct - Lack of management and controls put in place to prevent unauthorised access to backfilled area (including public, leaseholders and livestock) causing risk of injury. Indirect or Cumulative - Increased unauthorised accessed via word-or-mouth, resulting in increased threatened to the safety and health of externals (including public, leaseholders and livestock) causing risk of injury.	D	4	12	High	Implement fencing/barricades and signage and access restriction to prevent vehicle and livestock accessing rehabilitation areas. Remove access roads to backfill area if not required for post closure monitoring Engineered design and earthworks of backfill area for closure, earthworks. Landforms geotechnical and safety inspections through LOM. Ongoing monitoring and remediation throughout closure.	D	1	24	Low	C3	Progressive rehabilitation is likely to result in significant areas of the site have highly established vegetation by closure.
D6 -Haul Road and Access Roads	Road Management/Rehabilitation Management	Haul road and access roads left unrehabilitated or if rehabilitated not maintained.	Direct - Potential scouring, soil erosion, loss of topsoil and sedimentation resulting in the alteration of water quality on and off site drainage features. Lack of management and controls put in place to prevent unauthorised access to closed access tracks and haul roads including public, leaseholders and livestock) causing risk of injury to unmaintained areas. Indirect or Cumulative - Rehabilitation success is affected by unauthorised vehicular access. Cumulative concentration of sediments within the downstream watercourse as a result of any sediment discharged. Leading to decreased aquatic ecological functioning. Increased unauthorised accessed via word-or-mouth, resulting in increased threatened to the safety and health of externals (including public, leaseholders) causing risk of injury to unmaintained areas.	C	3	18	High	Engagement with Pastoral Lease holder and confirm with post closure monitoring requirements as to whether to retain or rehabilitate haul roads and access tracks. Implement fencing/barricades and signage and access restriction to prevent vehicle accessing rehabilitation areas. Engineered design and earthworks of backfill area for closure, earthworks. Landforms geotechnical and safety inspections through LOM. Ongoing monitoring and remediation throughout closure. Former access roads and haul road to and around the sites to be rehabilitated to prevent continued use unless otherwise confirmed to remain by the pastoralist or use for post closure monitoring. Culverts will remain where necessary to not obstruct natural/alterd drained flows Inspections of site safety throughout LOM.	D	2	21	Low	C3	High certainty that adequate controls in place to manage areas for rehabilitation.
				C	4	8	Extreme	Final closure design to account for rehabilitation potential Planning and allocation of appropriate rehabilitation media (topsoil and organic matter) Establishment of a fire regime that promotes native vegetation Implement active weed control	E	4	16	High		

Appendix C Legal Obligations Register

Rustlers Roost Project Area

Minerals Titles Act – Tenement Conditions

Tenement Condition	Completed
ML 1083	
Nil	-
Tenement Rehabilitation or Closure Conditions	0
Rehabilitation or Closure Conditions Complete	NA
% Complete	NA

Mining Management Act – Authorisation

Cond No.	Version	Condition	Completed
Authorisation 0738-01 (Variation 5)			
0738-01	V5	No conditions identified applicable to rehabilitation and closure activities.	-
Tenement Rehabilitation or Closure Conditions			0
Rehabilitation or Closure Conditions Complete			NA
% Complete			NA

Mining Management Act – Mining Management Plan

	Commitment	Completed
PGL Rustlers Roost MMP 2018-2019 Care and Maintenance Resubmission (DITT Doc ID MR2020/0297) Closure Commitments to be addressed where relevant in this MCP and EIS (following assessment and approval).		
	Primary will conduct geochemical assessment including kinetic test works on the existing WRD and fresh drill samples from oxide, transitional and sulphide waste rock. DITT notes knowledge gaps for site closure. Detailed geochemical assessment of existing waste rock and newly drilled samples from the oxide, transitional and sulphide zones as part of the EIS_for RPA and Q29 open cut my redevelopment. Finding to be included in EIS assessment Report.	Y
PGL Rustlers Roost MMP 2016-2017 Resubmission (DPIR Doc ID MR2018/0037) Closure Commitments to be addressed where relevant in this MCP and EIS (following assessment and approval).		
	Primary will review closure documents put forward by previous operators considering the current regulatory environment and will present to the NT DME an updated closure plan for Rustlers Roost by June 2016, included in the appendices.	Y
	Leave the site in a physically and geochemically safe and stable condition such that risks to public safety are minimised and existing environmental values are protected.	N
	Disturbed areas can support appropriate end land uses.	N
	Ensure the pit verges are stabilised and fenced.	N
	Minimise impact from residual historical mining wastes (heap leach pads) to surrounding environment.	N
	Ensure adequate drainage and erosion control is established on-site.	N

	Commitment	Completed
	Establish vegetation that is self-sustaining, perpetual, and which provides habitat for local fauna and successive flora species, and to achieve long-term stabilisation and protection of the previously disturbed / artificial landforms consistent with the final end land use.	N
	Work with the landholder and government to promote the use of the land for agriculture (particularly grazing), including the use of existing roads, and watering points.	N
	Further to this Primary will commission an environmental audit of the site to: <ul style="list-style-type: none"> • Review as built landforms to design. • Review and compare historic waste characterisation with actual. • Review historic revegetation attempts and make recommendations. 	N
	Preliminary investigations of the heap leach material and surface water run-off and seepage at point of discharge will be undertaken during the current reporting period to assist in determination of current conditions of the heap leach pads for future rehabilitation planning.	Y
	PGL will consult with relevant stakeholders to determine the end land use requirements that will give positive outcomes to both landowners and government.	Y
	PGL will consult with relevant stakeholders to determine the final destination of the assets and final land usage that will give positive outcomes to both landowners and government.	Y
	PGL will review the current closure plan for the site and ensure that it is in-line with Company policy and strategic development. Updates and changes to the plan will be conducted as necessary and included in subsequent submissions of its MMP.	N
	Monitoring will continue for an estimated 5 years after closure and decommissioning. Monitoring will include weed and pest management with monitoring and assessment, water quality monitoring, maintenance of firebreaks and monitoring of erosion with rehabilitation where necessary. Post mining monitoring would be based on current management and monitoring practices with surface and groundwater monitoring plans for the water bodies and creeks. Weed management will be undertaken on site. Fire management will also be undertaken including controlled burning to manage weeds, maintain firebreaks and to keep fuel sources to a minimum.	N
	Assess water quality (through Surface Water EMP and Groundwater EMP) in the pit voids and water dam for suitability for fauna after mine closure and fence off water bodies to prevent stock and native fauna mammal access if unsuitable.	N
	Progressive rehabilitation of disturbed areas during the wet season.	N
	Manage progressive and final rehabilitation earthworks to improve drainage and decrease erosion. During rehabilitation phase, contour ripping will be undertaken to minimise surface sheet erosion and to promote vegetation establishment.	N

	Commitment	Completed
	Undertaking remedial works and maintenance works on previously rehabilitated areas, as required.	N
	<p>PGL has recently commenced a scoping study project for the Rustlers Roost site, this study aims to identify future minable resources, rehabilitation activities that need to be undertaken and long-term closure objectives for the site. Specifically, the scoping study will investigate options available, and resources required to rehabilitate the heap pads and ponds as well as investigating a final design for the WRD.</p> <p>The outcomes of the scoping study will be used by PGL to develop a rehabilitation and closure plan for the site. It is expected that the scoping study will be completed by the next submission of the Rustlers Roost site MMP.</p>	Y
	Total Mining Proposal Criteria	20
	Mining Proposal Criteria Complete	6
	% Complete	30%

Mining Management Act – Mine Closure Plan

Closure Outcome	Completion Criteria	Measurement	Completed
<i>Rustlers Roost Mining Closure Plan 2020 (Version 2.0) (To be succeeded by MCP for the approved EIS open cut redevelopment project)</i>			
Built landforms are stable and complimentary to the surrounding natural landforms.	Landform completed as designed and is stable. Erosion is minimal and no signs of geotechnical instability.	Geotechnical and visual assessment is required.	N
Resultant drainage patterns are consistent with and complimentary to pre-existing drainage.	Natural watercourses show no significant degradation resulting from increased flow. Watercourse not choked from decreased flow.	Visual inspection and comparison with pre- mining surveys.	N
Site is revegetated in compliment to the natural landscape and measures have been put in place to increase the success of native vegetation over introduced or pest species.	Species diversity meets targeted levels reflecting the diversity of the surrounding ecosystem. Vegetation cover is within the range of undisturbed ecosystem surrounding the site. No evidence of new weed species.	Vegetation mapping carried out at intervals during rehabilitation / care and maintenance.	N
The rehabilitated ecosystem has similar functions and resilience to the natural system.	Ecosystem show no significant deviation from natural system indicating the presence or absence of new, native, or introduced, species.	Visual inspection and comparison with pre- mining surveys.	N
All AMD materials are contained, encapsulated, or removed to prevent contamination to the surrounding ecosystem with consideration to the current climate system.	Water sampling indicates no negative impact on water leaving site. Review calculated waste and ore characteristics against actual.	Regular audit on the performance of landforms the subject of progressive rehabilitation. Regular physical and visual sampling throughout progressive rehabilitation and into the future.	N

Closure Outcome	Completion Criteria	Measurement	Completed
Total Mine Closure Plan Criteria			5
Mine Closure Plan Criteria Complete			0
% Complete			0%

Aboriginal Sacred Sites Act – AAPA Authority Certificates

Condition	Completed
AAPA Authority Certificate C93/153 Mining activities	
No conditions identified applicable to rehabilitation and closure activities.	-
AAPA Authority Certificate C2016/168 Exploration Drilling	
No conditions identified applicable to rehabilitation and closure activities.	-
Rehabilitation or Closure Conditions	0
Rehabilitation or Closure Conditions Complete	0
% Complete	NA

Environmental Assessment Act – Preliminary Environmental Report

Commitment	Completed
<i>Environmental Assessment Act – Preliminary Environmental Report (Closure Commitments to be addressed where relevant in this MCP (following assessment and approval)).</i>	
<p>Open Pits</p> <p>Pit water inflow consists of direct precipitation and groundwater ingress. Both the water level and quality will return to its pre-mining condition when pit dewatering and bore field production are ceased. In addition, the pit bases will be backfilled with sufficient material to raise its level above the static water level to prevent standing water.</p> <p>To preclude acidic leachate from the waste rock dumps, all transitional waste is scheduled to be backfilled to or retained in the open pits. All transitional waste rock in the pit bottoms will be capped with five metres of oxidised material.</p>	Y
<p>Waste Rock Dump</p> <p>The waste rock disposal area will be revegetated according to the rehabilitation plan. During the period of waste rock disposal, the waste dump will not be reclaimed. The top of the dump will be slightly sloped and will provide a level surface for revegetation. The side slopes will be less than the angle of repose and will, therefore, offer long-term stability.</p>	N
<p>Heap Leach Pads</p> <p>Residual cyanide will be reduced from spent heaps for permanent closure. The spent heaps will be rinsed with fresh water until the WAD cyanide of the rinsate is lowered to the level required by DME.</p> <p>After water rinsing has been completed, the leach pad perimeter berms and ditches will be graded to prevent the accumulation and ponding of any water that passes through the heaps during future precipitation events. The liner under the heaps will not be removed after decontamination has been completed. In addition, the top of the leach pad will be revegetated.</p>	N
<p>Ponds</p> <p>The proposed procedures for permanent closure of the Rustler's Roost Gold Mine ponds are:</p> <ul style="list-style-type: none"> All rinse water from the spent heaps and all residual process liquids will be contained within the ponds during closure activities. These liquids will be evaporated completely from the ponds. 	N

Commitment	Completed
<ul style="list-style-type: none"> • After the ponds area no longer needed to support closure activities, the synthetic liner and evaporate will be disposed of by folding the synthetic liner around the evaporate and burying it insitu. • The ponds will be backfilled and graded to prevent the impounding of water and to blend with the surrounding terrain. • Revegetation of the pond area will be conducted according to the rehabilitation plan (5.5.4). 	
<p>Miscellaneous Facilities</p> <p>Permanent closure procedures are proposed for the miscellaneous facilities as outlined below:</p> <ul style="list-style-type: none"> • All residual process liquids will be drained to the process water pond where they will be evaporated. • All process chemicals and petroleum products and their empty containers will be removed from the project site. • The process plant building will be dismantled and removed from the project site. • Roads not required for access through the area will be ripped and graded. • Disturbed areas will be revegetated according to the rehabilitation plan (see 5.5.4). 	Y
<p>Objective</p> <p>The Company will rehabilitate the project site to standards acceptable to the DME.</p> <p>Progressive and final rehabilitation of the project area are important components of the Company's mining objective. In addition to the general rehabilitation, the Company will leave the site in a safe and stabilised condition by preventing hazardous contamination and minimising erosion.</p>	N
<p>Preventing Acid Drainage</p> <p>The Company will retain within or backfill to the open pit all transitional waste rather than place this material in the waste dump. This will prevent the possible formation of acidic leachate.</p> <p>Current test work indicates that oxidised material will not form acidic leachate. Continuing characterisation studies conducted during mining operations will provide further information on the long-term prevention of acid drainage. The results of this data will be incorporated into the final rehabilitation plan and adjustments made to it as necessary to prevent acid drainage.</p> <p>Most ore contained within the leach pad will be oxidised material and will not form acidic leachate. Transitional ore contains a potential for acid formation; however, the dynamics of the leach cycle will reduce this potential' as well as the mass balance may neutralise any acid formation. The potential for acid formation from the transitional spent ore will be an on-going study. These results will be presented to DME prior to final rehabilitation of the leach pad.</p>	N
<p>Erosion Control and Cover Soil Stockpiling</p> <p>Conservation of soil resources will ensure an adequate source of cover soil material for rehabilitation and prevention of excessive erosion. The main soil management programme will be:</p> <ul style="list-style-type: none"> • Progressive soil removal to reduce large surface areas from exposure will reduce erosion. • Perimeter bunding will reduce erosion and siltation. • Cover soil and vegetative material will be stripped from all areas of development and stockpiled. Stockpiles will be maintained for as short a period as possible through progressive rehabilitation to prevent seedstock loss and deterioration. 	N

Commitment	Completed
<p><u>Revegetation</u></p> <p>The Company will revegetate with local native species as well as easily established ground covers. The following measures will be undertaken:</p> <ul style="list-style-type: none"> • Rehabilitation trials will commence during the first year of operations to determine the most adaptive plant species. • To benefit from Wet season rains, revegetation will be conducted in the late Dry season. 	N
<p><u>Waste Rock Dumps</u></p> <p>The Company will progressively rehabilitate the waste dumps although the actual mining sequence will dictate its timing. Long-term waste dump stabilisation will be primary emphasis:</p> <ul style="list-style-type: none"> • The outer slopes will be shaped as required to ensure stabilisation. The benches formed during its construction will most likely be sufficient. • The upper surface will be capped with a minimum of 0.5m loose layer of oxide waste and cover soil. • Revegetation of the upper surface will be completed. 	N
<p><u>Leach Pad</u></p> <p>The Company will progressively rehabilitate the leach pads following its washing and rinsing cycle. The following measures will be utilised:</p> <ul style="list-style-type: none"> • Spent ore heap will be washed and rinsed to acceptable WAD cyanide discharge levels. • The upper surface of the spent heap will be contoured to a convex shape to enhance drainage off the leach pad. • Cover soil will cap the new surface and revegetation started. • Upon site decommissioning, the side slopes of the leach pads will be stabilised as required. 	N
<p><u>Mine Pits</u></p> <p>At the completion of mining and backfilling each pit, the Company will undertake the following measures to leave the open pits as a safe landform:</p> <ul style="list-style-type: none"> • The upper bench of the open cut will be pushed by bulldozer to form a scree slope to the first bench to enable the limited cover soil to attract pioneering plants. • All road access points will be blocked with large boulders to prevent vehicular access into the open cut. • Access to the pits' perimeter will be hindered through bunds and/or diversions which would prevent vehicular access. • Transitional waste placed in the pit bottom will be capped with sufficient oxidised waste to prevent the accumulation of standing water at the pit base. 	N
<p><u>General Site</u></p> <p>Following the decommissioning operations and facilities removal, the Company will rehabilitate the general site. These areas include the plant and crusher sites, any borrow sources, haul roads and easements. The following measures will be undertaken:</p> <ul style="list-style-type: none"> • Minimisation of erosion using spoon drains to direct rainwater run-off. • Ripping compacted surfaces to loosen the sub-base prior to cover soil replacement. • Revegetation of all areas that contain replaced cover soil with native species through seeding and/or pioneering. 	N
<p align="center">Rehabilitation or Closure Commitments</p>	<p align="center">13</p>
<p align="center">Rehabilitation or Closure Commitments Complete</p>	<p align="center">2</p>
<p align="center">% Complete</p>	<p align="center">15%</p>

Other – Agreements

Feature	Commitment	Completed
2014 Agreement between Pastoralist and Miner		
Heap Leach Pads	<p>The main points of the in-situ rehabilitation design concept include:</p> <ul style="list-style-type: none"> Contour the outer surface to 1 in 3 slopes with windrows. Shape the upper surface to control water run-off. Stabilise area prone to contact with flood waters with oversize rocks. Revegetate with native species; and Leach pads to be fenced off, which has already been completed by PGL in 2013. 	N
Waste Dump	<ul style="list-style-type: none"> Outer walls to be profiled to 1 in 3 slope including spaced, parallel troughs to control water run-off: and Revegetate with native species. 	N
Solution and Storm Water Ponds	Expected to be utilised for pastoral use.	N
Plant and Administration Building Site	Plant and buildings already removed. Concrete footings and hardstand area to remain for pastoral use.	Y
Explosives Compound	Already rehabilitated.	Y
Open Pits	<p>When mining operations have been completed the pit will be secured to ensure that the safety risk to public and pastoral operations is minimised. This can be achieved by:</p> <ul style="list-style-type: none"> Installing containment bunds. Ramp blockage to prevent access. Appropriate signage. Secure fencing (already completed by PGL in 2013); and Allow the pit to fill with both groundwater and rainfall. 	N
Mobile Plant Area	Already rehabilitated except for hardstand area which was to be maintained for pastoral use.	Y
Crushing Plant Area	Already rehabilitated apart from concrete footings. Initial, unsuccessful attempts to dig the footings out indicate they are deep and may require fracturing to assist in their extraction. Timing of removal may therefore depend on when Primary has the correct equipment on site.	N
ROM Pad	Already rehabilitated.	Y
Camp Site	Already rehabilitated.	Y
Site Rubbish	Already rehabilitated.	Y
Roads and Tracks	Either already rehabilitated or to remain for pastoral use.	Y
Rehabilitation or Closure Commitments		12
Rehabilitation or Closure Commitments Complete		7
% Complete		58%

Quest 29 Project Area

Minerals Titles Act – Tenement Conditions

Tenement Condition	Completed
ML 29783	
Nil	-
Tenement Rehabilitation or Closure Conditions	0
Rehabilitation or Closure Conditions Complete	NA
% Complete	NA

Mining Management Act – Authorisation

Cond No.	Version	Condition	Completed
Authorisation 0739-01 (Variation 3)			
0739-01	V3	No conditions identified applicable to rehabilitation and closure activities.	-
Tenement Rehabilitation or Closure Conditions			0
Rehabilitation or Closure Conditions Complete			NA
% Complete			NA

Mining Management Act – Mining Management Plan

Commitment	Completed
PG Q29 MMP 2019-2020 Care and Maintenance (DITT Doc ID MR 2020/0444)	
The MMP cites an incorrect security amount. The department is currently holding \$449,800.00 in security for the Quest 29 Project. Please update this section in next reporting period.	Y
Total Mining Proposal Criteria	1
Mining Proposal Criteria Complete	1
% Complete	100%

Mining Management Act – Mine Closure Plan

Completion Criteria	Measurement	Completed
Mining Closure Plan Q29 2019-2020 (Version 2.0) (To be succeeded by MCP for the approved EIS open cut redevelopment project)		
Demolish and remove infrastructure and footings		N
Stabilization of pit by abandonment bund and pit access closed		N
Stabilise, backfill dams/ponds		N
Stabilise and spread cover and rehabilitate by direct seeding, heap leach		N

Completion Criteria	Measurement	Completed
Capping, spread cover and rehabilitate by direct seeding, heap leach		N
Install sediment basins		N
Pest and Weed control post closure ,water monitoring, revegetation, and maintenance		N
Total Mine Closure Plan Criteria		7
Mine Closure Plan Criteria Complete		0
% Complete		0%

Aboriginal Sacred Sites Act – AAPA Authority Certificates

Condition	Completed
AAPA Authority Certificate C98/147 Mining activities	
No conditions identified applicable to rehabilitation and closure activities.	-
AAPA Authority Certificate C2016/168 Exploration Drilling	
No conditions identified applicable to rehabilitation and closure activities.	-
Rehabilitation or Closure Conditions	0
Rehabilitation or Closure Conditions Complete	0
% Complete	NA

Environmental Assessment Act – Preliminary Environmental Report

Feature	Commitment	Completed
	<i>Environmental Assessment Act - Preliminary Environmental Report (Closure Commitments to be addressed where relevant in this MCP (following assessment and approval)).</i>	
Open Mined	<p>Open pit(s) – Water inflow and quality will return to its pre-mining level once mining ceases. The pit(s) will be allowed to rapidly fill to preclude the development of acid leachate. Any sulphide or transitional waste in the bottom of the pits will be capped with 5m of oxide waste prior to filling with water.</p> <p>Mine open pit(s) At the completion of mining the Company will undertake the following to leave the open pits(s) as a safe landform:</p> <ul style="list-style-type: none"> The upper bench will be bulldozed to form a scree slope for limited surface soil to attract pioneering plants All road access points will be blocked in an appropriate manner to prevent vehicular access into the pit(s) Vehicular access to the pit(s) perimeters will be hindered by the construction of bunds and/or diversions <ul style="list-style-type: none"> The pit(s) may be allowed to rapidly flood with natural waters. 	Y
Waste Rock Dump	<p>Waste Rock Dump(s) – The dump(s) will be progressively re-vegetated according to the rehabilitation plan. During active waste rock disposal, the dump will not be reclaimed. The top of the dump will be slightly sloped and will provide a level surface for revegetation. The side slopes will be less than the angle of repose and will also be revegetated.</p>	Y

Feature	Commitment	Completed
	<p>The Company will progressively rehabilitate the waste. Long-term waste dump stabilisation will be primary emphasis:</p> <ul style="list-style-type: none"> • The outer slopes will be shaped as required to ensure stabilisation. The benches formed during its construction will most likely be sufficient. • The upper surface will be capped with a minimum of 0.5m loose layer of oxide waste and cover soil. • Revegetation of the upper surface will be completed. 	
Heap Leach Pads	<p>Residual cyanide will be reduced in the spent heaps until WAD cyanide levels in the rinsate reaches the levels required by the DME. The perimeter berms and ditches will be graded to prevent water ponding. If possible, the top of the heap will be re-vegetated. The leach pad will be progressively rehabilitated following its washing and rinsing cycle as follows:</p> <ul style="list-style-type: none"> • Surface soil (if available) will be used to cap the new surface and re-vegetation will be started; and • The side slopes of the leach pad will be stabilised as required and the dump surface will be contoured to enhance drainage off the leach pad. 	N
Ponds/Dams	<p>All rinse and residual process liquids will be contained within the ponds and evaporated. The liner will be folded around the evaporate and buried. The ponds will be backfilled and graded to prevent water ponding. Re-vegetation of the pond area will be undertaken in accordance with the rehabilitation plan</p>	N
Miscellaneous	<p>All process chemicals and petroleum products and their containers will be removed from site. The process plant will be removed from site. Roads not required for access will be ripped. All buildings will be progressively removed from site. Disturbed areas will be re-vegetated in accordance with the rehabilitation plan.</p>	Y
Post closure Monitoring	<p>Post closure monitoring of the leach pads will be undertaken until the cyanide WAD levels meet the requirements of the DME.</p>	Y
Objective	<p>The Company will rehabilitate the project site to standards acceptable to the DME. Progressive and final rehabilitation of the project area are important components of the Company's mining objective. In addition to the general rehabilitation, the Company will leave the site in a safe and stabilised condition by preventing hazardous contamination and minimising erosion.</p>	N
Preventing Acid Drainage	<p>The Company will retain within or backfill to the open pit all transitional waste rather than place this material in the waste dump. This will prevent the possible formation of acidic leachate.</p> <p>Current test work indicates that oxidised material will not form acidic leachate. Continuing characterisation studies conducted during mining operations will provide further information on the long-term prevention of acid drainage. The results of this data will be incorporated into the final rehabilitation plan and adjustments made to it as necessary to prevent acid drainage.</p> <p>Most ore contained within the leach pad will be oxidised material and will not form acidic leachate. Transitional ore contains a potential for acid formation; however, the dynamics of the leach cycle will reduce this potential' as well as the mass balance may neutralise any acid formation. The potential for acid formation from the transitional spent ore will be an on-going study. These results will be presented to DME prior to final rehabilitation of the leach pad.</p>	N

Feature	Commitment	Completed
Erosion Control and Cover Soil Stockpiling	The main soil management programme will be as follows: Progressive soil removal to reduce large surface areas from exposure to reduce erosion. Perimeter bunding to reduce erosion and siltation; and Stockpiles will be maintained for as short a period as possible by progressive rehabilitation to prevent seedstock loss and deterioration.	N
Revegetation	The Company will revegetate with local native species as well as easily established ground covers. The following measures will be undertaken: <ul style="list-style-type: none"> Rehabilitation trials will commence during the first year of operations to determine the most adaptive plant species. To benefit from Wet season rains, revegetation will be conducted in the late Dry season. 	N
General Site	Following the decommissioning operations and facilities removal, the Company will rehabilitate the general site. These areas include the plant and crusher sites, any borrow sources, haul roads and easements. The following measures will be undertaken: <ul style="list-style-type: none"> Minimisation of erosion using spoon drains to direct rainwater run-off. Ripping compacted surfaces to loosen the sub-base prior to cover soil replacement. Revegetation of all areas that contain replaced cover soil with native species through seeding and/or pioneering. 	N
	Rehabilitation or Closure Commitments	14
	Rehabilitation or Closure Commitments Complete	5
	% Complete	36

Other – Agreements

Commitment	Completed
Agreements applicable to rehabilitation and closure activities closure	
No agreements applicable to rehabilitation and closure activities closure	-
Rehabilitation or Closure Commitments	NA
Rehabilitation or Closure Commitments Complete	NA
% Complete	NA

Toms Gully Project Area

Minerals Titles Act – Tenement Conditions

	Tenement Condition	Completed
ML 29814		
	Nil	-
	Tenement Rehabilitation or Closure Conditions	0
	Rehabilitation or Closure Conditions Complete	NA
	% Complete	NA

Mining Management Act – Authorisation

Cond No.	Version	Condition	Completed
Authorisation 0740-01 (Variation 4)			
0740-01	V4	No conditions identified applicable to rehabilitation and closure activities.	-
		Tenement Rehabilitation or Closure Conditions	0
		Rehabilitation or Closure Conditions Complete	NA
		% Complete	NA

Mining Management Act – Mining Management Plan

Commitment	Completed
PG Toms Gully MMP 2020 (To be succeeded by MMP for the approved EIS underground mining operation) (DITT Doc ID MR 2020/0353)	
No conditions identified applicable to rehabilitation and closure activities for ML 29814.	-
Total Mining Proposal Criteria	0
Mining Proposal Criteria Complete	NA
% Complete	NA

Mining Management Act – Mine Closure Plan

Closure Outcome	Completion Criteria	Measurement	Completed
Mining Closure Plan Toms Gully 2015			
		No conditions identified applicable to rehabilitation and closure activities for ML 29814.	-
		Total Mine Closure Plan Criteria	0
		Mine Closure Plan Criteria Complete	NA
		% Complete	NA

Aboriginal Sacred Sites Act – AAPA Authority Certificates

Condition	Completed
AAPA Authority Certificate C98/147 Mining activities	
No conditions identified applicable to rehabilitation and closure activities for ML 29814.	-
Rehabilitation or Closure Conditions	0
Rehabilitation or Closure Conditions Complete	0
% Complete	NA

Environmental Assessment Act – Preliminary Environmental Report

Commitment	Completed
<i>Environmental Assessment Act – Environmental Impact Statement.</i>	
No conditions identified applicable to rehabilitation and closure activities for ML 29814.	-
Rehabilitation or Closure Commitments	0
Rehabilitation or Closure Commitments Complete	0
% Complete	NA

Other – Agreements

Commitment	Completed
Agreement between Old Mount Bunday Pastoral Leaseholder and PGL for applicable to rehabilitation and closure activities closure on ML 29784	
No agreements applicable to rehabilitation and closure activities closure	-
Rehabilitation or Closure Commitments	0
Rehabilitation or Closure Commitments Complete	0
% Complete	NA