Appendix 18.
Mine Closure Plan

FOUNTAIN HEAD GOLD PROJECT

MINE CLOSURE PLAN

01238D_3_V3

MAY 2021

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PNX Metals

Fountain Head Gold Project

Mine Closure Plan

01238D_3_v3, May 2021

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Glossary

Term	Definition
Aspect	A key theme or element of rehabilitation that needs to be addressed to meet closure objectives.
Completion Criteria	Agreed standards or levels of performance that indicate the success of rehabilitation and enable an operator to determine when its liability for an area is able to cease.
Closure Domains	Different landforms and infrastructure on the site, each having different rehabilitation and closure requirements.
Closure Objectives	Required outcomes, for each aspect, that will allow return of disturbed land to a safe, stable, non-polluting/ non-contaminating landform in an ecologically sustainable manner that is productive and/or self-sustaining and is consistent with the agreed post-mining land use.
Post-mining land use	The land use after the cessation of mining.

Abbreviations

Abbreviation	Definition
CIP	Carbon-in-pulp
DENR	Department of Environment and Natural Resources
EIS	Environmental Impact Statement
IWL	Integrated Waste Landform
MCP	Mine Closure Plan
ML	Mining Leases
NAF	Non-acid forming
NOI	Notice of Intent
PAF	Potentially acid-forming
ToR	Terms of Reference
WRS	Waste Rock Storage

1. Introduction

1.1 Project Proponent

PNX Metals Limited ('PNX Metals' or the 'Company') (ABN: 67 127 446 271), is a publicly listed, mineral exploration company (ASX: PNX) with a significant tenement portfolio of both base and precious metals, primarily in the Northern Territory, and also in South Australia.

The Company's main focus is developing two projects in the Pine Creek region of the Northern Territory:

- The Fountain Head Gold Project ('Fountain Head'), containing the Fountain Head gold deposit, which is located at the selected processing plant and tailings facility site for the Hayes Creek Project.
- The Hayes Creek zinc-gold-silver Project ('Hayes Creek'), comprising of 14 wholly-owned mineral leases including the Iron Blow and Mount Bonnie deposits.

PNX Metals contact details for the Project are provided in Table 1.1.

Table 1.1 – Proponent Contact Details

Contact	Phone	Email	Address
James Fox Managing Director	08 8364 3188	info@pnxmetals.com.au	Level 1, 135 Fullarton Road, Rose Park, South Australia 5067

1.2 Project History and Status

In 2018, PNX acquired four mining leases (MLs) at Fountain Head (MLN4, MLN1020, MLN1034 and ML31124) with the objective of using Fountain Head as a site to construct a processing plant and tailings facility to treat ore from the Hayes Creek Project. During the 2018 field season, exploration drilling was undertaken to identify additional gold resources at the Fountain Head site. PNX published a Mineral Resource Estimate for the Project containing 2.58 Mt at 1.7 g/t Au for 138,000 oz Au (reported in accordance with the JORC Code, 2012, see ASX release 11 July 2019 for full details including JORC tables). Recent Reverse Circulation (RC) drilling efforts have confirmed new zones of broad, high-grade gold mineralisation intersected near surface in the area between the Fountain Head and Tally Ho mineral lodes over a strike extent of approximately 100 m. These zones have returned grades above the anticipated 0.5 g/t. PNX Metals is actively continuing exploration and further defining the resource.

The Fountain Head area is part of the Northern Territory Goldfields where extensive mining and exploration activity dates back to the 1870s. Mining in the area was undertaken intermittently between 1883 and 1951. More recently a small open cut pit was excavated at the site by Dominion Mining in the 1990s. Northern Gold acquired the leases in 2001 and then in 2005, GBS Gold Australia acquired Northern Gold. GBS Gold mined the Fountain Head and Tally Ho deposits between 2007 to 2008. GBS Gold were mining at Fountain Head when they went into receivership in August 2008, which saw the site placed in care and maintenance. No rehabilitation of the waste rock stockpile has been undertaken and the Fountain Head and Tally Ho pits (separate pits but joined by a bridge) flooded. Kirkland Lake Gold purchased the GBS Gold leases in November 2009. The site has remained under care and maintenance since 2009 with past activities leaving the site highly disturbed.

PNX submitted a notice of intent (NoI) to the Northern Territory Environmental Protection Agency (NT EPA) for the Fountain Head Gold Project in December 2019. The final terms of reference (ToR) were issued on the 11 May 2020 and determined the Project would be assessed at the level of an environmental impact statement (EIS) under the *Environment Assessment Act*.

1.3 Scope and Purpose

This mine closure plan (MCP) has been prepared to meet the EIS terms of reference (ToR) issued by the NT EPA that require the draft EIS to include a conceptual MCP.

This MCP provides the framework for closure of the Project according to the EIS ToR and Guidelines for Preparing Mine Closure Plans (DMP & EPA, 2015). The MCP will be reviewed and updated (as required) during the Project's life considering additional Project detail, site conditions, progressive rehabilitation success and stakeholder engagement. The MCP will be submitted with the mining management plan, required under the *Mining Management Act 2001* (see Section 3.4).

1.4 Objectives

The objectives of this MCP are to:

- Enable all stakeholders to have their interests considered during mine closure planning and for agreement to be reached on post-mining land use.
- Ensure that the process of closure is orderly, cost-effective and timely.
- Develop a schedule for the implementation of the plan.
- Restore and return disturbed sites as close as possible to their original state or to an otherwise agreed end land use.
- Ensure that the final land use is stable, safe, self-sustaining and non-polluting.
- Establish a set of indicators that will demonstrate the successful completion of the closure.

1.5 Mine Closure Consultant

PNX has engaged ERIAS Group Pty Limited (ERIAS) to assist in coordinating the environmental approvals for the Project. This includes preparation of this MCP. Contact details for ERIAS are provided in Table 1.2.

Table 1.2 – Consultant Contact Details

Contact	Phone	Email	Address
David Browne Principal	0419 012 698	david.browne@eriasgroup.com	22B Beulah Road, Norwood, South Australia 5067

2. Project Overview

2.1 Project Location

The Project is located approximately 170 km southeast of Darwin and approximately 13 km east of the Stuart Highway (Figure 2.1). Site access is via Fountain Head and Ban Ban Springs roads. The Alice Springs-Darwin Railway is immediately south of the Project.

The Project is located on an operating cattle station (Ban Ban Springs Station) within a pastoral lease that is within three MLs (MLN4, MLN1034 and ML31124) (Figure 2.2).

There is existing disturbance associated with historical exploration and mining activities (see Section 1.2).

2.2 Project Summary

PNX proposes to recommence mining of the Fountain Head pit, gold will be extracted from the ore via a carbon-in-pulp (CIP) process to a produce gold doré. Dewatering of the Fountain Head void is required for mining to recommence. Mining can recommence before all the water has been removed and subsequently a staged approach to dewatering is proposed. Dewatering will need to be strictly scheduled and managed so that there are no mining and processing delays. Modelling shows that dewatering would need to commence approximately six months in advance for mining to begin as scheduled. An activity breakdown is provided in Table 2.1 below.

Table 2.1 – Project Phases and Components

Project Phase	Activity
Phase 1 – Dewatering	• Dewatering of existing open pit • Remediation and extension of existing water storage dam (evaporation pond) walls
Phase 2 – Construction, Mining, Processing	• Expansion of existing open pit • Construction of the integrated waste landform (IWL) • Establishment of potentially acid-forming (PAF) waste rock stockpile adjacent to the pit • Construction of crushing facilities and gold processing plant (CIP) • Construction of supporting infrastructure, i.e., workshops, power station, roads, offices • Ongoing dewatering of the pit and evaporation pond • Mining of the pit, processing of ore, storage of waste rock and tailings in the IWL. • Progressive rehabilitation of exposed areas and the IWL.
Phase 3 – Closure and Rehabilitation	• Rehabilitation of the integrated waste landform (IWL) • Backfilling of potentially acid forming waste rock into the Fountain Head pit and flooding of the pit • Removal of all plant and infrastructure • Rehabilitation of all disturbed areas • Post closure monitoring and maintenance

PROJECT LOCATION

Fountain Head Gold Project | Mine Closure Plan

FIGURE 2.1

SCALE: 1:1,200,000 @ A4

0 5 10 20 KM

GDA2020 MGA Zone 52

- Populated place
- Site
- Major gold deposit
- Major base metal deposit
- Roads
- Railway
- Watercourse

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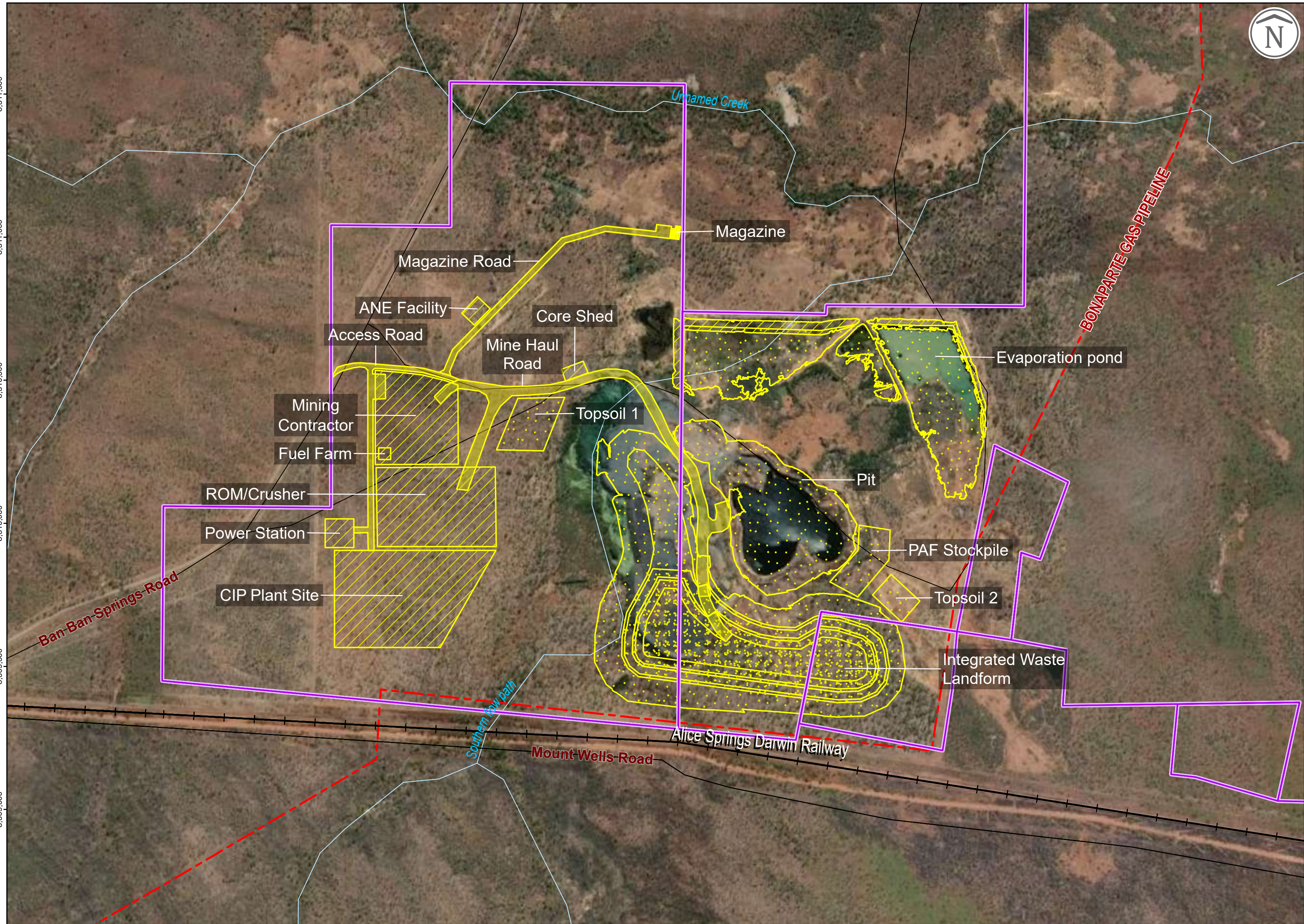
Issue Date:	03.05.2021
Map ID:	01238D_MCP_GIS001_v0-a
Figure Number:	01238D_MCP_F02.1_GIS_v0-a

DATA SOURCE:
Project data from PNX Metals, 2021.
Base data from NT Government, 2021 & GEODATA 250K, 2006.
Imagery © ESRI, DigitalGlobe and Partners, 2021.

PROJECT LAYOUT

Fountain Head Gold Project | Mine Closure Plan

FIGURE 2.2



SCALE: 1:20,000 @ A4

0 100 200 400 M

GDA2020 MGA Zone 52

Road
Railway
Gas pipeline
Watercourse
Mining leases
Infrastructure type
Area
Building
Road

Issue Date: 2021.05.13

Map ID: 01238D_MCP_GIS002_v0-d

Figure Number: 01238D_MCP_F02.2_GIS_v0-d

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DATA SOURCES:
Project data from PNX Metals, 2021.
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2.2.1 Historical Disturbance

Historical mining activities have resulted in significant disturbance to the landscape and surrounding environment in the Project area. Remnant disturbance and infrastructure from past Projects includes:

- Existing WRS.
- Fountain Head Tally Ho open pit (now referred to as the Fountain Head pit).
- Water storage dam.
- Fountain Head Lake.
- Roads and tracks.
- Areas previously disturbed by alluvial mining activities.

Existing disturbance is shown in Figure 2.3.

Existing on-site environmental issues resulting from previous mining activity are managed by PNX under the Fountain Head Tally Ho Care and Maintenance Mining Management Plan and include:

- Land erosion.
- Weed infestation.
- Unrehabilitated WRS.
- Large areas of bare soil, with no rehabilitation.

2.2.2 Project Interaction with Pre-existing Site Conditions

In selecting the location for Project infrastructure, PNX's preference has been to locate infrastructure on land that has already been disturbed, i.e., areas with little vegetation growth, thereby avoiding clearing areas of undisturbed vegetation so far as reasonably practicable.

The Project provides an opportunity for the controlled removal of weeds in the Project area, particularly dense infestations of Gamba grass located around existing infrastructure. PNX maintains a weed management plan which will be used to manage the weeds on site to prevent further spread in the Project area.

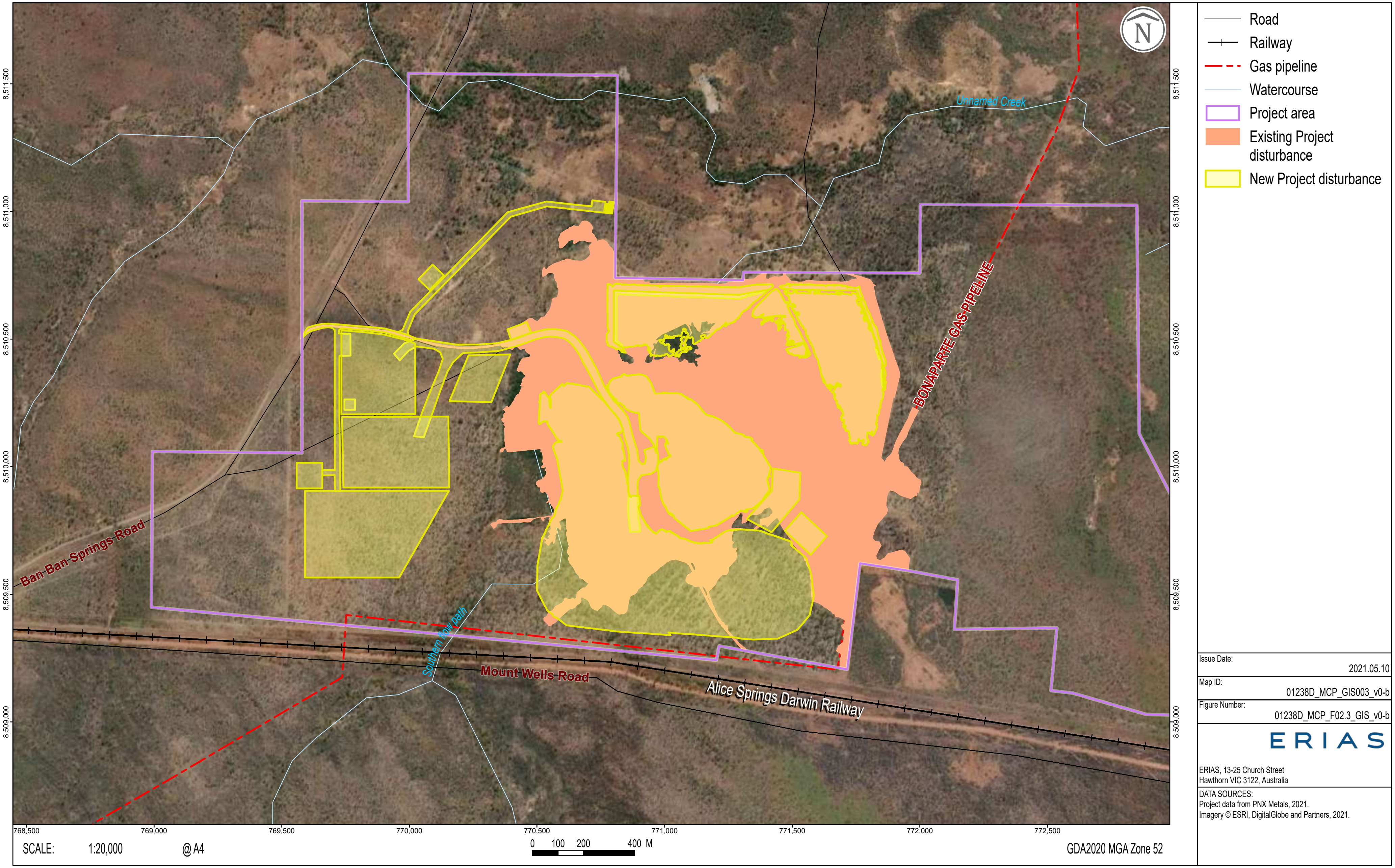
Sediment controls, e.g., sediment dams, will capture surface water runoff around the IWL and Project infrastructure. The existing WRS has not been rehabilitated following previous mining activity. PNX plans to progressively rehabilitate the WRS (IWL) as it is expanded during operations. Results of geochemical testing of the existing waste rock in the WRS show all samples as non–acid-forming (NAF), indicating that the waste rock tested is very unlikely to produce acid and metalliferous drainage (AMD) and is suitable for general construction.

An existing water storage dam will be converted to an evaporation pond following minor remediation to the existing wall and an extension to increase storage capacity. Remediation of the

EXISTING AND NEW PROJECT DISTURBANCE

Fountain Head Gold Project | Mine Closure Plan

FIGURE 2.3



Issue Date: 2021.05.10

Map ID: 01238D_MCP_GIS003_v0-b

Figure Number: 01238D_MCP_F02.3_GIS_v0-b

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DATA SOURCES:
Project data from PNX Metals, 2021.
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dam will improve structural integrity and the dam's potential use post closure for other land uses, e.g., water storage for stock water and/or irrigation.

2.2.3 Project Layout

The Project area is approximately 634 ha (Table 2.2). Existing disturbance affects 165 ha or 26% of the overall area and the new Project disturbance is estimated to be an additional 81 ha or 13% (See Figure 2.3).

Table 2.2 – Project Infrastructure and Land Clearing on the Project Area

Land Area	Area (ha)	% of Project area
Project area	634.58	-
Fountain Head Gold Project footprint area	155.0	24.4
Pre-existing disturbance, including pit lake and dam	164.7	26.0
Fountain Head Gold Project footprint within existing disturbance	74.5	11.7
Fountain Head Gold Project new land clearance	80.6	12.7

The Project design will be refined during detailed design, and the disturbance footprint may change.

2.3 Mining

2.3.1 Mine Schedule

The draft mining schedule has been designed to supply approximately 750,000 tpa of ore for processing. To achieve this production rate the pit will be mined in stages to ensure consistent ore supply while pre-stripping other areas of the pit.

The current pit design has the following material summary (Table 2.3), with further refinement of the pit, it is expected that the stripping ratio will improve increasing the Project economics.

Table 2.3 – Fountain Head Pit Materials

Material	Units	Quantity
Ore	Tonnes	2,722,437
Waste	Tonnes	17,754,275
Total materials	Tonnes	20,476,712
Strip ratio	Waste:Ore	6.5:1

The current mine life is approximately 3.5 years and could be extended with future exploration drilling which is currently planned to occur in close proximity to the current pit design.

2.3.2 Pit Design

The Project involves a cutback of the existing open pit void left following mining undertaken by GBS Gold, and an extension to the existing void in a northwards direction (Figure 2.4). The existing pit will be deepened by approximately 65 m.

Pit parameters will be similar to Table 2.4 based on assessment of previous geotechnical reports and observations of wall performance of the existing pit.

Table 2.4 – Pit and Haul Road Design Preliminary Parameters

Feature	Unit	
Surface RL (mine grid)	mRL	1,105
Final pit floor (mine grid)	mRL	965
Total pit depth	m	140
Pit length	m	700
Pit width	m	400
Road width – dual lane	m	30
Road width – single lane	m	17
Ramp gradient	V:H	1:8
Batter height	m	15
Berm width	m	5
Upper batter angle	°	55
Lower batter angles	°	60 to 70
Overall pit slope	°	~45

2.3.3 Existing Waste Rock Storage

The existing WRS, located to the west of the pit, was constructed during the last phase of mining by GBS Gold from 2007 to 2008 (see Figure F011). No rehabilitation of the WRS has occurred and while batters are at the angle of repose (Plate 2.1), the WRS is generally stable and some revegetation, particularly where oxide waste rock has been placed, has occurred. Geochemical testing of the existing waste rock in the WRS show all samples as NAF.

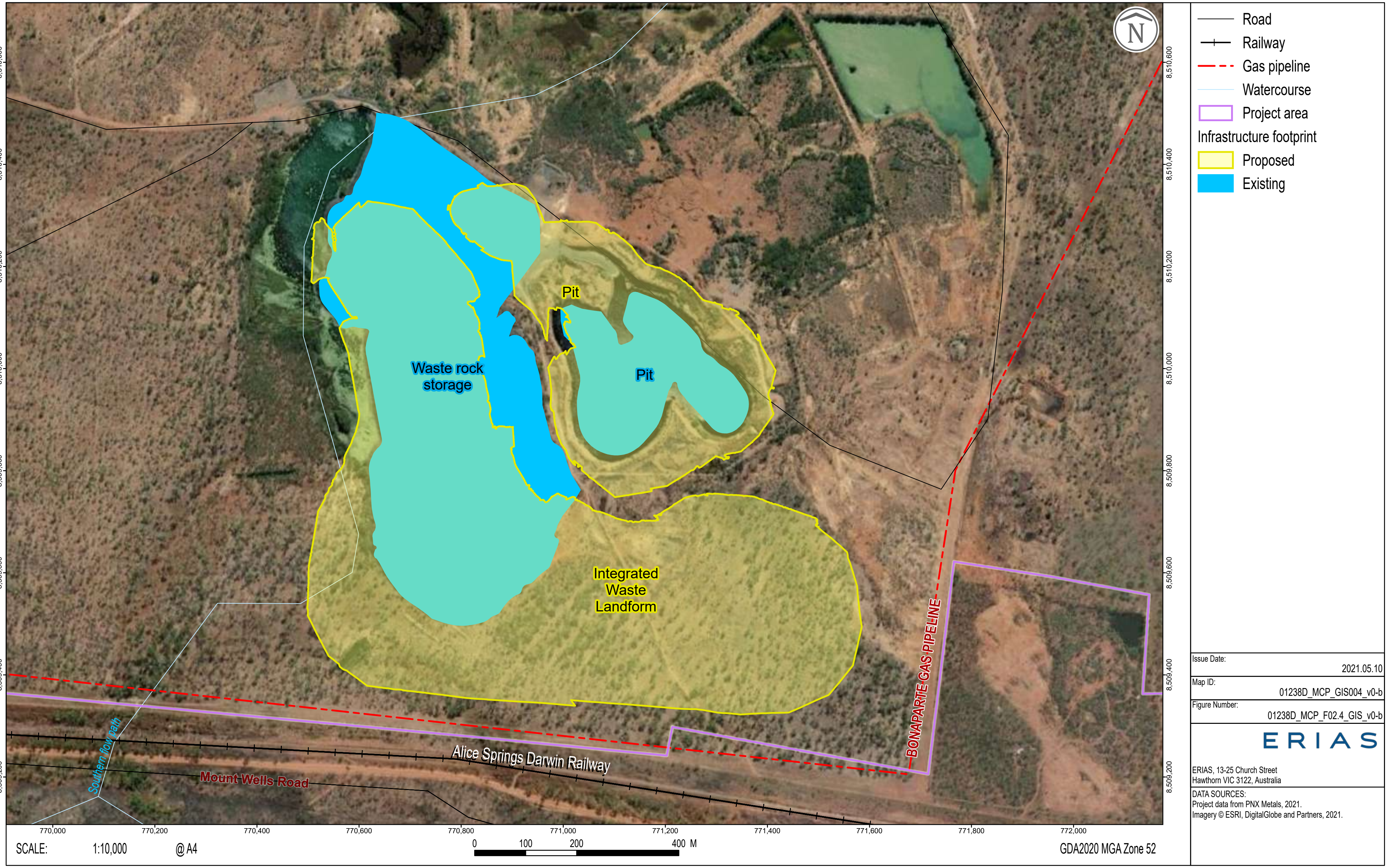
Plate 2.1 – Existing Fountain Head Waste Rock Storage

Source: PNX Metals.

PROPOSED FOUNTAIN HEAD PIT AND IWL IN COMPARISON TO EXISTING PIT AND WRS

Fountain Head Gold Project | Mine Closure Plan

FIGURE 2.4



2.3.4 Integrated Waste Landform

The waste rock will then be excavated from the pit and hauled to the IWL, and the ore will be hauled to the dedicated ROM pad for stockpiling and subsequent processing. The IWL will be integrated into the existing WRS and will contain all waste rock and tailings generated for the Project. The tailings will be placed within a dedicated cell within the IWL with approximately 20m of waste rock between the tailings embankment and the outer edge of the IWL. Integration of tailings with waste rock has several advantages, including:

- Negating the need for a separate tailings storage facility.
- Improved landform stability though placing approximately 20m of waste rock around the tailings embankment.
- Filter-press tailings (approximately 10% moisture content) will enable machinery to traffic over the tailings and subsequently increasing the density of tailings and reducing infiltration. The lag between the cessation of processing and rehabilitation of the tailings surface will also be shorter as the need to wait for tailings to dry out and consolidate is reduced.
- The ability to undertake progressive rehabilitation as the landform develops throughout operations.

The IWL landform design parameters are outlined in Table 2.5, a conceptual design of the IWL is provided in Figure 2.5.

Table 2.5 – IWL Parameters

Feature	Value
Embankment crest height (m)	22.5
Storage capacity (Mt)	2.87
Tailings storage capacity (Mm^3)	1.37
Maximum waste crest height (m)	40
Waste capacity (Mt)	18.75
Waste capacity (Mm^3)	6.94
Batter angle, final rehabilitation (°)	~18

Waste rock will be placed around the tailings embankment to form a ‘doughnut’ shaped structure within which the tailings will be placed. The filtered tailings will be trucked to the storage cell within the IWL which will be lined with compacted clay complete with an underdrainage system.

At closure the tailings will be capped with 0.5 m of compacted clay and 1.5 m of waste rock to minimise the potential for water to infiltrate through the tailings to groundwater and reduce the risk of mobilising metals. The IWL will also be shaped into a convex landform to encourage runoff.

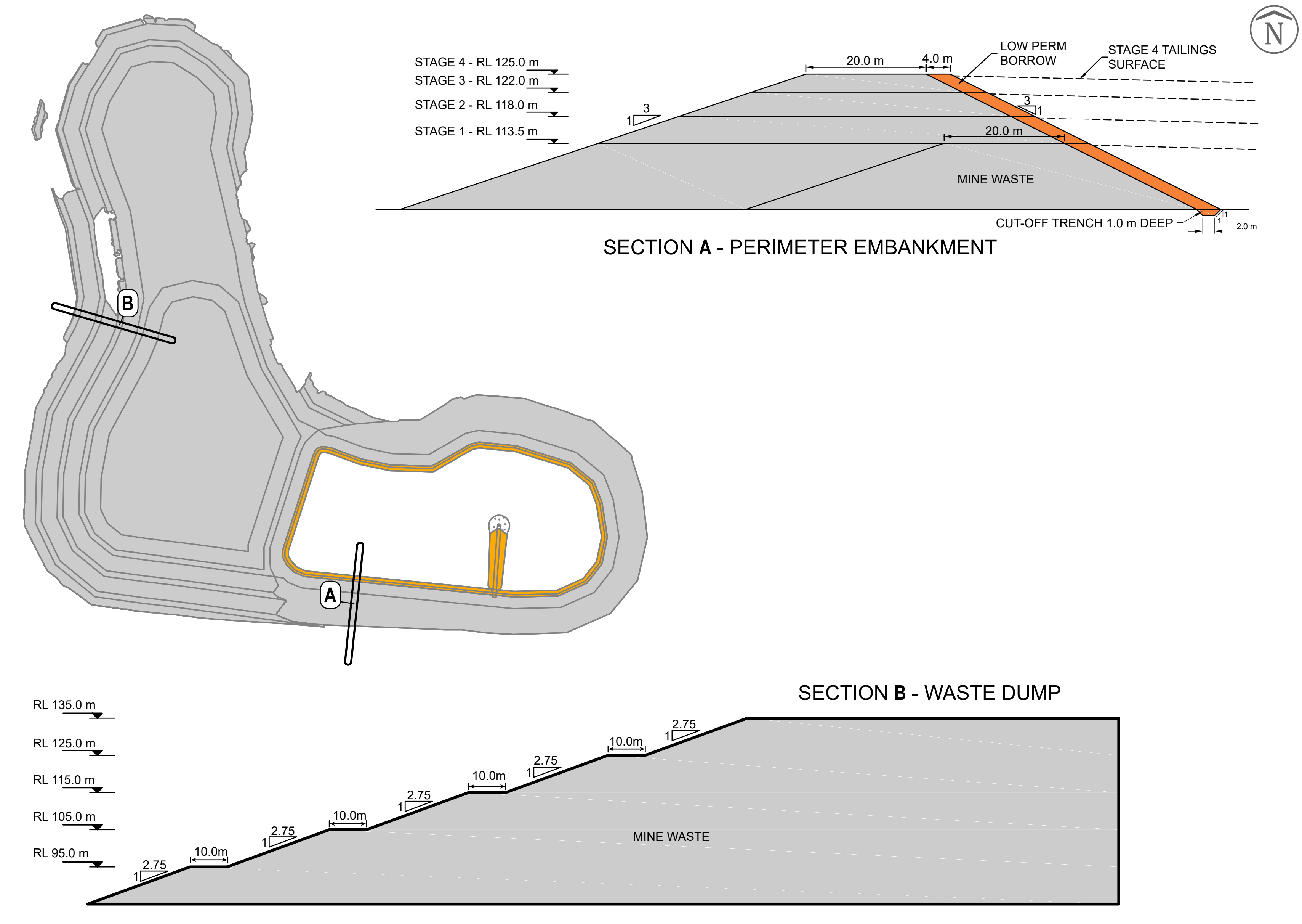
2.3.5 PAF Stockpile

Waste rock which has been classified as being PAF, i.e., sulphur content above 0.2%, will be segregated and stockpiled adjacent to the open pit (See Figure 2.2). The location of the PAF stockpile has been selected to facilitate pushing PAF material into the pit for permanent storage

CONCEPTUAL IWL DESIGN

Fountain Head Gold Project | Mine Closure Plan

FIGURE 2.5



Competent rock

Clay liner

Waste rock

SCALE: 1:10,000 @ A4

0 100 200 400 M

GDA2020 MGA Zone 52

Issue Date: 2021.05.25

Map ID: 01238D_MCP_GIS007_v0-b

Figure Number: 01238D_MCP_F02.5_GIS_v0-b

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DATA SOURCES:
IWL design from Appendix 26 of the EIS.
Project data from PNX Metals, 2021.

(below water), without the need for haulage, at the completion of mining. Volumes of both oxidised (oxide + transitional) and fresh waste rock and ore to be mined from the proposed expanded Fountain Head pit have been estimated under the current mine plan. The estimates show only around 60,000 m^3 (150,000 t) of PAF waste rock and 20,000 m^3 (70,000 t) of PAF ore will be mined. The total amount of PAF and PAF-LC waste rock is estimated at around 280,000 m^3.

At the conclusion of mining, NAF waste rock from the IWL will be tipped over the edge of the pit to cover benches. This will avoid PAF material being caught on the benches and potentially not falling to the bottom of the pit when it is pushed into the pit at the completion of mining. Once in the pit, PAF material will be inundated through natural groundwater recharge and pumping of water from the evaporation pond back to the pit. Once submerged, any potential impacts relating to AMD drainage will be mitigated.

2.4 Processing Plant

The gold bearing ore from mining will be stockpiled on the ROM. The process plant will treat the ore by CIP method. The major components of the plant (crushing, grinding and leaching circuits, reagents store, plant infrastructure services, laboratory and offices) are positioned to be accessible for operation and maintenance. During decommissioning, all processing plant infrastructure will be removed and a site contamination assessment will be undertaken.

2.5 Associated Infrastructure Construction

Supporting infrastructure will be removed during closure will include:

- Main administration office, ablution block and carpark.
- Crib room for mine workers.
- Workshop, stores, service bay and stockyard.
- Heavy vehicle washdown pad and oil separators.
- Diesel fuel and oil storage and dispensing facilities.
- Power generation facility.
- Exploration core shed with office and ablutions.
- Perimeter and internal fencing with signage.
- Explosive magazines.
- ANE Storage sheds/facility.
- Water storage/evaporation dam.
- Mine access roads.
- UHF Radio repeater communications tower.

3. Closure Obligations and Commitments

3.1 Terms of Reference

The NT EPA Terms of Reference (TOR) for the Project (NT EPA, 2020) identifies the following mine closure requirements:

1. Provide clear descriptions and maps of the mine lease that delineate and define the PNX responsibility for rehabilitation of legacy disturbances that may or may not be further disturbed by the Project.
2. As the Project has a short life of mine, prepare a conceptual MCP.
3. Develop the MCP according to leading practice guidance (see Section 3.2).
4. Develop the MCP to include the information outlined in Table 3.1.

Table 3.1 – Information Required in the Conceptual MCP

Topic	Required Information	MCP Section
Closure Objectives	• Proposal-specific closure objectives and an explanation of how they are consistent with closure objectives in leading practice guidelines.	• Sections 6.3 & 6.4.
	• Intended future/next land-use and land tenure arrangements.	• Sections 6.2 & 6.4.
	• Stakeholder expectations and an outline of methods (including milestones) for reaching agreement with stakeholders on closure objectives.	• Section 4.
General Plans	• A site plan identifying the intended final landforms of the site.	• Figure 6.1
	• Intended closure timeframes.	• Section 8.1.
	• Expected post closure monitoring and management arrangements, including identification of how these arrangements would be funded and who would be responsible for them.	• Section 9 & 10.2.
	• Indicative volumes, sources and characterisation of materials required for rehabilitation and closure (e.g. fill, cover materials).	• Section 6.4.
	• Methods and processes that will be implemented to address any knowledge gaps associated with specific rehabilitation and closure activities.	• Section 6.6.
Key components: • Open pit.	• For each of the key components, provide the following:	
	• Closure options:	

Topic	Required Information	MCP Section
• Integrated waste landform. • Process plant • Site drainage. • Revegetation.	– Outline all rehabilitation and closure options that have been or are being considered, and where uncertainties remain, outline a process that will be used to decide which closure options will be adopted.	• Section 6.4.
	– Evaluate and compare the potential environmental outcomes and the costs, benefits and residual environmental and social risks of the rehabilitation and closure alternatives considered.	• Section 6.4, 6.7, Appendix 1.
	– Demonstrate that the selected closure option delivers superior post-closure environmental outcomes over other feasible options. Where backfilling the pit is not the selected closure option, demonstrate that the selected option presents an environmental improvement over the pre-existing conditions at the Project site. Demonstrate that there will be no ongoing costs borne by the community and government in future. This should be demonstrated with respect to the principles of ecologically sustainable development.	• Section 6.7.
	• Plans for progressive rehabilitation, including details of any audits and reporting on its progress that would be undertaken.	• Section 8.2.
	• Explanation of how the component rehabilitation contributes to meeting the overall closure objectives.	• Section 8.2.
	Also provide, as relevant to the component:	
	• The intended dimensions and shape of final landforms and detail on whether they will shed or retain surface water and act as a source or sink to groundwater.	• Section 6.4.
	• An assessment of the intended pit lake in accordance with Appendix H of the Western Australian Guidelines for Preparing Mine Closure Plans (DMP & EPA, 2015) including density driven exchange between pit lake water and surrounding groundwater. This assessment should be provided as a contingency measure in the instance the Hayes Creek Project does not proceed.	• Section 6.4.4.
	• Methods for topsoil management and soil profile reconstruction, with demonstration of their effectiveness for rehabilitating disturbed areas and ensuring long term stability.	• Section 8.2.
	• A schedule and strategies to be used for revegetation, including species to be used and their source, and identification of any research that may be required to determine appropriate revegetation methods.	• Section 8.2.
	• A conceptual site model including landforms and final structures that are designed to divert,	• Section 6.6.3.

Topic	Required Information	MCP Section
	capture, retain and/or treat surface runoff from the site.	
Risks to successful rehabilitation and closure	• Description of matters that could influence unanticipated or early closure or care and maintenance of the mine, how this may affect rehabilitation objectives, and the contingency and mitigation measures to be implemented.	• Section 8.3.
	• Discussion of the potential risk that the Project may create an ongoing environmental, social and/or economic legacy if operations are required to cease ahead of schedule due to unforeseen circumstances, prior to the planned closure and rehabilitation of the site.	• Section 8.3.
	• Discussion of the potential risks associated with earthquakes, unusual rainfall events, weeds, fire, flood and climate change.	• Appendix 1

Table 3.2 identifies the preliminary key environmental factors, and associated objectives, that will be addressed in the Draft EIS and in mine closure planning. Protection of the key environmental factors has been a priority in the development of the MCP.

Table 3.2 – Key environmental factors from the TOR

Theme	Key environmental factor	Objective
Water	Hydrological processes	Maintain the hydrological regimes of groundwater and surface water so that environmental values are protected.
Land	Terrestrial environmental quality	Maintain the quality of land and soils so that environmental values are protected.
Water	Inland water environmental quality	Maintain the quality of groundwater and surface water so that environmental values including ecological health, land uses, and the welfare and amenity of people are protected.
Water	Aquatic ecosystems	Protect aquatic ecosystems to maintain environmental water requirements and the biological diversity of flora and fauna and the ecological functions they perform.
People and communities	Social, economic and cultural surroundings	Protect the rich social, economic, cultural and heritage values of the Northern Territory.

Source: NT EPA, 2020.

3.2 Leading Practice

3.2.1 International Council of Mining and Metals (ICMM)

The ICMM recommends that planning for mine rehabilitation and closure should be an integral part of early mine planning and include an early definition of the closure vision, principles and objectives supported by stakeholder engagement (ICMM, 2019; 2020a). Sufficient information is required to demonstrate how mine closure objectives can be met. Rehabilitation and closure plans should consider potential environmental impacts from the Project into the long-term future.

3.2.1 Leading Practice Sustainable Development Program in the Mining Industry: Mine Closure

The Leading Practice Sustainable Development Program in the Mining Industry series of handbooks has been produced to share Australia's world-leading experience and expertise in mine management and planning. The handbook for closure provides a framework for how mine closure should be approached:

> 'Ideally, mines close only when their mineral resources are exhausted, a mine closure plan is in place and the plan is progressively implemented. There is time available for planning, monitoring and trials, and funds are externally held to cover the costs of implementing the closure plan. Predetermined outcomes can be achieved or progressed satisfactorily and there is ample opportunity to overcome any major issue that may create problems after closure. Stakeholders are prepared for the intended closure date, employees can plan to find alternative employment, and the community has the opportunity to work with the mine to ensure sustainable benefits from the mining activities.' (MHW, 2016).

This is not always the reality and in the case of this Project, which has a short mine life, the implications of decisions made during planning and design, construction and operations for closure need to be factored into the decision-making process. The vision of a mine closure plan is to ensure that a process is established to guide all decisions and understand the implications of decisions during the life of the mine.

3.3 Western Australia Guidelines

The EIS ToR state that the MCP is to be prepared considering the Western Australia Guidelines for Preparing Mine Closure Plans (DMP & EPA, 2015). These guidelines provide guidance on the preparation of MCP to meet WA regulatory requirements and are used by other jurisdictions in Australia as they are recognised as an appropriate, and leading practice, reference.

These guidelines have been considered in the preparation of this MCP, especially the structure and content of the plan.

3.4 NT *Mining Management Act 2001*

Section 40 of the *Mining Management Act 2001* requires a mining management plan for the management of a mine site. The mining management plan is to include a plan and costing of closure activities (s. 40(2)).

A certificate of closure may be applied for on the completion of rehabilitation of a mine site (s. 46). The certificate will be issued when the operator has met the completion criteria for the site.

The MCP defines completion criteria (Section 6.3), noting that these will be regularly reviewed as the Project progresses.

3.5 Mine Lease Requirements

There are no known mine lease conditions related to mine closure.

3.6 Legal Obligations Register

As per the ‘Mine Closure Plan Guidance - How to prepare in accordance with Part 1 of the Statutory Guidelines for Mine Closure Plans’ (DMIRS, 2020. Government of Western Australia Department of Mines, Industry Regulation and Safety, V3, March 2020) all statutory obligations relevant to rehabilitation and closure at a given mine site must be identified and provided in a suitable format, usually referred to as a Legal Obligations Register. The Register should form part of the operator’s overarching legal register for all operations on the site.

The Project EIA Section 2 – Approvals and Regulatory Framework provides the overarching legal register which will form the basis for the Mine Closure Legal Obligations Register.

4. Stakeholder Engagement

4.1 Stakeholder Engagement

The preparation of this MCP has been undertaken during a period of travel restrictions due to the COVID-19 pandemic. Engagement with the stakeholders to date has been undertaken during Project scoping, the notice of intent (NOI), project information updates and the Draft EIS.

Since May 2019, stakeholder engagement has been undertaken with NT government agencies, Ban Ban Springs Station, other resource companies, Warai and Wagiman representatives and the Grove Hill Hotel. No comments or issues were raised regarding mine closure.

The statement of reasons (SOR), which is the NT EPA's response to the NOI, identified impacts which were raised by government advisory bodies. These have since been addressed in the Draft EIS and include the following closure matter:

Potential legacy conditions associated with wastes generated at site and the need for additional geochemical investigations and a mine closure plan to be presented as a contingency in the case that the Hayes Creek Project does not go ahead as planned.

PNX will continue to update and refine the Project stakeholder engagement plan which provides structure and processes for keeping communities, government and other stakeholders informed of Project updates and milestones. The ongoing program of engagement will include:

- Maintaining good relationships with landholders, local business and industry, Traditional Owners and government (at all levels).
- Identifying new stakeholders and re-analysing levels of interest and impact regularly to maintain a good understanding of stakeholder needs and concern.
- Keeping stakeholders up to date with relevant Project information in a timely manner and addressing concerns as they arise.
- Meeting government requests for information or further engagement.
- Providing community and government with information about the performance of the Project against environmental objectives and the success of mitigations outlined in the EIS.
- Monitoring and responding to issues raised through the stakeholder management system and incorporating feedback into the Project, where possible.
- Considering community programs to help monitor Project impacts.
- Continuing to provide updates on the progress of the Project on the PNX Metals website.
- Consultation with landholders in particular, specifically the underlying pastoral lease holder, will be maintained by PNX throughout the life of the Project.

- Relevant matters raised during stakeholder engagement will be incorporated into mine closure planning and future versions of this MCP.

5. Baseline Data Analysis

This chapter summarises key environmental data, informed by the Project EIS and related specialist studies, that has influenced the closure objectives and completion criteria that have been developed for the Project (Section 6). Data from ongoing studies during Project development and operations will be used to refine the closure outcomes and completion criteria as mine closure planning advances.

5.1 Existing Land Use

The Project area is located within three MLs (MLN4, MLN1034 and ML31124). The existing disturbance associated with the Project is about 165 ha which represents 19% of the MLs (Table 5.1).

Table 5.1 – Project Disturbance

Lease Number	Lease Area (ha)	Existing Disturbance		Total with new Disturbance	
		Area (ha)	% of Lease Area	Area (ha)	% of Lease Area
MLN1034	304.2	42.1	13.8	94.2	30.9
MLN31124	33.5	9.5	28.4	19.8	58.9
MLN4	529.9	113.1	21.3	125.3	23.6
TOTAL	**867.6**	**164.7**	**19.0**	**239.2**	**27.6**

5.2 Geology and Land Systems

The Project deposits are located within the Pine Creek Inlier or 'Pine Creek Geosyncline', an ancient granitic basin overlain by shallow marine to continental supracrustal rocks (sediments and volcanics) that accumulated in less than 20 million years (Needham et al., 1984).

The cyclic siltstone, mudstone and greywacke packages of the Fountain Head and Tally Ho mineralisation have been metamorphosed over time to greenschist facies. In the area, stratigraphy is folded along northwest-southeast axes that plunge shallowly to the southeast.

Mineralisation at Fountain Head is intimately associated with the Fountain Head Anticline. The Tally Ho deposit is located just to the southwest of Fountain Head deposit and sits on the western limb of the Fountain Head Anticline. Mineralisation occurs in veins as either conformable anticlinal lodes (with flanking mineralisation) or subvertical 'ladder vein' styled mineralisation, and is found within mudstones, greywackes and phyllite units. Gold is associated with quartz veining containing a pyrite-arsenopyrite sulphide assemblage and coarse gold is also not uncommon.

The Project comprises two land systems: Rumwaggon and McKinlay. These represent sandstone plains and rises, and alluvial floodplains, respectively, i.e., low rounded hills and gravelly ridges with intervening alluvial floodplains and channels.

5.3 Geochemistry

5.3.1 Existing Waste Rock

Evidence from surface water monitoring is that the existing waste rock is non-acid forming and is not generating acidic or neutral metalliferous drainage (Appendix 3 of the EIS). This is further supported by geochemical testing of the existing waste rock which indicates this material is unlikely to generate any acidity, with all but one sample tested classified as clearly NAF (Appendix 6 of the EIS).

The acid neutralising capacity/maximum potential acidity (ANC/MPA) ratios indicate this material is unlikely to produce acidic drainage and presents low environmental risk. Leach testing (using water extracts) of material from the existing waste rock stockpile produced extracts with a neutral pH, low salinity and very low or non-detectable concentrations of metals and metalloids (Appendix 6 of the EIS).

5.3.2 Waste Rock from the Fountain Head Pit

Testing of the waste rock to be removed from the Fountain Head pit indicated that most samples (80%) were NAF, while 15% were potentially acid-forming low capacity (PAF-LC) and 5% were potential acid forming (PAF), indicating that pyritic rock is not widespread (Appendix 6 of the EIS). A more precise estimate of PAF material will be determined following further testing. The majority of waste rock is expected to have sufficient neutralising capacity to prevent acid generation.

Leach testing of waste rock to be removed from the Fountain Head pit was undertaken using water extracts and accelerated oxidations with hydrogen peroxide (Appendix 6 of the EIS). Water extractions on waste rock included testing of PAF, PAF-LC and NAF materials. All water extracts produced circumneutral to alkaline solutions with low salinity. With the exception of aluminium, metal concentrations in water extracts for NAF samples (≤0.2%S) were significantly lower than PAF/PAF-LC (>0.2%S) samples; however, metal concentrations in all water extracts were generally very low to non-detectable.

Peroxide testing of waste rock was also undertaken on PAF, PAF-LC and NAF materials. This test provides an indication of metal and metalloid concentrations associated with acidic runoff from waste rock subject to oxidation processes following exposure and surface storage. The results showed a correlation between the total sulphur content of a sample and the amount of metal and metalloids dissolved in peroxide extracts, particularly iron, copper, cobalt, nickel and arsenic. It was noted however that samples with a relatively low total sulphur content (<0.35%) also had elevated concentrations of some metals (Al, Co, Mg, Ni, Pb and Zn) in peroxide extracts. The results indicate that runoff from oxidised waste rock containing more than 0.2% sulphur (i.e., PAF material) may contain elevated concentrations of some metals and metalloids.

During mining, the sulphide content of waste rock will be assessed with a cut off of 0.2% Total S proposed. Waste rock with a sulphur content above 0.2% will be considered PAF and will be temporarily stockpiled adjacent the pit.

5.3.3 Ore

Testing of ore material (prior to processing) indicated that it was NAF with low sulphur content and acid neutralising capacity (ANC) (Appendix 6 of the EIS). Testing (using water extracts) of one ore sample indicated that leachate was mildly alkaline with low salinity and low to undetectable metal and metalloid concentrations (Appendix 6 of the EIS). Based on these testing results, rainfall runoff from ore on the ROM pad during operations presents minimal risk for producing acid or saline drainage or mobilising metals.

5.3.4 Tailings

Testing of cyanide-leached ore was undertaken to understand the likely quality of runoff water from surface storage of tailings. In the absence of oxidation, fresh tailings may produce leachates containing elevated arsenic concentrations on contact with water, with results indicating concentrations of arsenic could be more than 100 times higher than the ANZG (2018) default guideline value for slightly to moderately disturbed aquatic ecosystems. Other metals including cobalt, copper, molybdenum, antimony and uranium were also elevated above guideline values for some tested samples. Peroxide leach testing indicates that once tailings are oxidised, leachate may contain high concentrations of arsenic, aluminium, cadmium, cobalt, chromium, copper lead and zinc. Arsenic is naturally enriched above average soil abundance in the tailings with a generally strong correlation with arsenic and sulphur concentrations, i.e., arsenic is likely associated with sulphides in the tailings.

5.4 Climate

The Project area is characterised by distinct wet (November to April) and dry (May through October) seasons. Climate and meteorological data recorded from the nearest Bureau of Meteorology (BoM) monitoring station, the Douglas River Research, located approximately 50 km southwest of the Project, indicates that the climate is largely typical of the tropical Northern Territory region.

The highest average maximum daily temperature recorded between 1996 and 2019 was 37.9°C (October), with the lowest average minimum temperature of 12.9°C recorded in July (Katestone, 2020) (Figure 5.1).

Average daily solar exposure from 1990 to 2020 indicates solar exposure levels are relatively even throughout the year with little seasonal variation (Katestone, 2020).

Annual average rainfall at the Douglas River Research Farm from 1968 to 2020 is 1,246 mm, with 91% of annual rainfall occurring from November to March, and 0.5% occurring from June to August (Katestone, 2020).

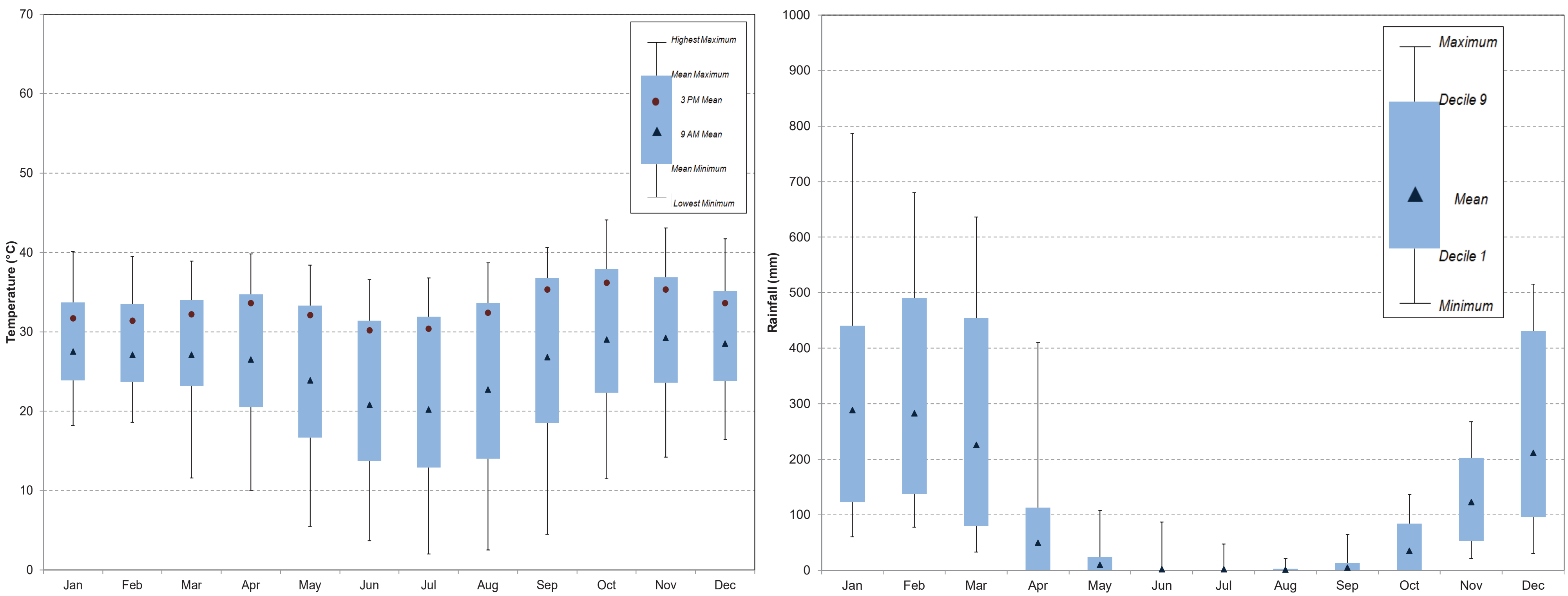
Wind direction data from the Douglas River Research Farm monitoring station shows there are two dominant wind directions, with seasonal and diurnal variation. Winds during the wet season occur predominantly from the northwest, and from the southeast during the dry season. Diurnal wind distribution indicates that during the day winds are predominantly from the southeast, particularly in the afternoon, and are typically the strongest winds to occur. Winds during the night are predominantly from the northwest.

Cyclones occur in the Darwin catchments on average at least once every two years.

TEMPERATURE RANGE AND AVERAGE MONTHLY RAINFALL

Fountain Head Gold Project | Mine Closure Plan

FIGURE 5.1



Source: Katestone, 2020

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5.5 Ecology

Flora and fauna surveys were conducted by Low Ecological Services in May 2017 and August 2019 (Appendix 8 of the EIS). Five habitats were identified during the on-ground survey within the Project area; open forest on alluvial floodplain, open woodland on sandstone plain, creek lines and riparians zones, pit lakes and tailings dams and disturbed areas. Examples of these habitats in the Project area are shown in Plates 5.1 – 5.5, and their locations are shown Figure 5.2.

Plate 5.1 – Open Forest on Alluvial Floodplain

Plate 5.2 – Open Woodland on Sandstone Plain

Plate 5.3 – Creek Lines and Riparian Zones

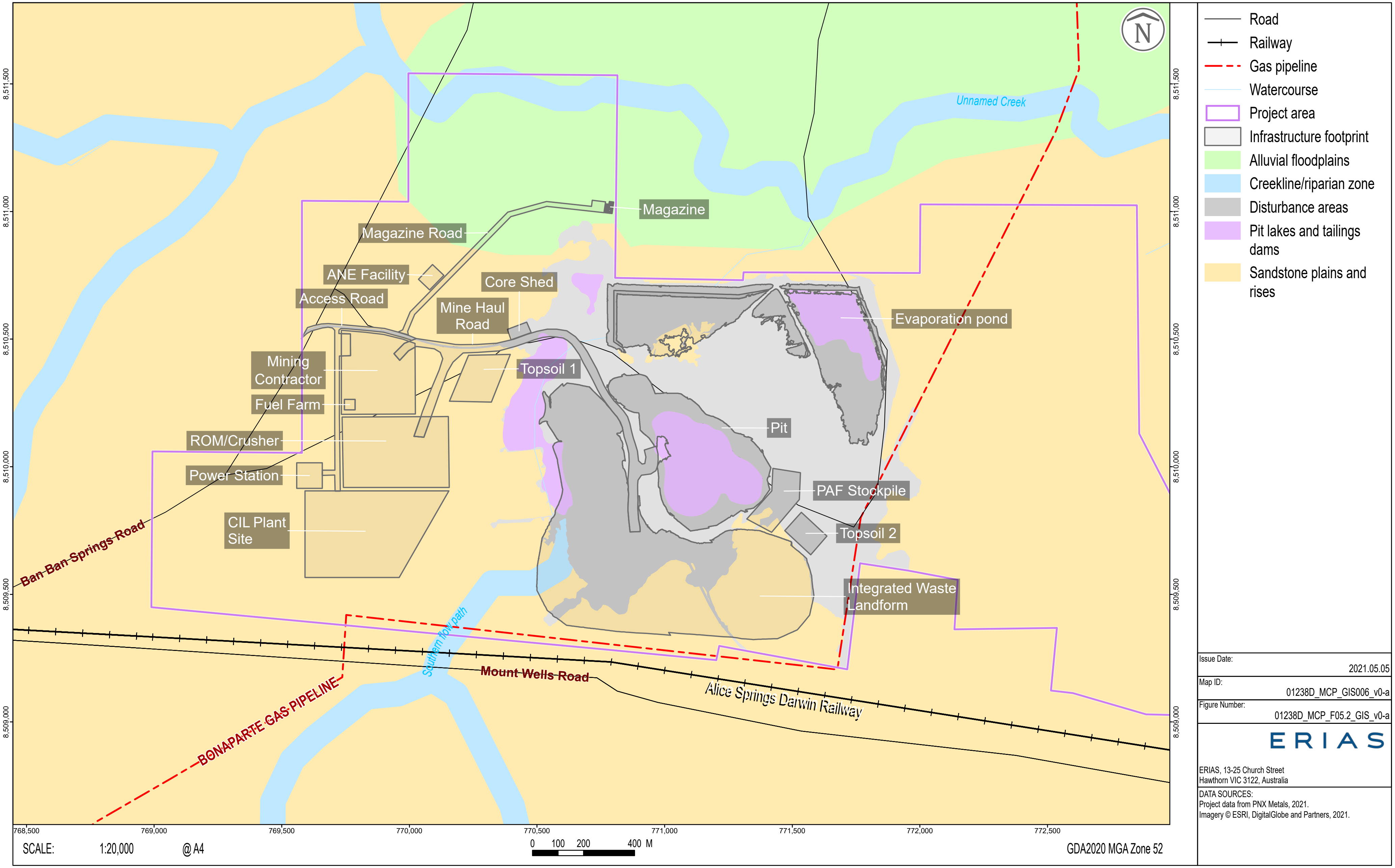
Plate 5.4 – Pit Lakes and Tailings Dams

Plate 5.5 – Pastoral and Mining Impacted Habitat – Fountain Head Survey Area

LOCATION OF HABITAT TYPES WITHIN THE PROJECT AREA

Fountain Head Gold Project | Mine Closure Plan

FIGURE 5.2



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Issue Date: 2021.05.05

Map ID: 01238D_MCP_GIS006_v0-a

Figure Number: 01238D_MCP_F05.2_GIS_v0-a

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Hawthorn VIC 3122, Australia

DATA SOURCES:
Project data from PNX Metals, 2021.
Imagery © ESRI, DigitalGlobe and Partners, 2021.

Typical vegetation associated with each habitat type is described in Table 5.2.

Table 5.2 – Vegetation Associated with Each Habitat Type Recorded in the Project Area.

Habitat Type	Primary Vegetation recorded
Open forest on alluvial floodplain	*Melaleuca viridiflora, Corymbia polycarpa, Eucalyptus confertiflora, Corymbia apodophylla, Lophostemon lactifluus, Acacia auriculiformis*
Open woodland on sandstone plain	*Corymbia latifolia, Erythrophleum chlorostachys, Eucalyptus tectifica, Eucalyptus miniata* and *Eucalyptus tintinnans*
Woodland on low sandstone hills	*Erythrophleum chlorostachys, Eucalyptus tintinnans and Eucalyptus clavigera, Erythrophleum chlorostachys* (mid-storey) and *Corymbia bleeseri*
Creek lines and riparian zones	*Nauclea orientalis, Bambus arnhemica, Ficus* sp. and *Melaleuca leucadendra*
Pit lakes and tailings dams	Nil
Disturbed areas (pastoral/mining/tracks)	Disturbed areas were a combination of cleared tracks, pits and gravel patches with little to no vegetation and revegetated areas consisting of *Eucalyptus tectifica, Acacia holosericea* and *Calytrix* sp.

Source: Appendix 8 of the EIS.

During the May 2017 and August 2019 on-ground surveys a total of 143 flora taxa were recorded across the survey area. No flora species of conservation significance were identified in the survey area during the May 2017 and August 2019 surveys, despite targeted survey effort for *Acacia praetermissa* and *Stylidium ensatum*. Potential habitat for *S. ensatum* was identified as part of the open forest on alluvial plains but no individuals were identified. Specimens collected from two sites during the May 2017 survey were sent to the NT Herbarium and identified as *Stylidium sp*. but could not be identified to species level due to a lack of flowers or fruits. No specimens of *Stylidium* were recorded during the August 2019 survey. Several other flora species could not be identified to species level. However, all were determined to not be threatened species due to their identified genus, description and/or location.

No threatened ecological communities were identified within 20 km of the Project area.

During the 2017 and 2019 field surveys, a total of 24 introduced flora species were identified within the survey area. An introduced species is defined as plants, animals, pathogens and other organisms that are living outside their native distributional range and have arrived there predominately due to anthropogenic activity, either deliberately or accidentally. Five of the 24 introduced species that identified within the survey area were identified within the Fountain Head Project area. Two species identified in the Project area (Gamba grass and Grader grass) are listed weeds in the Northern Territory. Gamba grass was prevalent across the Project area, particularly around most of the edge of the existing pit, along the fence running parallel with the train line and scattered throughout disturbed areas. The identified species have all been declared as weeds under the NT *Weeds Management Act*.

A total of five native amphibians, 61 native birds, 10 native mammals and two native reptile species were recorded across the Project area during the May 2017 and August 2019 surveys. An additional one bird taxa and six mammal taxa could not be identified to species level.

6. Closure Planning

6.1 Closure Vision

Planning for closure has been integral to the development of the Project with a particular focus on minimising disturbance in areas not previously impacted by mining. PNX developed the following Closure Vision to guide its decision making in the development of this closure plan.

Development of the Fountain Head Gold Project will reduce vegetation clearance by locating project infrastructure on previously disturbed and unrehabilitated areas. The closure of the site will address current legacy rehabilitation issues by integrating these legacy areas into the Project footprint resulting in a site which is safe, stable and discharges from the site complying with Australian water quality guidelines (ANZG, 2018) for slightly to moderately disturbed aquatic ecosystems. The final land use for the site will be a mixture of grazing and natural vegetation communities.

6.2 Closure Domains

Mining will create different landforms and infrastructure on the site, each having different rehabilitation and closure requirements. The use of domains is a common approach in mine closure planning to identify areas within a mine site which have common issues. Once domains have been identified, a closure plan can be identified for each domain based on the key attributes and issues associated with the domain. The Project has been divided into eight closure domains for the purposes of this MCP (Table 6.1 and Figure 6.1). Appropriate closure strategies have been developed to address the specific requirements of each domain.

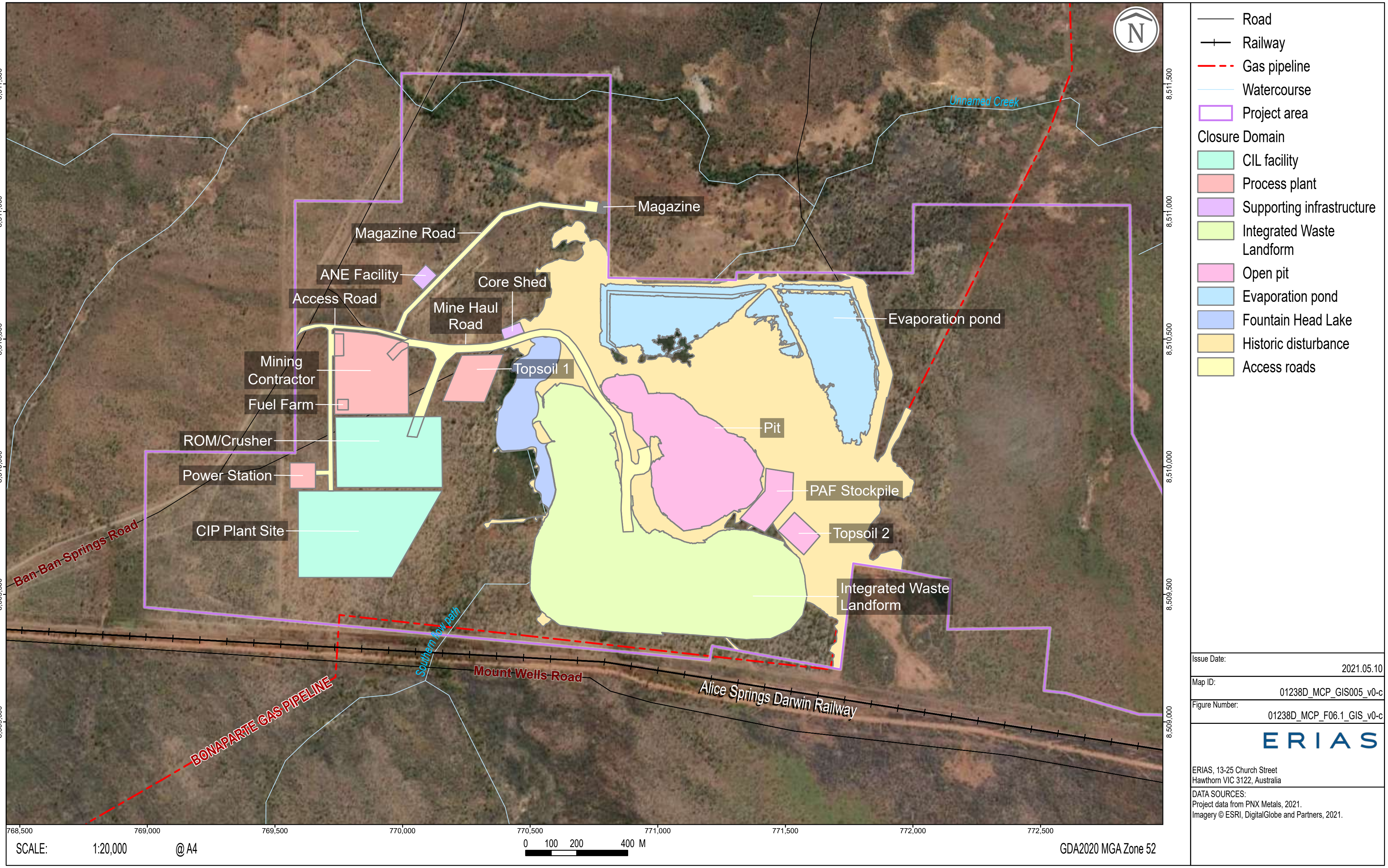
Table 6.1 – Project Closure Domains

Closure Domain	Components	Area (ha)
Process plant	Fuel farm Mining contractor yard CIL plant site Power station ROM/crusher Topsoil stockpile 1	0.17 8.22 15.81 0.99 11.19 3.01
	Sub-total	39.40
Supporting infrastructure	PNX core shed Bund crest Bund ANE facility	0.36 0.01 0.08 0.48
	Sub-total	0.94
Integrated waste landform	Waste rock storage, tailings storage facility	55.40
Open pit	Fountain Head pit Potentially acid-forming (PAF) stockpile Topsoil stockpile 2	19.39 2.72 1.34
	Sub-total	23.44
Water storage (evaporation pond)	Evaporation pond	24.06

PROJECT CLOSURE DOMAINS

Fountain Head Gold Project | Mine Closure Plan

FIGURE 6.1



Issue Date: 2021.05.10

Map ID: 01238D_MCP_GIS005_v0-c

Figure Number: 01238D_MCP_F06.1_GIS_v0-c

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DATA SOURCES:
Project data from PNX Metals, 2021.
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Table 6.1 – Project Closure Domains (cont'd)

Closure Domain	Components	Area (ha)
Fountain Head Lake	Fountain Head Lake	7.35
Access roads	Mine haul roads Access roads Magazine road	7.11 2.36 2.19
	Sub-total	11.66
Historic disturbance	Miscellaneous areas	77.17
TOTAL		**239.42**

6.2 Post-mining Land Use(s)

As identified in Section 1.4, the overall objective of this MCP is to achieve a post-mining land use that is safe, stable, self-sustaining and non-polluting.

Consideration of potential post mining land uses has been undertaken by assessing the Project features post mining and current land uses surrounding the Project. The proposed post-mining land use is to return the land to cattle grazing, with the exception of the following that will be fenced to restrict access and exclude stock:

- Pit: the pit will fill with water as groundwater levels rebound.
- IWL: the IWL will be rehabilitated to establish a post-mining land use of native vegetation and remain a new feature of the landscape.

It is proposed that the evaporation pond will be rehabilitated and returned to grazing. Ban Ban Station has indicated that it would like the Evaporation Pond to remain as a water storage for future pastoral activities. PNX will work with Ban Ban Station during the operational phase of the Project to achieve this outcome.

Post-mining land use(s) will be finalised following discussion with stakeholders, e.g., the landowner, regarding potential land use opportunities post closure and, in particular, whether any of the infrastructure could be used for other land uses.

6.3 Closure Objectives and Completion Criteria

Closure objectives and completion criteria have been developed using the Western Australian government's framework for developing mine-site completion criteria (Young et al., 2019). The framework identifies six key components for the development of, and assessment against, completion criteria:

- Selection of post-mining land use(s).
- Aspects and closure objectives.
- Selection of references (measurable targets that will define completion criteria e.g., analogue sites or baseline conditions).
- Selection of attributes and risk-based prioritisation.

- Development of completion criteria.
- Monitoring.

Completion criteria have been developed for each closure domain. Completion criteria have been developed to ensure they are specific to an environmental aspect and are measurable and attainable for the Project. Quantitative criteria have been prioritised, although where quantitative criteria are not suitable, qualitative criteria have been developed. Completion criteria will continue to be refined as the Project progresses.

6.4 Closure Strategy

The following sections provide an overview of each closure domain, with proposed post-mining land use(s), closure objectives, closure criteria and proposed strategy.

6.4.1 Process Plant

The process plant domain will occupy an area of 39.40 ha and comprise hardstand areas, a number of buildings and Topsoil Stockpile 1. The topsoil will be used for progressive rehabilitation of the Project site.

Table 6.2– Process Plant Domain Strategy

Area of disturbance	39.40 ha
Closure date	2025
Infrastructure to be retained	All infrastructure to be removed
Final land use	Grazing
Closure objectives	• Process plant is rehabilitated such that there are no ongoing safety issues, all contamination is removed, and site is not impacting the surrounding environment. • The visual impact of the rehabilitated site compatible with surrounding landscape and acceptable to stakeholders.
Completion criteria	• Water runoff from the process plant area will not impact environmental values of receiving streams. • Revegetated areas pasture production equivalent to 2000 kg/hectare. • The post-mining profile is integrated into the surrounding landscape
Closure strategy/activities	• The process plant, mining contractor yard, power station and fuel farm will be removed, using specialist contractors where required, e.g., tanks containing cyanide, fuel, taking the necessary precautions when working with hazardous materials and in confined spaces. • The domain will be assessed for contamination with a focus on potential cyanide or hydrocarbon contamination. Any contamination identified, depending on level of contamination, will either be placed into the pit or taken off site for remediation • Place 0.3 m of topsoil or oxide rock over landform. • Contour rip topsoil. • Revegetate using appropriate species. • Implement erosion control as required. • Monitor vegetation establishment and control any weed infestations. • Monitor surface water.
Specific closure assumptions	• Volume of contaminated material equivalent to 0.1 m over area of the process plant domain

	• Sufficient volume of topsoil or oxide rock is available
Closure material sources	• Topsoil or oxide rock (118,200 m³) sourced from stockpiles.
Waste disposal site	• Excess reagents/consumables will be removed from site and either returned to the supplier, recycled or disposed of appropriately • Process plant is likely to have residual value or could be recycled.
Further investigations or liabilities, risks or hazards	• Site contamination assessment following closure.

6.4.2 Supporting Infrastructure

Supporting infrastructure for the Project comprise small, discrete areas that will occupy approximately 1 ha. All supporting infrastructure is located adjacent to access roads, north of Fountain Head Lake.

Table 6.3 – Supporting Infrastructure Domain Strategy

Area of disturbance	0.94 ha
Closure date	2025
Infrastructure to be retained	All infrastructure to be removed
Final land use	Grazing
Closure objectives	• All infrastructure removed to ensure site is safe. • Any contaminated soils identified and remediated by removal, encapsulation or treatment. • Site is safe, stable and non-polluting.
Completion criteria	• Water runoff from the supporting infrastructure area will not impact environmental values of receiving streams. • Revegetated areas pasture production equivalent to 2000 kg/hectare.
Closure strategy/activities	• Excess ANE/explosives will be removed from site by the supplying contractor. • Infrastructure will be dismantled and removed. • Assessment of disturbed areas to determine if any contamination present. Any contamination identified, depending on level of contamination, will either be placed into the pit or taken off site for remediation • Reshape areas if necessary, to manage surface water runoff. • Place topsoil (0.3m deep) over rehabilitated area. • Contour rip disturbed area and revegetate using appropriate species. • Implement erosion control as required. • Monitor vegetation establishment for weed infestations.
Specific closure assumptions	Nil
Closure material sources	• Seed for revegetation collected locally. • Topsoil 2,820m³ sourced from topsoil stockpile
Waste disposal site	• Depending on economics, the infrastructure may be sold or dismantled by a contractor for disposal off site for recycling as scrap metal.
Further investigations or liabilities, risks or hazards	• Site contamination assessment following closure.

6.4.3 Integrated Waste Landform

The final IWL will occupy an area of 55.40 ha (3.6 Ha of new disturbance), with the landform consisting of 5 lifts each of 10m height. A berm of 10m wide will be implemented for each lift. At the completion of each lift the waste rock will be shaped to form a 18^0 batter. Topsoil will be placed above the tailings cap. The upper 3 batters being reshaped to 18^0 and contour ripped but will not have topsoil. Whilst vegetation will establish over time over the entire landform, the focus of revegetation efforts will be on the lower slopes, with higher slopes being covered with competent rock to minimise runoff and provide protection to the lower slopes.

Table 6.4 – Integrated Waste Landform Domain Strategy

Area of disturbance	55.40 ha
Closure date	2025
Infrastructure to be retained	Nil
Final land use	Native vegetation
Closure objectives	• Creation of safe and chemically and physically stable landform that minimises erosion and supports vegetation and is consistent with this MCP. • Surface drainage patterns are reinstated.
Completion criteria	• Runoff from the IWL does not impact environmental values of receiving streams. • Revegetated areas trending towards adjacent vegetation communities located on similar topography in the region. • The post-mining profile is integrated into the surrounding landscape, no slopes greater than 18^o will remain at closure.
Closure strategy/activities	• Remove decant water pump and pipeline • Cap/seal decant tower. • Develop concave landform using filtered tailings at the end of operations. • Construct a store and release cover consisting of: – 0.5m clay compacted to 5×10^{-9}. – 1.5m of loose oxide waste rock. – 300mm of topsoil. • Reshape batters of IWL to achieve batter angle 18^o • Place 300mm of topsoil over the tailings footprint with remainder of topsoil on the lower 2 lifts of the IWL. If no topsoil is available use oxide waste rock. • Contour rip landform and revegetate using appropriate species. • Implement erosion control as required. • Fence the landform to exclude stock. • Redirect seepage under drains (if any seepage) to discharge into the pit. • Remove seepage ponds and rehabilitate. • Monitor vegetation establishment, erosion and weed infestations.
Specific closure assumptions	• Tailings from the CIP processing plant will be filter pressed to produce a filtered tailings of approximately 10% moisture content. • Tailings have sufficient strength to support trucks and dozers travelling across the surface of the tailings. • Sufficient clay suitable to form a compacted clay clover and waste rock is available to cap tailings.

	• Sufficient topsoil is available to cover lower batter of IWL. • All potentially acid-forming material is returned to the pit and will be inundated post mining.
Closure material sources	• 8,100m³ of topsoil, 13,500m³ of compacted clay and 40,500 m³ of oxide rock is required to cover tailings. • Seed for revegetation collected locally.
Waste disposal site	All waste rock to be integrated into landform or used elsewhere on site (e.g., pit safety bund).
Further investigations or liabilities, risks or hazards	• Geotechnical assessment of tailings strength (currently underway). • Long term tailings column leach tests (currently underway). • Cover modelling to confirm proposed strategy. • Closure materials balance assessment.

6.4.4 Open Pit

The total area of this closure domain is 23.44 ha comprising the open pit, PAF stockpile and Topsoil Stockpile 2. The topsoil will be used for progressive rehabilitation of the IWL and other disturbed areas around the site.

The final open pit will be approximately 140 m deep, expanding the current footprint of 6.8 ha to 9.4 ha. The PAF stockpile will occupy an area of 1.1 ha. At the conclusion of mining, the PAF stockpile will be relocated back into the pit and PAF material will be covered with water to prevent any potential AMD.

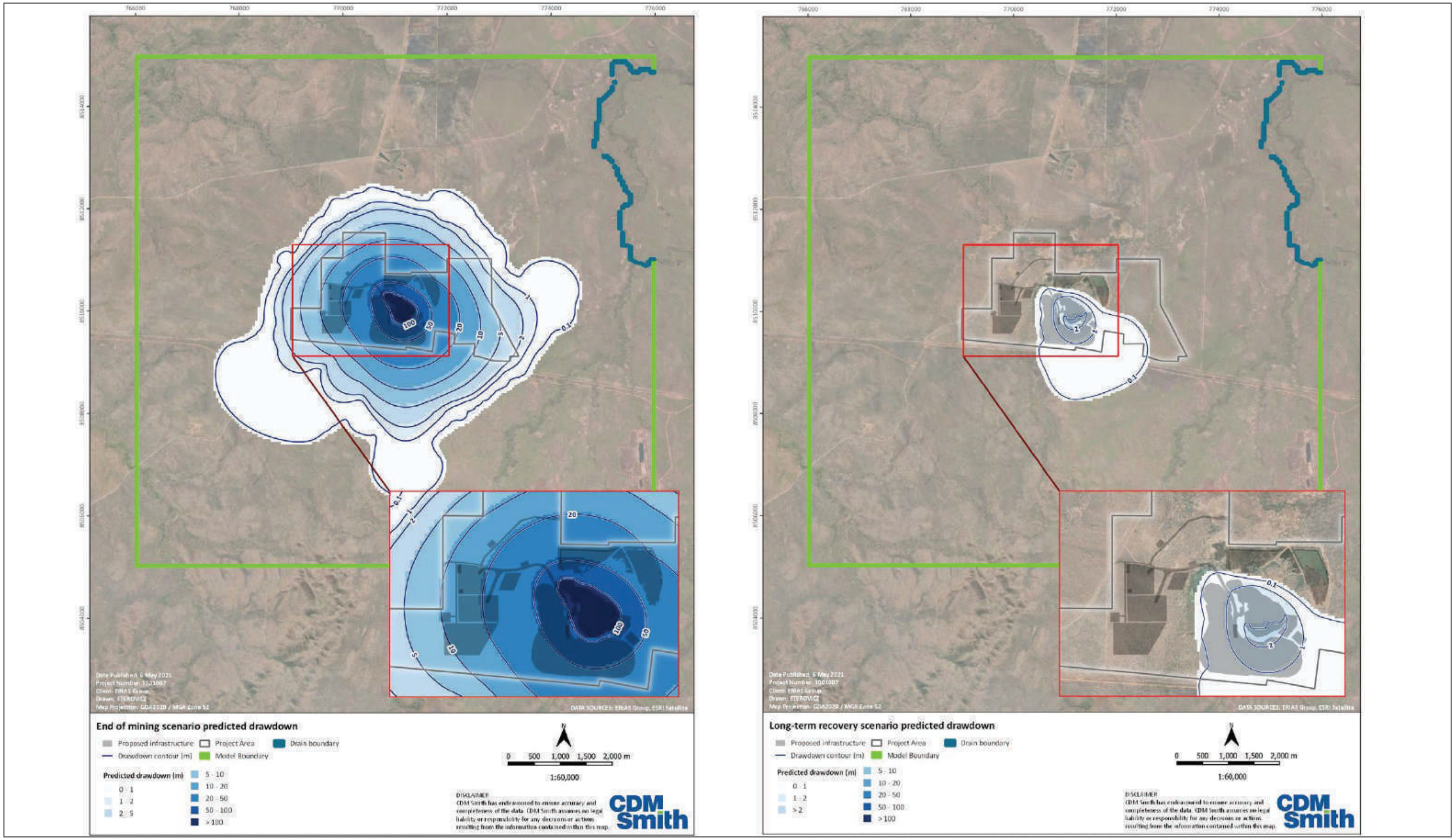
The pit will act as a groundwater sink both during mining and post closure. The recovered pit water level is predicted to stabilise after around 40 years post mining at an average level of 92.7 m AHD, with seasonal variation of 2 m and a maximum predicted drawdown ranging from 2 to 5 m at the furthest extent (Figure 6.2).

In subsequent years, solutes are predicted to concentrate in the pit lake due to the dominance of evaporation over rainfall. The modelling (Appendix 3 of the EIS) shows that after 500 years the TDS concentration in the pit lake is predicted to be around two and a half times the groundwater concentration, if the pit lake functions as a sink to groundwater with a throughflow component that is approximately 20% of groundwater inflow. Metal concentrations are also predicated to increase approximately three-fold. With the exception of arsenic, the water would be suitable for stock drinking water and the protection of aquatic ecosystems (Table 6.5). This predicted outcome would be the same for the existing pit lake, i.e., without the Project occurring.

PREDICTED GROUNDWATER DRAWDOWN LEVELS

Fountain Head Gold Project | Mine Closure Plan

FIGURE 6.2



Source: CDM Smith

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Table 6.5 – Current and Predicted Concentration of Pit Water Chemical Elements after 30 and 500 years

Parameter	ANZECC, 2000 Guideline – Aquatic Ecosystem Protection	ANZECC, 2000 Guideline – Stock Drinking Water	Current	30 years	500 years
EC (μS/cm)	20 or 250	-	409	407	1083
TDS (mg/L)	-	5,000	266	265	704
Hardness (mg$CaCO_3$/L)	-	-	141	140	373
Total Alkalinity as $CaCO_3$	-	-	136	135	360
Calcium (mg/L)	-	1,000	13	13	34
Magnesium (mg/L)	-	-	25	25	66
Potassium (mg/L)	-	-	2	2	2
Sodium (mg/L)	-	-	29	29	77
Sulphate (mg/L)	-	1,000	68	68	180
Aluminium (μg/L)	150	5,000	5	5	13
Arsenic (μg/L)	140	500	567	567	1501
Copper (μg/L)	2.5	400 or 5,000	0.6	0.6	2
Iron (μg/L)	-	-	26	26	69
Zinc (μg/L)	31	20,000	4.4	4.4	12

Table 6.6 – Open Pit Domain Strategy

Area of disturbance	23.44 ha
Closure date	2025
Infrastructure to be retained	Nil
Final land use	Water storage
Closure objectives	• Pit is structurally stable and will not impact on the safety of people or fauna. • PAF stockpile location is structurally stable and will not impact on the safety of people or fauna.
Completion criteria	• PAF material placed back into open pit and submerged with water to prevent acid and metalliferous drainage. • Pit lake water quality is similar (±10%) to predicted water quality if the Project had not occurred. • Abandonment bund is established around the pit in accordance with DIR (1997).
Closure strategy/activities	• PAF waste rock is returned to the pit post mining. • Inundate the pit either through natural groundwater recharge and by pumping of mine water from the evaporation pond back to the pit. • A pit safety bund will be constructed outside the area designated as the 'potentially unstable pit edge zone' according to DIR (1997). Where practicable, the safety bund will be constructed during operations to minimise rehandling of material. • Erect a stock proof fence around the open pit.

	• Signs will be erected around the pit clearly stating the risk to safety and prohibiting access. • PAF stockpile base will be contour ripped and revegetated with appropriate species. • Conduct monitoring of pit water quality.
Specific closure assumptions	Nil
Closure material sources	• Waste rock used to construct safety bund from IWL.
Waste disposal site	Nil
Further investigations or liabilities, risks or hazards	• Update pit water quality following completion of column leach tests of PAF stockpile material. • Evaluate the potential to redirect surface water flows into the pit to enable the pit to be flushed each wet season and prevent ongoing deterioration of pit water quality

6.4.5 Evaporation Pond

The preliminary design provides for a final wall crest at approximately 98.8 m AHD, and a surface area of approximately 30 ha to the crest of the evaporation pond.

The Evaporation Pond will be located mostly within an area of existing disturbance within the north-central part of the Project area. As mentioned in Section 3.2, the landholder has indicated a preference that the Evaporation Pond be retained for water storage for pastoral activities. This plan reflects the strategy required to return the domain to a grazing pasture and will be updated when formal agreement is reached with the landholder.

Table 6.7 – Evaporation Pond Domain Strategy

Area of disturbance	24.06
Closure date	2025
Infrastructure to be retained	Nil
Final land use	Grazing
Closure objectives	• The site is safe and stable. • The visual impact of the rehabilitated site is compatible with surrounding landscape and acceptable to stakeholders. • The domain supports pasture comparable to reference sites.
Completion criteria	• Water runoff from the domain does not impact environmental values of receiving streams. • Revegetated areas pasture production equivalent to 2000 kg/hectare.
Closure strategy/activities	• Remove any infrastructure or equipment (e.g., evaporators). • Residual water from the evaporation pond will be pumped to the pit. • Assessment of disturbed areas to determine if any contamination present. Any contamination identified, depending on level of contamination, will either be placed into the pit or taken off site for remediation. • Reshape embankments to achieve a landform consistent with the surrounding landscape. • Contour rip landform and revegetate appropriate species. • Implement erosion control as required. • Monitor vegetation regrowth for weed infestations.
Specific closure assumptions	• Sufficient oxide waste rock is available for rehabilitation.

Closure material sources	• Nil
Waste disposal site	Infrastructure may be recycled or have residual value.
Further investigations or liabilities, risks or hazards	• Closure materials balance assessment.

6.4.6 Fountain Head Lake

There is not expected to be a change in the surface extent of Fountain Head Lake resulting from the Project; therefore, the area will be 7.35 ha. Water level will vary by 30 cm with seasonal fluctuation.

Table 6.8 – Fountain Head Lake Domain Strategy

Area of disturbance	7.35 ha
Closure date	2025
Infrastructure to be retained	Nil
Final land use	Wetland
Closure objectives	• Embankment causeway is safe and stable • The visual impact of the rehabilitated site is compatible with surrounding landscape and acceptable to stakeholders.
Completion criteria	• Water discharge from the lake does not impact environmental values of receiving streams.
Closure strategy/activities	• Remove any infrastructure or equipment. • Implement erosion control as required. • Monitor vegetation growth and weed infestations. • Monitor surface water quality.
Specific closure assumptions	Nil
Closure material sources	Competent waste rock for spillway and erosion control
Waste disposal site	Nil
Further investigations or liabilities, risks or hazards	Nil

6.4.7 Access Roads

The mine haul roads will be constructed from waste rock from the existing WRS. Geochemical testwork has shown that this material is very unlikely to produce any ARD and therefore is suitable for construction purposes, such as roads.

Table 6.9 – Access Roads Domain Strategy

Area of disturbance	11.66 ha
Closure date	2025
Infrastructure to be retained	Nil
Final land use	Grazing
Closure objectives	Disturbed areas are rehabilitated consistent with adjacent pasture grasses.
Completion criteria	• Water runoff from the domain does not impact environmental values of receiving streams. • Revegetated areas pasture production equivalent to 2000 kg/hectare.

Closure strategy/activities	• Remove any other infrastructure along roads/access tracks, e.g., signs. • Assess areas for contamination with a focus on hydrocarbon contamination or areas displaying staining. Any contamination identified, depending on level of contamination, will either be placed into the pit or taken off site for remediation • For the access road to the magazine, barriers to surface water drainage will be removed and the area recontoured to maintain surface drainage. For the remaining access roads, the road width will be reduced and any recontouring required will maintain surface drainage • Contour rip landform and revegetate using appropriate species. • Implement erosion control structures as required. • Monitor vegetation growth and weed infestations.
Specific closure assumptions	No contaminated material along haul roads.
Closure material sources	Nil
Waste disposal site	Infrastructure may have residual value or could be recycled.
Further investigations or liabilities, risks or hazards	Closure materials balance assessment.

6.4.8 Historic Disturbance

The area of historical disturbance not required for the Project forms the largest closure domain at 77.17 ha. This area is located between and around major Project components such as the evaporation pond, Fountain Head pit (and associated stockpiles) and the IWL. This area reflects the disturbance resulting from historical mining activity.

Table 6.10 – Historic Disturbance Domain Strategy

Area of disturbance	77.17 ha
Closure date	2025
Infrastructure to be retained	Nil
Final land use	Grazing
Closure objectives	Disturbed areas are rehabilitated consistent with adjacent pasture grasses.
Completion criteria	• Water runoff from the domain does not impact environmental values of receiving streams. • Revegetated areas pasture production equivalent to 2000 kg/hectare.
Closure strategy/activities	• Remove any infrastructure. • Reshape disturbed areas to safely manage surface water runoff. • Contour rip landform and revegetate using appropriate species. • Implement erosion control structures as required. • Monitor vegetation growth and weed infestations.
Specific closure assumptions	No contaminated material is present.
Closure material sources	Nil
Waste disposal site	Any old equipment/plant that may be sold or dismantled by a contractor for disposal off site for recycling as scrap metal.
Further investigations or liabilities, risks or hazards	Nil

6.5 Closure Materials Balance

Topsoil will be stockpiled during construction for use in progressive rehabilitation during operations, and final rehabilitation at closure. Table 6.11 outlines the estimated volume of material required to complete rehabilitation and the volume of materials available. Due to historical disturbance where no or limited topsoil was stockpiled not all disturbed areas will receive topsoil.

Table 6.11 – Materials Balance

Domain	Topsoil (m^3)	Clay (m^3)	Oxide Waste Rock (m^3)
Process Plant	118,200		
Supporting Infrastructure	2,820		
Integrated Waste Landform	8,100	13,500	40,500
Total Required	**129,120**	**13,500**	**40,500**
Total Available	**131,820**	#	**1,600,000**
Balance	**+2700**	#	**+1,559,500**

The exact quantities and quality of clay required will be determined from further studies. Potential sources may include the clay sourced as result of expansion of the pit or a dedicated borrow area.

Any unused topsoil or oxide rock will be placed on the lower batters of the IWL facing the railway to reduce the visual impact.

6.6 Information Gaps and Further Assessment

The information provided in the previous sections is sufficient for identifying closure activities and potential closure risks. Further investigations are required to confirm assumptions that have been used in the development of this plan. Current gaps that warrant further investigation are discussed in the following sections.

6.6.1 Pit Water Quality

Modelling of pit water quality has indicated that the pit will act as a groundwater sink following closure. It is expected that solutes will concentrate in the pit lake due to the dominance of evaporation over rainfall. With the exception of arsenic, the water would be suitable for stock drinking water and the protection of aquatic ecosystems.

PNX continue to investigate options to improve long term water quality and in particular are evaluating the following:

- Directing runoff at the southern end of the pit into the pit.
- Directing water from Fountain Head Lake into the pit.

6.6.2 Species for revegetation.

The short mine-life prohibits an opportunity for rehabilitation trials. Appropriate revegetation species for domains assigned as grazing will be developed in consultation with landowners.

The majority of cattle grazing in the region uses a mix of native and exotic pasture grasses and introduced legumes. Widespread perennial pasture grasses include black speargrass (*Heteropogon contortus*), kangaroo grass (*Themeda triandra*), giant speargrass (*Heteropogon* *triticeus*) and perennial sorghum (*Sorghum plumosum.*) (DoR, 2011). Introduced grasses likely to be used in revegetation include Buffel grass, Sabi grass or Indian bluegrass. The main legumes available for extensive pastoral use are Verano and Amiga stylo (*Stylosanthes hamata*), Seca and Siran stylo (*S. scabra*) and Wynn cassia (*Chamaecrista rotundifolia*) (DoR, 2011).

The IWL will be revegetated using species recorded in the open woodland on sandstone floodplain habitat (See Table 5.2).

The effectiveness of these species will be monitored, and corrective action implemented if required.

6.6.3 Management of long-term surface flows

Redirecting surface water flows into the pit to enable the pit to be flushed each wet season and prevent ongoing deterioration of pit water quality is currently under evaluation.

Surface drainage infrastructure (e.g., spillways) and erosion control (e.g., rock armouring) will be retained on site, the effectiveness of these controls will be continually monitored to ensure long-term stability. The IWL has been designed to ensure runoff is even across the whole landform, avoiding any channelling leading to gullying and degradation of the landform. No structures will be retained on site to divert surface flows, the site-wide concept is to return drainage to the natural flows.

6.6.4 Geochemistry

Kinetic leach tests are currently being established to evaluate the following materials:

- PAF waste rock.
- Blend of NAF and PAF (LC) waste rock.
- NAF waste rock.
- PAF(LC) waste rock
- CIL tailings

PAF waste rock will be temporarily stored on the surface prior to final disposal in the pit. Previous testing has indicated that this material has the potential to produce poor quality leachate. The purpose of the kinetic column leach tests is to provide an estimate of lag time to low pH conditions and the likely quality of drainage even before low pH conditions are reached. This testing will identify if additional management options are required during the stockpiling of PAF waste rock prior to disposal in the pit.

Testwork to date has identified a NAF waste segregation criteria of <0.2% sulphur. Using this criteria, it is recognised that the NAF rock will contain a small proportion of PAF(LC) rock. It is expected that operational blending would neutralise any minor acidity generated. The purpose of the blended NAF/PAF (LC) leach column is to determine the likely nature of drainage of these materials and that the proposed strategy is appropriate. To assist in understanding the results of the blended NAF/PAF (LC) columns individual columns containing only NAF and PAF(LC) will be established.

Following from the static testing of CIP tailings a kinetic leach column has been established to provide information on the likely longer term drainage quality of tailings stored in the IWL. Data from the leach columns will be used to further refine the proposed cover strategy for the tailings.

6.7 Alternatives Considered

The Fountain Head site is highly disturbed from mining activity, which dates back to the 1800s and more recently to 2008. The site has been under care and maintenance since this time, and has legacy issues relating to previous mining activity, including: unrehabilitated WRS, eroded soils, weeds and several large bodies of water with varying water quality.

Existing pit water quality contains elevated arsenic but is otherwise of reasonable quality. Modelling has identified that water quality will deteriorate with or without the presence of the Project as a result of evaporation. As outlined in Section 6.6.1, PNX continue to evaluate options to improve long term pit water quality.

Co-disposal of waste rock and tailings in the IWL is preferred rather than constructing a tailings storage facility on site. Co-disposal reduces the overall footprint required to manage mine waste and has benefits in terms of the overall site water balance and allows for progressive rehabilitation throughout operations.

7. Closure Risk Assessment

Residual impacts have been assessed by considering both the consequence (Table 7.1) of the impact (initially before any mitigation measures and after the successful application of mitigation or management measures) and the likelihood (Table 7.2) of the event occurring.

This approach has allowed determination of the risk via a matrix, as discussed further below. While the definitions of the various consequence and likelihood categories are, to some degree, subjective, (particularly given that the Project is in the early stages of its development) the process does identify the potential significant impacts as a result of Project activities.

Table 7.1 – Descriptor Used to Classify Consequence

Consequence	Description
Catastrophic	A major event that could cause severe or long-term damage to a key environmental factor. Examples include spill that causes major downstream impact that requires at least 12 months to remediate or total destruction of cultural heritage site
Major	Substantial and significant changes to a key environmental factor that will attract public concern, only partially able to be rehabilitated or uncertain if impact can be successfully rehabilitated. Examples include spill that results in major downstream impact that requires remediation over a 12-month period or major destruction to a cultural heritage site
Moderate	Significant temporary or minor permanent impact to a key environmental factor. Examples include seepage from a dam that requires rectification works over several months to repair or permanent damage to a cultural heritage site
Minor	Some limited temporary consequence but no significant long-term impact to any key environmental factors. Examples include a spill which is easily remediated or minor damage to a cultural heritage site which can be repaired
Negligible	Possible impacts but without noticeable consequence

Table 7.2– Descriptors Used to Classify Likelihood

Likelihood	Description
Virtually certain	Will occur, or is of a continuous nature, or the likelihood is unknown
Likely	Likely to occur during the mine’s lifetime
Possible	May occur in some mines
Unlikely	May occur in some mines but not expected
Virtually impossible	Has almost never occurred in similar mines but conceivably could

The level of risk for each potential impact is determined by combining the likelihood of the impact and the consequence via a matrix based on the above criteria. This approach is shown in Table 7.3.

Table 7.3 – Significance Assessment Matrix

		Likelihood				
		Virtually Certain	Likely	Possible	Unlikely	Virtually Impossible
Consequence	Catastrophic	Extreme				
	Major		High			
	Moderate			Moderate		
	Minor				Low	
	Very Low					Very Low

The final risk assessment is provided in Appendix 1. All residual risks were assessed as moderate or lower and are considered as low as reasonably practicable (ALARP).

8. Closure Implementation

8.1 Schedule

A notional schedule is provided in Table 8.1 for planned closure of the mine. This will be reviewed and revised as closure planning advances. While the timing of works in relation to the wet and dry seasons is not considered in the schedule, where practicable, earthworks will be conducted during the dry season and seeding will take place following the wet season rainfall and monitored to determine whether additional seeding is required.

Table 8.1 – Mine Closure Schedule

Closure Task	Planning and Detailed Design	Construction (2022)	Operations			Closure	
			Yr 1 (2022)	Yr 2 (2022)	Yr 3 (2023)	Yr 1 (2023)	Yr 2 -7 (2024 to 2029)
Stakeholder engagement	■	■	■	■	■	■	■
Strip and stockpile topsoil and vegetation		■	■	■			
Establish pit safety bund		■				■	
Progressive rehabilitation, of IWL		■	■	■	■		
Plug decant tower and remove infrastructure						■	
Place low permeability cover over tailings						■	
Remove process plant, power station, workshops, fuel storage etc.						■	
Contamination assessment and remediation						■	
Rehabilitate domains						■	
Erect fencing						■	

Closure Task	Planning and Detailed Design	Construction (2022)	Operations			Closure	
			Yr 1 (2022)	Yr 2 (2022)	Yr 3 (2023)	Yr 1 (2023)	Yr 2 -7 (2024 to 2029)
Post closure monitoring and maintenance							

8.2 Topsoil Management and Progressive Rehabilitation

Topsoils and subsoils that will be stripped will either be stockpiled (in designated topsoil stockpiles) until re-contoured areas are available, or preferably used immediately to rehabilitate disturbed areas. In relation to the Project's planned disturbance, certain areas will be progressively disturbed and rehabilitated over the life of the Project (such as the IWL), while other areas will be disturbed during early works and will remain disturbed until rehabilitation is conducted during decommissioning and closure. A topsoil management procedure will be developed for use during operations which will contain measures such as:

- Minimise the timeframe between area no longer being used for Project requirements and rehabilitation to reduce the likelihood of weeds becoming established.
- Minimise stockpile height to maximum 3 m.
- Revegetate with native vegetation to minimise loss of soil quality.
- Monitored for weeds and control programs implemented as required.

The short mine life limits the opportunity to establish rehabilitation trials. PNX will, however, undertake rehabilitation progressively. This will provide an opportunity to observe rehabilitation progress and outcomes that can be incorporated into future rehabilitation. Progressive rehabilitation will be undertaken in areas that are no longer required for the operation (e.g., historical disturbance areas) and the lower batters of the IWL. These areas will be reprofiled as required, covered with topsoil, ripped and seeded. Where possible, operations will be completed considering closure requirements to allow for progressive rehabilitation to be integrated into daily mining activities. This will also minimise the need for rehandling material, e.g., the IWL will be constructed to facilitate the final landform, with berms sized to enable contouring to achieve final batter slopes and the pit safety bund being constructed with suitable waste rock as it is excavated from the pit. Progressive rehabilitation will assist to minimise risks and costs associated with unexpected premature mine closure.

8.3 Temporary or Sudden Mine Closure Planning

Temporary or sudden closure is a suspension of mining activities for a limited period, and can be caused by:

- Financial pressures (e.g., market conditions).
- Environmental incidents (floods or cyclones).
- Social incidents (e.g., health epidemics).

- Regulatory changes (e.g., from government/policy changes).
- Structural failures (e.g., tailings facility failures) (ICMM, 2019).

Currently, the Project area has been under care and maintenance since 2009 and has an active approved care and maintenance plan. General care and maintenance activities that have occurred during this period and which will be undertaken in the event of a temporary or sudden closure include:

- Maintaining access tracks/roads.
- Maintaining fire breaks (mechanical).
- Asset protection-controlled burning.
- Weed mapping.
- Weed control/treatment.
- Water monitoring (surface and groundwater).
- Erosion and sediment control.
- Site inspections and audits.
- Maintenance of fencing and infrastructure.

Given the short mine life, the risk of a temporary or sudden closure is reduced compared to longer life mines. As stated in 9.2, progressive rehabilitation will be undertaken during operations to minimise the risk of rehabilitation failure associated with a sudden or temporary mine closure. Financial provisioning (Section 10) will be established to ensure that care and maintenance activities are undertaken in the event of a temporary or sudden closure.

9. Closure Monitoring and Maintenance

Monitoring will be undertaken to assess progress towards meeting the closure objectives and completion criteria. Monitoring allows a proponent to assess whether completion criteria have been fulfilled or are likely to be fulfilled. Monitoring comprises three steps:

- Data monitoring: targeted information directly related to the indicators in the definition of completion criteria (e.g., surface water quality).
- Auditing and evaluation: review of information against the completion criteria.
- Corrective action: investigation into whether rehabilitation practices are not effective or where completion criteria need to be modified, where auditing identifies a risk of not meeting completion criteria.

9.1 Monitoring Program

Table 9.1 summarises the post-closure monitoring program. This program will be developed further as part of the Project's monitoring program.

9.2 Maintenance

The maintenance program will involve inspections and works will be identified based on what is observed during routine inspections and the monitoring program results.

In addition to those identified in Table 9.1, inspections will be undertaken to assess the integrity of the following:

- Surface drainage structures and diversion channels.
- Fountain Head Lake spillway.
- Fencing.
- Integrity of tailings cover.
- Blockages to tailings underdrainage system (this assumes that discharges through the underdrainage system continues to occur)
- Evidence of unauthorised entry into restricted areas will be checked and any damage to fencing will be repaired. Similarly, observed damage to drainage structures and diversions will be repaired.
- Other maintenance/remediation needs will be determined on a case-by-case basis and will likely include:
  - Soil stabilisation measures.

- Repair of erosion control strategies or the installation of additional erosion management structures, if required.
- Earthworks and reseeding.
- Sourcing and spreading of additional topsoil.
- Reseeding or direct planting of particular areas.
- Additional seeding with groundcovers species.
- Targeted weed eradication (removal and other controls, i.e., spraying).

Table 9.1 – Post-closure Monitoring Program

Aspect	Location	Description	Frequency	Duration	Responsibility
Surface water	• Pit • Fountain Head Lake • Downstream near Margaret River confluence • Upstream control for whole site	• Water level where possible • Field parameters • TSS • Metals • Major cations	Triannual (start, middle and end of wet season)	Until completion criteria met and site relinquished by DITT	Environment Manager
Groundwater	• Bores north and northwest of pit • Bores on southern edge of pit	• Standing water level • Field parameters • TSS • Metals • Major cations	Biannual (early and late dry season)		
Vegetation	• All closure domains	• Transect and quadrant monitoring for vegetation (species density and diversity) and weeds	Annual, early dry season		
Landform stability	• Process plant • IWL • Pit safety bund	• Visual inspection	Triannual (start, middle and end of wet season), and following significant rainfall events		

10. Responsibilities and Financial Provisioning

10.1 Closure Responsibilities

PNX will have overarching responsibility to ensure compliance with all approval, permit and license conditions. PNX believes that high standards of environmental and social management begin with clear responsibilities amongst managers, supervisors, employees and contractors. The PNX Mine Manager will be responsible for mine closure planning and implementation of the MCP.

10.2 Financial Provisioning

Under the *Mining Management Act 2001*, mining proponents are required to allocate financial provisioning are available for closure. Financial provisioning for closure gives regulators certainty that a mine site will still meet completion criteria in the unlikely event that the operator defaults on their closure responsibilities. The estimated closure cost will be submitted to Department of Industry, Tourism and Trade with the Fountain Head Mining Management Plan.

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Appendix 1
Risk Assessment

				Pre-Mitigation			Residual				
Hazard/Aspect	**Applicable Domain(/s)**	**Incident/Event**	**Impact**	**Likelihood**	**Consequence**	**Mitigations/Controls**	**Likelihood**	**Consequence**	**Environmental**	**Financial**	**Community**
Land stability	Integrated Waste Landform	Failure of the IWL embankment	Landslide and mass movement of sediment, increase in turbidity in waterways from sediment laden runoff. Exposure of tailings leading to contaminated runoff.	Unlikely	Major	– Geotechnical assessment of IWL to ensure long-term stability. - Design of IWL in accordance with ANCOLD guidelines. - 20m of waste rock between tailings and outer edge to IWL. - Tailings will be filtered with approximate 10% moisture content.	Virtually Impossible	Major	Moderate	Moderate	
Erosion	Integrated Waste Landform	Rainfall surface drainage causing erosion/gullying of the IWL	Exposure of tailings from poor drainage management of the IWL, leading to contaminated runoff entering waterways or deteriorating soil quality and revegetation success.	Unlikely	Major	– Design of IWL in accordance with ANCOLD guidelines. - 20m of waste rock between tailings and outer edge to IWL. - IWL shaped such that any runoff is evenly distributed over the IWL. - Batters of IWL shaped for form a convex landform with batter angles of 20 degrees - No bench's to remain which are often the cause of erosion i.e. overtopping and concentration of flow. - Undertake monitoring for signs of erosion on the IWL. – Install erosion control devices or riprap if necessary.	Virtually Impossible	Major	Moderate	Moderate	
Contamination	Process plant, Access Roads	Unidentified contaminated area	Slower regeneration due to contaminated soil. Contaminated runoff entering waterways.	Possible	Minor	– Undertake site contamination assessment and clean up during decommissioning.	Unlikely	Minor	Low		
Contamination	Process plant, Access Roads	Unidentified contaminated runoff entering waterways.	Deterioration of water quality	Possible	Minor	– Undertake site contamination assessment and clean up during decommissioning.	Unlikely	Minor	Low		
Rehabilitation	All	Rehabilitation design poorly implemented, insufficient/inadequate rehabilitation materials	Failure of rehabilitation and subsequently do not meet completion criteria, delay of relinquishment of site.	Possible	Moderate	– Use rehabilitation techniques which are proven to be effective within the industry. – Implementation of QA/QC program to ensure that landforms meet design and materials (i.e., waste rock and topsoil) used are appropriate. – Determine materials balance prior to closure. – Undertake ongoing monitoring of rehabilitation progress (e.g., vegetation cover). towards completion criteria during rehabilitation.	Unlikely	Minor	Low	Low	
Waste rock	Integrated Waste Landform	Waste rock mischaracterised as NAF is actually PAF or material is non-acid forming but leaches metals under neutral drainage	Acidic and/or neutral runoff entering waterways causing deterioration in water quality, deterioration of soil quality	Possible	Major	– Undertake ongoing waste rock and tailing characterisation throughout mine life, ensure sufficient understanding of geochemistry of stockpiles prior to removal and rehabilitation. – Monitor water quality for signs of metalliferous drainage	Unlikely	Major	Moderate		
Stakeholder expectations	All	Stakeholder expectations about closure not met	Delay in relinquishment of site, increased closure costs.	Unlikely	Moderate	– Completion criteria and post-mining land uses developed in conjunction with relevant stakeholders – Monitoring rehabilitation success and implementing corrective action where necessary to ensure completion criteria are met.	Unlikely	Minor		Low	
Groundwater	Integrated Waste Landform	Failure of cover system results in contaminated seepage from IWL infiltrating local groundwater	Deterioration of groundwater quality	Possible	Major	– Undertake ongoing waste rock and tailing characterisation throughout mine life, ensure sufficient understanding of geochemistry of water rock prior to removal and rehabilitation. - Complete cover design modelling to demonstrate that proposed cover strategy of 0.5m compacted clay and 1.5m of waste rock is appropriate. - Implement QA/QC program for the construction of the cover. - Install monitoring equipment within cover to demonstrate that cover is working as designed. – Monitor water quality for signs of metalliferous drainage	Unlikely	Moderate	Moderate		
Rehabilitation	Integrated Waste Landform	Material properties for compacted clay layer and/or waste rock layer is not consistent with those properties used in modelling, resulting in increased infiltration through cover with corresponding increase in seepage of elevated metals (particularly As) to groundwater.	Contamination of groundwater.	Possible	Major	– Undertake characterisation of clay to be used for compacted liner and waste rock to be used as cover layer.	Unlikely	Major	Moderate		
Biodiversity	All	Weed infestation	Rehabilitation failure due to weed infestation	Possible	Moderate	– Monitor areas for signs of weed infestations – Undertake weed eradication control if necessary.	Unlikely	Minor	Low		
Biodiversity	All	Compaction of soil	Native vegetation unable to reach adequate rooting depths due to soil compaction	Possible	Minor	– Contour ripping to loosen soil. – Monitor revegetation success. - Implementation of QA/QC plan.	Unlikely	Minor	Low		
Financial	All	Unplanned or unforeseen closure	Site not rehabilitated to adequate standards, site not left in a stable, non-polluting state.	Unlikely	Moderate	– Financial provisioning for closure implementation. - Undertake progressive rehabilitation to minimise the area of land that is disturbed. – Preparation and implementation of a care and maintenance management plan in the case of sudden closure.	Virtually Impossible	Moderate	Low		
Air quality	All	Wind blown dust emissions from exposed soils	Reduced air quality, dust irritance for local flora and fauna or other receptors	Likely	Minor	– Progressive rehabilitation to minimise duration of exposed soils	Unlikely	Minor	Low		
Health and safety	Open pit, Integrated Waste Landform	Injury to public due to unauthorised access	Injury	Possible	Major	– Appropriate safety signage is displayed and fencing is constructed. - Placement of earth bund around pit.	Unlikely	Major			Moderate

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