Mine Impacted Water Overview Report

Bendigo-Ophir Gold Mine

11 October 2025

J-NZ0488-001-R-Rev0

MINE WASTE MANAGEMENT
GREENROAD GROUP

MATAKANUI
GOLD LIMITED

Mine Impacted Water Overview Report

Bendigo-Ophir Gold Project

Document Number: J-NZ0488-001-R-Rev0

Document Date: 11 October 2025

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REVISION	DATE	AUTHOR	RECORD OF REVIEW
RevA	10/08/2025	EW/PW	PW
RevB	14/09/2025	PW	PW
Rev0	11/10/2025	PW	PW

EXECUTIVE SUMMARY

Mine Waste Management Limited (MWM) has developed this report summarising the environmental geochemistry and water related studies that have been undertaken for Matakanui Gold Limited (MGL) for the proposed Bendigo-Ophir Gold Project (BOGP) to understand potential effects of the project. Specifically, the assessment of effects covered by this report include:

- The assessment of geoenvironmental hazards.
- The effects of these geoenvironmental hazards on water quality.

Report Objectives

The assessment of effects has been used to support the development of the Water Management Plan (WMP) and the Engineered Landform Management Plan (ELFMP), which was developed by MGL for the BOGP, and are provided as separate documents, to ensure the effects of mine impacted water (MIW) on the receiving environment are minimised.

The objectives of this overview report are to:

Summarise and facilitate understanding of the geoenvironmental hazards for the BOGP as part of the assessment of effects.

- Explain how these geoenvironmental hazards can generate mine impacted waters (MIW).
- Identify potential effects of MIW on the downstream receiving environment.
- Develop engineering controls for the BOGP to mitigate potential effects of MIW.
- Support the development of management plans to ensure the recommendations identified by the various studies, presented in this overview report, are undertaken.

Findings

Studies indicate that the environmental risks associated with MIW at the proposed BOGP can be successfully managed if the correct management processes are utilised, appropriate engineering controls are implemented, and performance monitoring is undertaken to support adaptive management principles if there is variation from the expected case.

The key issues relating to water that need to be managed are:

- Elevated total suspended solids (TSS) in surface waters.
- Neutral metalliferous drainage (NMD) that may have elevated potential constituents of concern (PCOC) such as arsenic (As), sulfate, (SO_4), and trace metals.
- Nitrate-rich drainage due to the use of ammonium nitrate fuel oil (ANFO) explosives and cyanide (due to gold recovery) that may also include ammoniacal nitrogen.

Collectively these waters are referred to as MIW to acknowledge the different potential contributions to poor water quality within the project area.

The key PCOC that are likely to be associated with MIW include: TSS, aluminium (Al), antinomy (Sb), As, cobalt (Co), copper (Cu), chromium (Cr), iron (Fe), molybdenum (Mo), nickel (Ni), lead (Pb), SO_4, strontium (Sr), zinc, (Zn), cyanide (CN), ammoniacal nitrogen (Amm-N) and nitrate nitrogen (NO_3-N). Water quality monitoring also includes pH, cadmium (Cd), manganese (Mn), selenium (Se), and uranium (U) as a more comprehensive dataset to ensure all potential risk are monitored (Ryder, 2025).

Management Approach

To mitigate the risks associated with MIW, the BOGP has developed a hierarchy of controls (Management Steps), which is in alignment with international guidance documents (e.g., INAP, 2014; DFAT, 2016), of how to manage the potential effects of NMD as follows:

1. Determine the closure objectives for the mine.
2. Understand the source hazards.
3. Prevent oxidation of sulfide minerals.
4. Minimise the mobilisation of stored oxidation products.
5. Control and treatment of mine-impacted waters.
6. Complete an assessment of the potential effects.
7. Monitor performance.

Studies have been completed to address these management requirements and provide recommendations for performance monitoring. These studies are summarised in this report (as shown in Table E1).

Potential Effects on Water and Management Outcomes

The potential effects of the BOGP are summarised in this section. Management of these potential effects is explained in the prescribed management plans.

Two surface water quality monitoring locations are proposed for compliance monitoring of potential effects including SC01 in Shepherds Creek and RS03 in Rise and Shine Creek (Table E1), which cover the main catchments affected by mining activities. A third compliance monitoring location is also proposed in Clearwater Creek as a control site that will be unaffected by mining-related activities.

Table E1 provides a summary of the streams that will be affected by mining:

- Baseline characteristics of each stream (pre mining).
- Potential effects to the downstream environment (below these compliance monitoring locations) with no management or engineering controls.
- Proposed water quality operating limits (operational phase and closure phase).
- Proposed engineering controls and management mechanisms.
- Overall effects of the BOGP on Shepherds Creek and Rise and Shine Creek.

Table E1: Potential Effects and Management Options

Baseline Water Quality	Shepherds Creek (SC01) is elevated in Cu. Rise and Shine Creek (RS03) is elevated in As, Co, Cu, and Fe.
Potential MIW Effects on Water Quality	TSS effects during project start-up (break-in).
	Operational Phase effects including: TSS, NMD, and nitrate.
	Closure Phase effects including NMD and nitrate.
Proposed Water Quality Limits	Operational and closure phase water quality objectives defined by Ryder (2025).
Engineering Controls and Management Mechanisms	Geochemical classification of materials.
	Appropriate management and placement of materials.
	Engineered landforms to control net percolation and oxygen ingress.
	Control of MIW and internal management of MIW during the operational phase.
	Control and treatment of MIW (active and then passive treatment) during the closure phases.
	Sediment and Erosion Control Management Plan.
	ELF Management Plan.
	Water Management Plan.
	Soil Management Plan.
	Performance monitoring and adaptive management.
	Ongoing studies to minimise effects and improve management outcomes.
Expected Overall Effects	Increases to stream base flow at closure.
	Possible slight elevation in PCOC during operations – to be managed by adaptive management processes.
	Minor increase in some PCOC but below proposed operating and closure water quality limits.
	In Rise and Shine Creek (RS03) only - Potential betterment where historic mining legacy effects on water are improved through management/treatment.

Report Structure and Contents

This overview report summarises all the documents relating to geoenvironmental hazards and the potential effects on water quality. These documents are summarised in Table E2 and are provided as appendices to this report. Recommendations provided in these reports, and this overview report are addressed in the WMP.

Due to the size of the reports (>50 Mb) these appendices have been split into:

- Attachment 1: Appendix B to G
- Attachment 2: Appendix H
- Attachment 3: Appendix I to O

Table E2: Environmental Geochemistry Report Summary

REPORT NAME	APPENDIX
Site Visit and Preliminary CSM	B
Preliminary Site Investigation	C
Baseline Water Quality Report	D
Sampling and Analysis Plan for Geochemical Characterisation	E
Geoenvironmental Hazards Factual Report	F
SPLP[1] and SEM[2] EDS[3] Analysis	G
Factual Report: Column Leach Test	H
Source Term Definition Report	I
Engineered Landform Design Philosophy	J
Net Percolation Assessment	K
Engineered Landform Water Quality Forecast Report	L
Water Treatment Study	M
Water Load Balance Model Report	N
Water Quality Database QA/QC[4]	O

[1] *Synthetic Precipitation Leaching Procedure*

[2] *Scanning Electron Microscope*

[3] *Energy Dispersive X-ray Spectroscopy*

[4] *Quality Assurance / Quality Control*

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1 INTRODUCTION

Mine Waste Management Limited (MWM) has developed this report summarising the environmental geochemistry and water related studies that have been undertaken for Matakanui Gold Limited (MGL) for the proposed Bendigo-Ophir Gold Project (BOGP) to understand potential effects of the project. Specifically, the assessment of effects covered by this report include:

- The assessment of geoenvironmental hazards.
- The effects of these geoenvironmental hazards on water quality.

1.1 Report Objectives

The assessment of effects has been used to support the development of the Water Management Plan (WMP) and the Engineered Landform Management Plan (ELFMP), which was developed by MGL for the BOGP, and are provided as separate documents, to ensure the effects of mine impacted water (MIW) on the receiving environment are minimised.

The objectives of this overview report are to:

Summarise and facilitate understanding of the geoenvironmental hazards for the BOGP as part of the assessment of effects.

- Explain how these geoenvironmental hazards can generate MIW.
- Identify potential effects of MIW on the downstream receiving environment.
- Develop engineering controls for the BOGP to mitigate potential effects of MIW.
- Support the development of management plans to ensure the recommendations identified by the various studies, presented in this overview report, are undertaken.

1.2 Project Background

MGL is proposing to establish the BOGP, which comprises gold mining operations, processing operations, ancillary facilities and environmental mitigation measures on Bendigo and Ardgour Stations in the Dunstan Mountains of Central Otago. The project site is located approximately 20 km north of Cromwell and will have a maximum disturbance footprint of 550 hectares.

The total Mineral Resource Estimate for the BOGP using a 0.5 g/t cut-off for open pit and 1.5 g/t for underground is 34.3 Mt at 2.1 g/t for 2.34 M oz (MGL, 2025). The Bendigo-Ophir resources occur in four deposits: Come in Time (CIT), Rise and Shine (RAS), Srex (SRX), Srex East (SRE). The majority of identified mineral resources are located within the RAS deposit. Three primary geological units are recognised at site:

- RSSZ – Rise and Shine Shear Zone
- TZ3 – Lower Greenschist facies Textural Zone 3 rocks of the Otago Schist
- TZ4 – Upper Greenschist facies Textural Zone 4 rocks of the Otago Schist

The proposed BOGP will include the following components:

- Open pits targeting the RAS, SRX, SRE, and CIT deposits.
- An underground mine targeting the RAS deposit.
- Three ex-pit engineered landforms (ELFs) – Shepherds ELF, SRX ELF, and West ELF (WELF).
- Two in-pit landforms (backfill) – CIT and SRE[5].
- Plant and processing area, where CIL extraction technologies will be used as part of the ore recovery process. This includes the Shepherds Creek Fill (SCK Fill).
- A tailings storage facility (TSF) and TSF Embankment.
- Other ancillary support services / structures (e.g., roads, water management infrastructure, water treatment plants, etc).

The proposed BOGP infrastructure is shown in Figure 1.

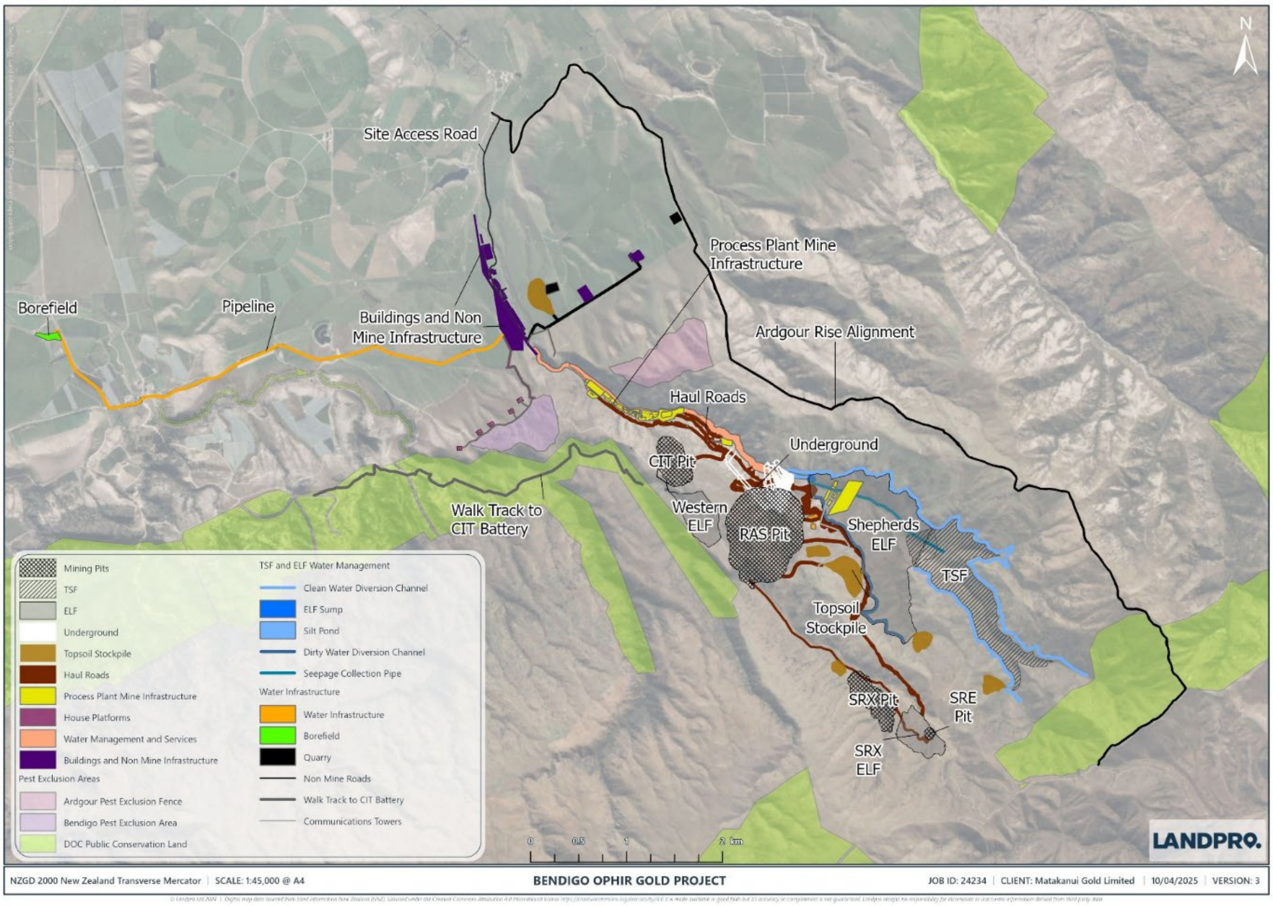

Figure 1: BOGP Infrastructure.

1.3 Mine Impacted Waters

It is expected that mining of the BOGP will affect waters within the project area and these effects will include:

- Elevated total suspended solids (TSS) in surface waters.

[5] *Note: SRE Pit is backfilled by the SRX ELF.*

- Neutral metalliferous drainage (NMD) that may have elevated potential constituents of concern (PCOC) such as arsenic (As), sulfate, (SO_4), and trace metals.
- Nitrate-rich drainage due to the use of ammonium nitrate fuel oil (ANFO) explosives and cyanide (due to gold recovery) that may also include ammoniacal nitrogen.

Collectively these waters are referred to as MIW to acknowledge the different contributions to poor water quality within the project area.

1.4 MIW Management Overview

To mitigate the risks associated with MIW, the BOGP has developed a hierarchy of controls (Management Steps), which is in alignment with international guidance documents (e.g., INAP, 2014; DFAT, 2016) of how to manage the potential effects of NMD as follows:

1. Determine the closure objectives for the mine.
2. Understand the source hazards.
3. Prevent oxidation of sulfide minerals.
4. Minimise the mobilisation of stored mobile oxidation products.
5. Control and treatment of mine-impacted waters.
6. Complete an assessment of the potential effects.
7. Monitor performance.

The following section describes these management steps in detail.

1.5 MIW Management Steps

Table 1 summarises the steps of MIW management including:

- Purpose
- Objectives
- Related studies

Table 1: Summary of studies undertaken by MWM in relation to the six steps of MIW management.

PURPOSE	STEP OBJECTIVES	REPORT NAME	APPX.
Set closure objectives	Define the water quality closure goals for the project to help frame the types of management that may be required to achieve this.	Site Visit and Preliminary CSM	B
		Preliminary Site Investigation	C
		Baseline Water Quality Report	D
		Recommended water quality compliance limits for the Bendigo-Ophir Gold Project (Ryder, 2025)	-
Define source hazard risks	Assess the environmental geochemistry hazards presented by the project	Sampling and Analysis Plan for Geochemical Characterisation	E

PURPOSE	STEP OBJECTIVES	REPORT NAME	APPX.
	materials, including NMD susceptibility and PCOC.	Geoenvironmental Hazards Factual Report	F
		SPLP[6] and SEM EDS[7] Analysis	G
		Factual Report: Column Leach Test	H
		Source Term Definition Report	I
Prevention and minimisation	Assess the engineering and design controls which can be used to prevent oxidation and minimise geochemical effects (mobilisation of oxidation products by water).	Engineered Landform Design Philosophy	J
		Net Percolation Assessment	K
		Engineered Landform Water Quality Forecast Report	L
Control and treat	Review of active and passive treatment options for hazards which cannot be fully minimised with source control engineering.	Water Treatment Study	M
Assessment of effects	Predict potential effects to the wider environment from the proposed BOGP.	Water and Load Balance Model Report	N
Monitor Performance	Assess the performance of controls through environmental monitoring	Water Quality Database QA/QC[8]	O
		Water Management Plan ELF Management Plan Soil Management Plan	-

The data and learnings obtained from these studies have been incorporated into the various management plans to ensure the correct management processes are utilised, appropriate engineering controls are implemented, and performance monitoring is undertaken to support adaptive management principles if there is variation from the expected case.

[6] *Synthetic Precipitation Leaching Procedure (SPLP) developed by the USEPA.*

[7] *Scanning electron microscopy with energy dispersive X-ray spectroscopy.*

[8] *Quality Assurance / Quality Control*

2 CLOSURE OBJECTIVES

This section discusses the closure objectives for the BOGP.

2.1 Introduction

Closure objectives for the BOGP need to be defined at the start of the project to ensure that the appropriate MIW management steps are developed to achieve the agreed closure objectives. For MIW the key objective is water quality.

Derivation of operational and closure water quality limits for the BOGP is in alignment with the Australian and New Zealand guidelines for fresh and marine water quality (ANZG, 2018). Further details on water quality objectives are provided by Ryder (2025) and are summarised in Section 2.6.

Three baseline study reports have been completed including:

- A site visit summary report.
- A Preliminary Site Investigation (PSI) to assess contamination risks associated with historic legacy mining activities.
- A baseline water quality report.

These reports are discussed in the following sections.

2.2 Site Visit and Preliminary Conceptual Site Model

This report by MWM (2023a) is provided as Appendix B.

2.2.1 Key Findings

Historic legacy mine workings are present in the area. The workings will require the following considerations:

- The mine sites and associated workings are considered HAIL[9] sites under the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS). As such, disturbance of these sites may require contaminated land assessments and management plans. This would include preliminary site investigations (PSI) and detailed site investigation (DSI).
- The materials from historic workings are likely influencing baseline water quality. Understanding these impacts will be important for ensuring differentiation of load sources from the BOGP and from these historic sources.
    - Data from legacy sites and from drillhole water quality data available in July 2023 indicated that PCOC in groundwater could include As and iron (Fe). Manganese (Mn) was also identified as being potentially elevated, however subsequent baseline water quality studies

[9] Hazardous Activities and Industries List (HAIL). https://environment.govt.nz/publications/hazardous-activities-and-industries-list-hail/

(Section 2.4) indicated that Mn is not elevated. Ryder (2025) has recommended a groundwater water quality limit of 0.4 mg/L for Mn to manage this potential risk.

2.3 Preliminary Site Investigation

This report by GRM (2025) is provided as Appendix C.

2.3.1 Key Findings

The results of this PSI have identified the following site conditions and potential contamination risks associated with the historic land use and proposed future mining activities:

- There is no record of permanent Māori occupation within the BOGP area, however the project area has a long history of pastoral occupation dating back to the late-1850s, and historic gold mining operations comprising alluvial sluicing and shallow mining of quartz reefs occurred in several areas across the site and surrounds between the 1860s through to the 1940s. Whilst pastoral land use has continued through to present day, only limited mineral exploration activities have been undertaken since the 1980s.
- Detailed heritage mapping of the historic land use has been undertaken with numerous historic mining features, including prospecting pits, water races, mullock piles, tailings and dams, sluices areas, mine adits, batteries, alluvial workings, mapped as being present within the BOGP area. Several agricultural and pastoral features and one feature that may be associated with Māori activity have been identified within the broader mining lease area, however most are distal to the BOGP area.
- Baseline environmental studies have been undertaken within the BOGP area to assess the ecological values of the environment with respect to groundwater, surface water, and aquatic and terrestrial ecosystems.
- Soil sampling and water quality monitoring around these areas has identified potentially elevated concentrations of metals in shallow soil (As and possibly cadmium (Cd)), surface water (As, cobalt (Co), copper (Cu), and Fe), and groundwater (As, chromium (Cr), Cu, Fe, strontium (Sr), thallium (Tl), and zinc (Zn)) within the project area.
- Arsenic has been identified at concentrations above industrial land use human health protection criteria in shallow soils within the BOGP, predominantly within the historic mining areas. Potentially complete exposure pathways may result from the disturbance of these soils during future mining activities. Arsenic and possibly Cd have also been identified in soils at concentrations that may pose an ecological risk to receptors post-mining if not appropriately managed during operations.
- If not appropriately managed, future mining activities within the BOGP area have the potential to release contaminants to the environment, potentially resulting in adverse impacts to terrestrial and aquatic ecosystems. Future mine site features including the open pit, underground workings, ELFs, TSF, processing plant, run-of-mine (ROM) pad, topsoil stockpiles, vehicle washdown and refuelling facilities, explosives magazine and emulsion

factory, and mining fleet workshops will require appropriate facility design and management plans to minimise potential risks to human health and the environment.

To manage the environmental and health risks associated with these soils elevated in arsenic, MGL has developed the project specific Soil Management Plan (MGL, 2025b).

2.4 Baseline Water Quality

This report by MWM (2025a) is provided as Appendix D.

2.4.1 Key Findings

This assessment indicated that:

- <u>Shepherds Creek</u> is elevated in Cu.
- <u>Bendigo Creek</u> is elevated in As, Co, Cu, and Fe.
- <u>Groundwater</u> is elevated in As, Cu, Fe, Zn, and on occasion Sr within the project area. Tl was elevated on one occasion (although this appears anomalous).

2.4.2 Baseline Water Quality Summary

The area has been degraded by pastoral and mining activities. These baseline conditions should be considered when setting water quality objectives for the operational and closure phases of the BOGP.

Ryder (2025) notes that overall, the freshwater environment and freshwater ecological values within the BOGP are relatively low, given:

- The absence of fish communities.
- Relatively poor invertebrate community composition and no rare or endangered freshwater invertebrate species present.
- Surface water quality, physical habitat and riparian habitat that has been impacted by historic mining activities, stock grazing, and invasive species.

Ryder (2025) states that a number of watercourses within the BOGP area appear to be more than ‘slightly to moderately’ disturbed, as defined under the ANZG (2018) water quality guidelines and that 90% species protection is considered an acceptable level of protection for these freshwater ecosystems given their historic and current level of disturbance.

2.5 Water Quality Objectives

Two key receptors have been identified as part of baseline studies; namely, groundwater used for domestic purposes (e.g., drinking water) and stockwater and surface waters that support aquatic communities.

2.5.1 Water Quality Limits

The proposed water quality criteria for the BOGP (Ryder, 2025) are summarised in Table 2 (surface water) and Table 3 (groundwater).

Table 2: Surface Water Quality Compliance Limits for the BOGP

PARAMETER (UNITS ARE MG/L UNLESS STATED OTHERWISE)	SURFACE WATER RECOMMENDED COMPLIANCE LIMIT(S)
pH (unitless)	6.5 - 9.0
Turbidity (NTU)	5 (over a 5-year rolling period, 80% of samples, when flows are at or below median flow, are to meet the limit)
Ammoniacal-nitrogen (NH3-N)	≤0.24 (annual median) <0.4 (annual 95th %) See Appendix A for adjustments
Nitrate-nitrogen (NO3-N)	<2.4 (annual median) <3.5 (annual 95th %)
Cyanide (CN)	0.011 (un-ionised HCN, measured as [CN], ANZG 2018) See Appendix A for adjustments
Sulfate (SO_4)	A. If hardness is <100 mg/L ($CaCO_3$), the sulfate compliance limit = 500 mg/L. B. If chloride is <5 mg/L, the sulfate compliance limit = 500 mg/L C. If the hardness is 100–500 mg/L AND if chloride is 5–<25 mg/L, the sulfate compliance limit is (in mg/L) [-57.478 + 5.79*(hardness mg/L $CaCO_3$) + 54.163*(chloride mg/L)] * 0.65 D. If hardness is between 100 and 500 mg/L AND if chloride is between ≥25 and ≤500 mg/L, the sulfate limit is (in mg/L): [1276.7+5.508*(hardness mg/L $CaCO_3$) +1.457*(chloride mg/L)] * 0.65 A minimum of 12 samples must be collected over any rolling 12-month period. For compliance limits in A to D, no more than 20% of samples collected over a rolling 12-month period may exceed the relevant compliance limit. E. An acute compliance limit = 1,000 mg/L averaged over 4 days and not to be exceeded more than once in a one-year period, OR in more than 10% of samples over a one-year period.
Aluminium (Al) (dissolved)	≤0.08
Antimony (Sb) (total)	0.074 (chronic) 0.250 (acute) See below
Arsenic (As(V)) (dissolved)	≤0.042
Cadmium (Cd) (dissolved)	≤0.0004 See below for adjustment algorithm
Chromium (Cr) (dissolved)	≤0.0033 (Cr(III)) ≤0.006 (Cr(VI)) See below for adjustment algorithm
Cobalt (Co) (dissolved)	0.001 (chronic) 0.11 (acute, not to exceed) See below for adjustment algorithm
Copper (Cu) (dissolved)	≤0.0018
Molybdenum (dissolved)	≤0.034
Zinc (Zn) (dissolved)	0.015 See below for adjustment algorithm
Adjustments	
Cd (dissolved)	HMTV = TV $(H/30)^{0.89}$, where hardness-modified trigger value (HMTV) = (µg/L), trigger value (TV) (µg/L) at a hardness of 30 mg/L as $CaCO_3$; H, measured hardness (mg/L as $CaCO_3$) of a fresh surface water.
Cr (dissolved	HMTV = TV $(H/30)^{0.82}$, where hardness-modified trigger value (HMTV) = (µg/L), trigger value (TV) (µg/L) at a hardness of 30 mg/L as $CaCO_3$; H, measured hardness (mg/L as $CaCO_3$) of a fresh surface water.
Co (dissolved)	Cobalt (µg/L)= exp{(0.414[ln(hardness CaCO3 mg/L)] – 1.887}
Sb (total)	(chronic) the average of 5 (monthly) samples over a 5-month period (acute) not to be exceeded at any time

PARAMETER (UNITS ARE MG/L UNLESS STATED OTHERWISE)	SURFACE WATER RECOMMENDED COMPLIANCE LIMIT(S)
Zn (dissolved)	HMTV = TV $(H/30)^{0.85}$, where hardness-modified trigger value (HMTV) = (µg/L), trigger value (TV) (µg/L) at a hardness of 30 mg/L as $CaCO_3$; H, measured hardness (mg/L as $CaCO_3$) of a fresh surface water.

HMTV = hardness modified toxicity value.

TV = toxicity value.

H = hardness

Table 3: Groundwater Quality Compliance Limits for the BOGP

PARAMETER (UNITS ARE MG/L UNLESS STATED OTHERWISE)	GROUNDWATER RECOMMENDED COMPLIANCE LIMIT(S)
Nitrate-nitrogen (NO_3-N)	11.3 (MAV)*
Cyanide (CN-)	0.6 (MAV)
Sulfate (SO_4)	≤250 (taste threshold)
Aluminium (Al)	1 (MAV)
Antimony (Sb)	0.02 (MAV)
Arsenic (As(V))	0.01 (MAV)
Cadmium (Cd)	0.004 (MAV)
Chromium (Cr)	≤0.05(MAV)
Cobalt (Co)	<1 (livestock drinking water)
Copper (Cu)	≤0.5
Iron (Fe)	≤0.3
Lead (Pb)	0.01 (MAV)
Manganese (Mn)	0.4 (MAV)
Molybdenum (Mo)	<0.01
Strontium (Sr)	4
Uranium (U)	0.03 (MAV)
Zinc (Zn)	≤1.5

** MAV = Maximum acceptable value – From NZ drinking water standards*

The PCOC presented in Table 2 and Table 3 are identified from the baseline studies, source hazard assessment, geochemical modelling, and the water and load balance modelling to understand potential effects of the BOGP.

Quantity is also measured, to inform load models and to understand effects on flow.

2.5.2 Compliance Water Quality Monitoring Locations

The proposed surface water compliance water quality monitoring locations are:

- **SC01 in Shepherds Creek**: Located downstream of the project area, this site monitors water quality and flow from the Shepherds Creek catchment.

- **RS03 in Rise and Shine Creek**: This site monitors water quality and flow from the Rise and Shine Creek catchment, which receives runoff from the SRX, SRE, and the WELF mine domains.
- **CC01 in Clearwater Creek**: A control site used to provide baseline data for comparison. It is located upstream of any mining influence and serves as a reference for natural background water quality.

The proposed groundwater compliance water quality monitoring locations are:

- **MW-101 – Compliance Bore (Ardgour Station)**: located near Shepherds Creek, this bore monitors groundwater quality and levels in the Shepherds Creek alluvium and Ardgour Valley Aquifer. It is used to assess potential impacts from mining activities on downstream groundwater users.
- **Base Bore – Production Bore (Abstraction Borefield)**: located within the Bendigo Aquifer Borefield, this bore monitors groundwater abstraction rates and quality for operational use. It ensures compliance with consented abstraction limits and drinking water standards.

Performance Monitoring locations are discussed in the Water Management Plan. The proposed compliance monitoring locations are shown in Figure 2.

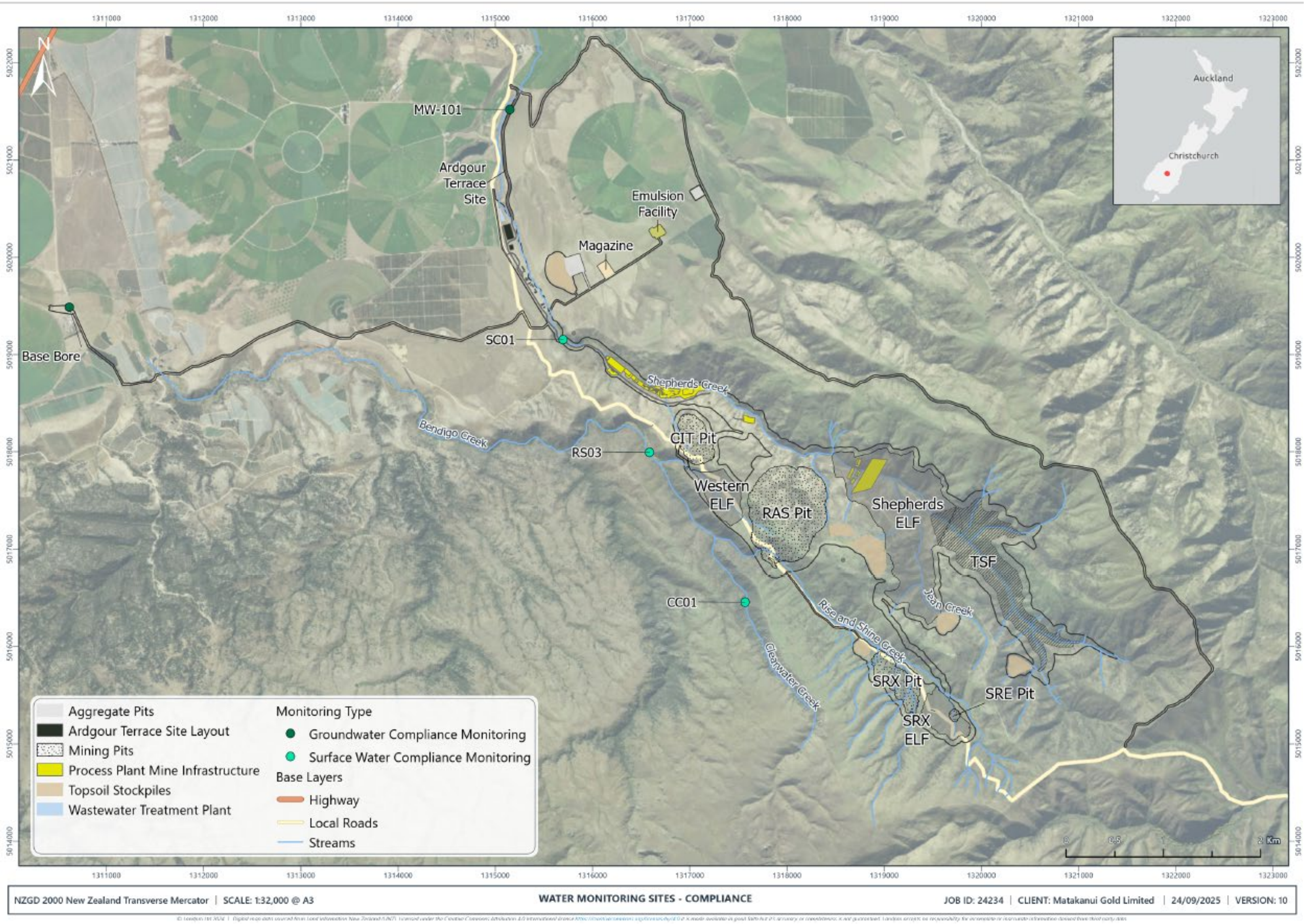

Figure 2: Water Monitoring locations - Compliance

2.6 Proposed Consent Conditions

Based on the work presented in this section the following should be considered in framing consent conditions:

Water Quality:

- Resource consent conditions for water quality proposed by Ryder (2025) are presented in Table 2 and Table 3. The PCOC are based on the geoenvironmental studies undertaken for the BOGP as summarised in this report and are reasonable in regards to those PCOC that could be elevated. These limits should be the basis for compliance monitoring.
- Compliance monitoring for certain PCOC is recommended once passive treatment commences. Anaerobic passive treatment system (PTS) can generate secondary PCOC including ammoniacal nitrogen, BOD[10], and sulfide. Monitoring of these PCOC is not required until an operating PTS is installed (noting baseline conditions should be established). Further work is required to confirm the type of PTS that will be installed and hence any monitoring requirements.
- Performance monitoring is proposed for certain PCOC (discussed further in Section 7).

Arsenic-Rich Soils:

- A detailed evaluation of the extensive soil dataset should be undertaken for the Rise and Shine Valley to better inform a risk assessment of the disturbance of soils with elevated As (and potentially Cd) concentrations during operations. Using the existing soil dataset, appropriate ecological background threshold values (BTV) should be derived using an appropriate industry-recognised methodology (e.g., upper tolerance limit (UTL)) for the Project area to support the assessment of environmental effects during operations and closure.
- Arsenic has been identified at concentrations above industrial land use human health protection criteria in shallow soils within the BOGP, predominantly within the historic mining areas. A Soil Management Plan (MGL, 2025b) has been prepared. However, the following management processes should be developed prior to mining to support this plan:
    - Dust management for the salvage, storage, and respreading of soils.
    - As-rich soil storage – Storage of As-rich soils in large stockpiles is likely to lead to reducing conditions (sub-oxic) and the potential mobilisation of As and Fe. Drainage from this area should report to the MIW management system.
- Confirmation of a suitable location for reuse of the As-rich soils for rehabilitation purposes within the Rise and Shine Creek Valley (keeping the materials within their geochemical origin) is required. Subsequent management of these areas should be considered (e.g., stock management). This is discussed in the Soil Management Plan (MGL, 2025b).

[10] *Biochemical oxygen demand*

3 SOURCE HAZARD CHARACTERISATION

This section assesses the geoenvironmental hazards that could affect water quality at the proposed BOGP. Arsenic-rich soils are excluded from this assessment and are covered by the PSI (GRM, 2025) discussed in Section 2.3 and are covered by the Soil Management Plan (MGL, 2025b).

3.1 Introduction

Understanding the potential effects on water quality due to the disturbance of materials associated with the proposed mine is a key step to determine what engineering controls are required for the BOGP. Identification of potential effects are obtained from:

- Analogue site data.
- Geochemical laboratory testing and analysis.
- Geochemical modelling.

Five reports have been completed to understand the geoenvironmental source hazards for the BOGP including:

- A Sample and Analysis Plan (SAP) to select initial samples for testing (predominantly TZ4 and RSSZ materials).
- The Geoenvironmental Hazards Factual Report.
- SPLP[11] and SEM EDS[12] Analysis.
- Factual Report: Column Leach Test
- Source Term Definition Report.

These reports are discussed in the following sections.

3.2 Sampling and Analysis Plan for Geochemical Characterisation

This report by MWM (2023b) is provided as Appendix E.

3.2.1 Key Findings

The preliminary SAP was created to obtain representative samples from the drill core available at the time of sampling (the majority being TZ4 and RSSZ materials as TZ3 was by RC[13] drilling and samples were not collected for TZ3 materials). This was a preliminary sampling program, and further samples have been obtained since this work was initiated (including additional TZ3 samples). The spatial distribution of these TZ4 and RSSZ samples, together with one drillhole through the TZ3 materials is shown in Figure 3 and Figure 4 for the proposed RAS Pit.

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[11] Synthetic Precipitation Leaching Procedure (SPLP) developed by the USEPA.

[12] Scanning electron microscopy with energy dispersive spectrometry.

[13] Reverse Circulation

Later sampling, discussed in the Geoenvironmental Hazards Factual Report (MWM, 2025b) identifies additional TZ3 samples that were collected for geochemical analysis and samples collected from other satellite pits such as CIT and SRX.

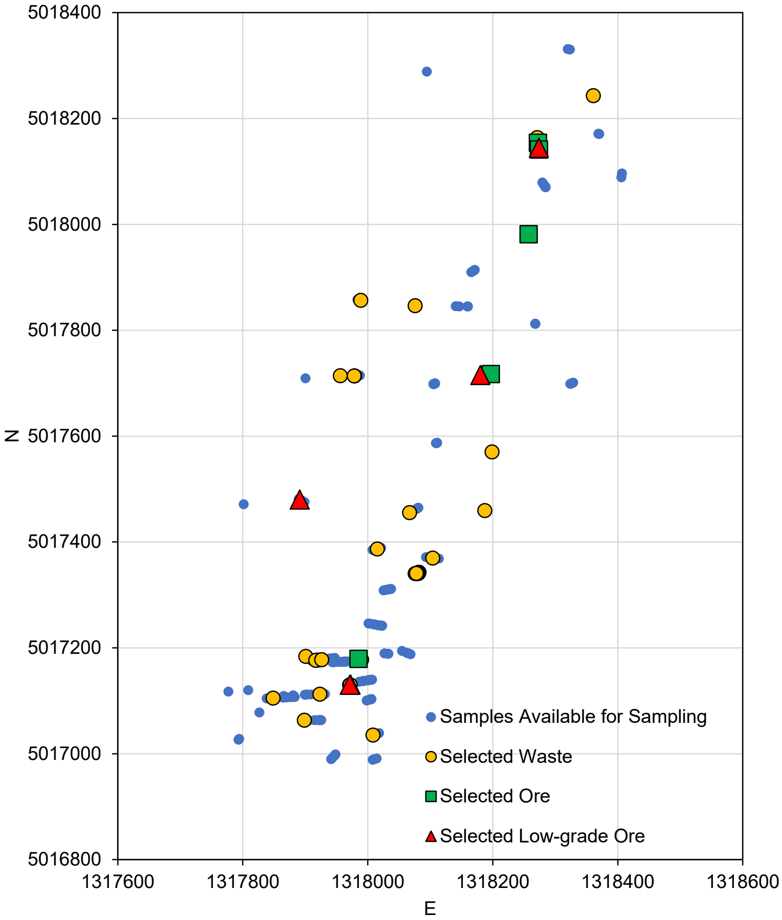

Figure 3: Plan view of the preliminary selected samples – RAS Pit Area

Source: MWM (2023b)

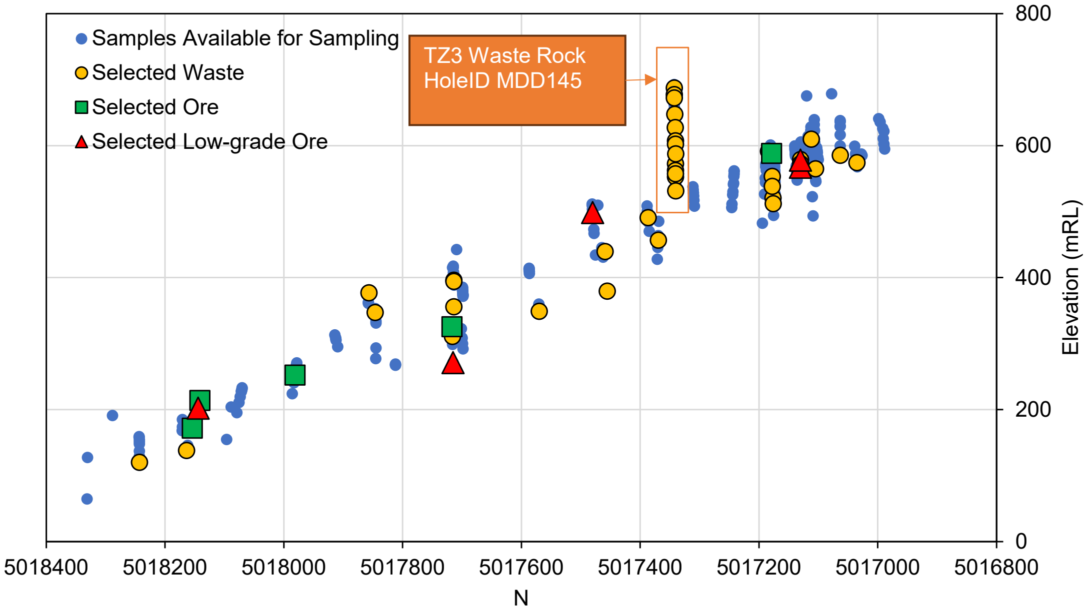

Figure 4: Lateral view of the selected samples – RAS Pit Area.

Source: MWM (2023b)

The results from the sampling program outlined in the SAP are presented in the Geoenvironmental Hazards Factual Report (Appendix F).

3.3 Geoenvironmental Hazards Factual Report

This report by MWM (2025b) is provided as Appendix F.

3.3.1 Key Findings

This report identifies the geoenvironmental hazards for the BOGP. For the study a total of 1,608 samples were analysed to identify risks associated with NMD. All BOGP materials are classified as non-acid forming (NAF), with circum-neutral pH drainage expected from mine domains that contain the materials.

AMIRA (2002) classification of BOGP materials is provided in Figure 5 with all samples classified as NAF and no samples are classified as potentially acid forming (PAF). This is based on the net acid producing potential (NAPP) and the net acidity generation (NAG) test pH data. Acid rock drainage is not expected.

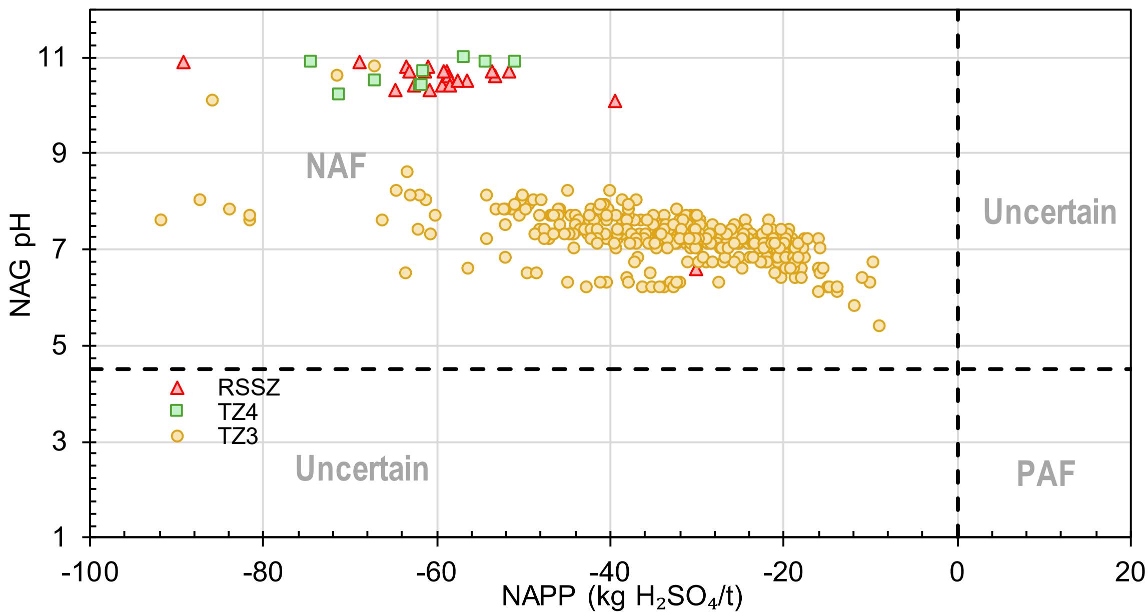

Figure 5: AMIRA (2002) classification (NAPP and NAG pH data) represented by geological unit.

The most significant NMD source hazard for waste rock relates to the TZ4 and RSSZ materials, some of which will be waste rock, and some will be processed (to extract gold) producing tailings. This higher hazard rating is due to a higher sulfur and As content (Figure 6 and Figure 7).

Analysis of the waste rock data indicates that:

- The TZ4 and RSSZ lithologies contain ~95.3% of As and 21.9% of sulfur (S) yet represents only 9.3% of the waste rock that will be disturbed.
- As shown in Figure 7, the S content of the TZ3 materials is significantly lower compared to other materials. However, some TZ3 materials can be elevated in As (Figure 6) and should be managed like RSSZ and TZ4 materials to minimise the effects of NMD.

- Appropriate management of TZ4 and RSSZ materials to reduce sulfide mineral oxidation is a critical step to minimise deleterious effects, i.e., manage 9.3% of the waste rock well to mitigate 95.3% of the As risk in the engineered landforms (ELFs) that will contain the waste rock.

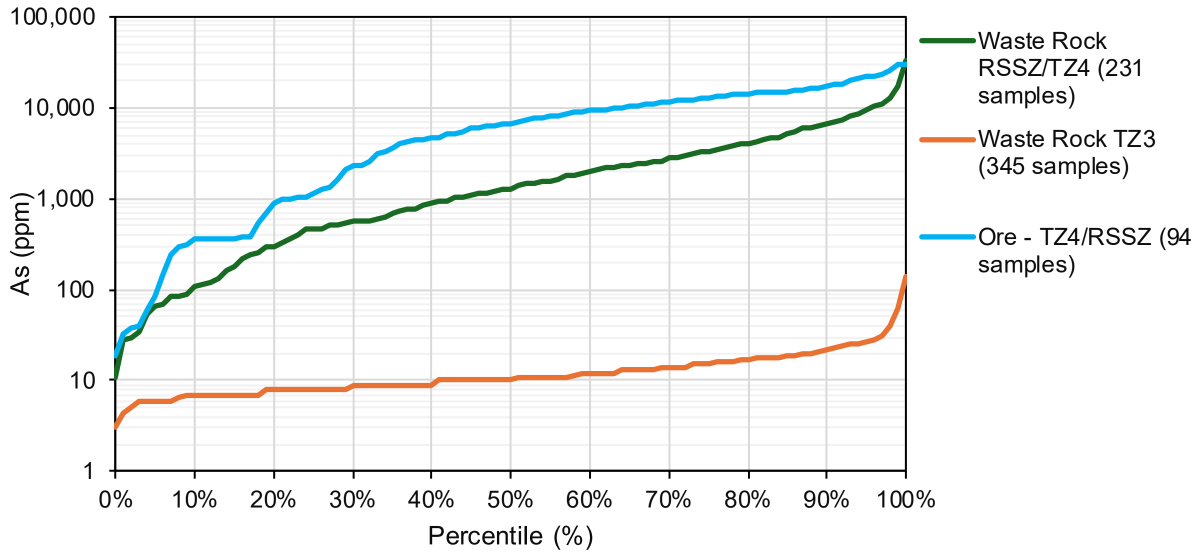

Figure 6: Arsenic distribution of different material types.

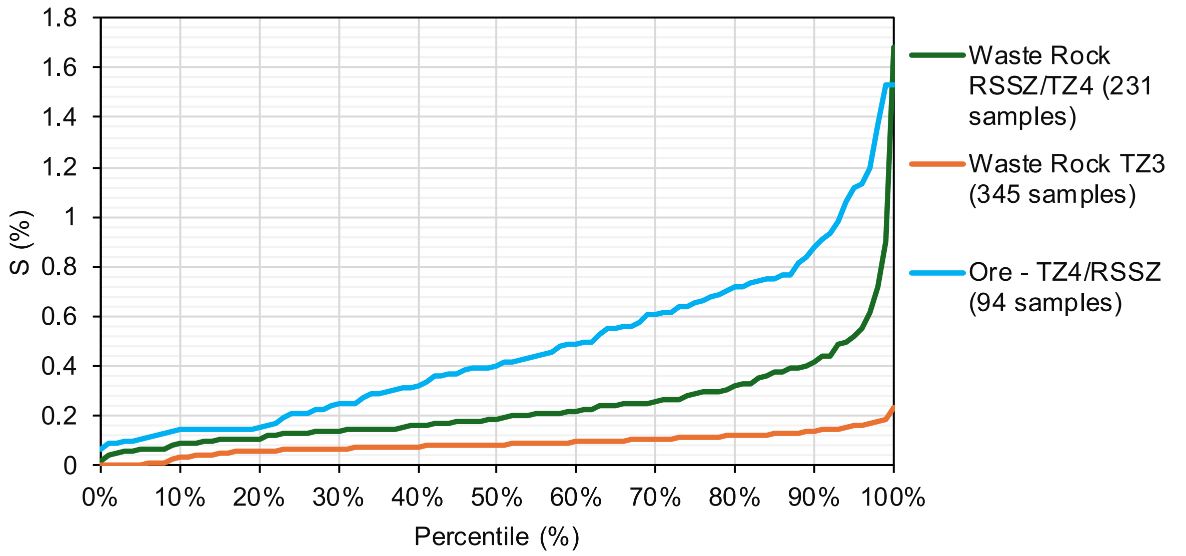

Figure 7: Sulfur distribution of different material types.

Based on geochemical composition (and supporting data):

- TZ3 materials are enriched in As and Co. Antimony (Sb) is possibly elevated.
- RZ4 and RSSZ materials are enriched in As and S. Sb is possibly elevated.

Drillhole data for TZ3 materials were reviewed to understand what TZ3 materials were elevated in As. MGL provided data for drillhole depth versus pXRF As content (Figure 8). Results indicate that most samples had <30 mg As/kg. Two drillholes (MDD207 and MDD206) had As content >30 mg/kg at about a depth of 150 m below ground surface. Further work is required to understand why these materials are elevated in As. Waste rock characterisation will be required using pXRF to ensure the source hazard associated with these high As materials (i.e., > 30 mg/kg) is minimised. The waste rock classification scheme is provided in Table 4 for low As rock and high As rock.

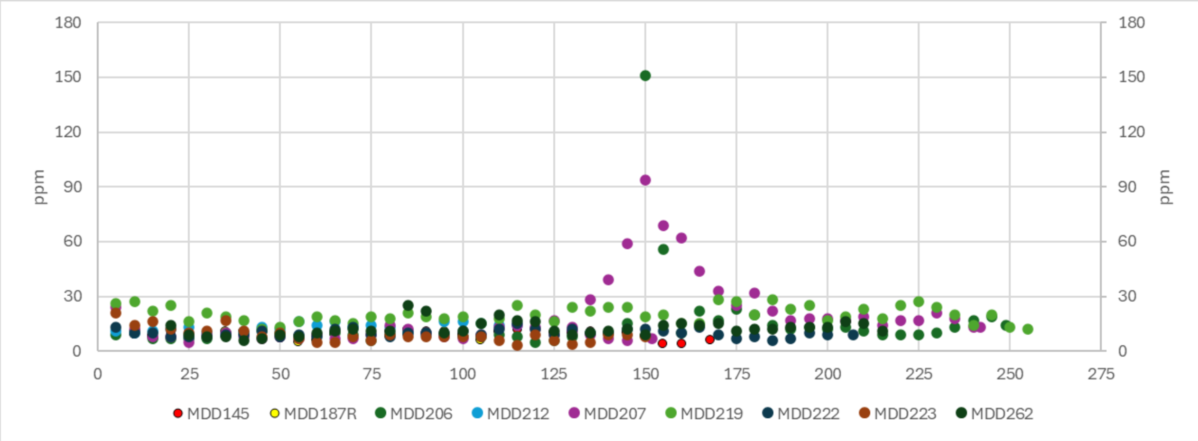

Figure 8: TZ3 As content versus drillhole depth

Table 4. Waste Rock Classification Scheme for the BOGP.

Waste type	**Classification**
TZ3 ≥30 mg As/kg	High As rock
TZ3 <30 mg As/kg	Low As rock
TZ4	High As rock
RSSZ	High As rock

This study indicated the following PCOC should be monitored in MIW due to NMD effects.

- SO_4 – due to elevated sulfur in waste rock and ore.
- As and Fe – due to the presence of As- and Fe- bearing sulfide minerals.
- Sb – due to its relationship with As and S minerals and may be elevated.
- Metals – Al, Co, Cu, Cr, and Zn.

3.4 SPLP and SEM EDS Analysis

This report by MWM (2025c) is provided as Appendix G.

3.4.1 Key Findings

A range of BOGP materials were sampled:

- Diamond drillcore from TZ3 and TZ4/RSSZ.
- Grab samples from historic legacy mine waste rock - mullock (mined ~100 years ago).
- Weathered TZ4 materials from the local road cutting near the CIT battery.

Testing included acid base accounting (ABA), Synthetic Precipitation Leaching Procedure (SPLP), and Scanning Electron Microscope (SEM) with Energy Dispersive X-ray Spectroscopy (EDS) of TZ3 and TZ4 materials to determine sulfur speciation.

ABA data confirmed all samples are classified as NAF. SPLP testing and subsequent metal ecotoxicity quotient (MEQ) analysis against proposed water quality compliance limits (Ryder, 2025) for the BOGP and (ANZG, 2018) where limits were not defined by Ryder (2025)) identified that:

- The following metals are elevated in the SPLP test, and it is recommended that compliance monitoring should be undertaken for Al, As, Co and Cu.
- The following metals are slightly elevated in the SPLP test, and performance monitoring should be undertaken for Cd and vanadium (V) at the ELF, TSF, and underground mine discharge points as this is likely to be the domains that will be potentially elevated.

SEM EDS indicated a range of sulfide minerals and anglesite, a lead sulfate mineral. Oxidation of sulfide minerals identified by SEM EDS could lead to the release of PCOC that include SO_4, As, Fe, and trace metals that include Co, Cu, lead (Pb), and zinc (Zn). However, Pb is not identified as being elevated in the SPLP test.

3.5 Factual Report: Column Leach Test

This report by MWM (2025d) is provided as H.

3.5.1 Findings

Column Leach tests (CLTs) are used to compliment other environmental geochemistry investigations for the BOGP to understand potential geoenvironmental hazards. Representative BOGP materials were selected from TZ3, TZ4/RSSZ, legacy historic mining and TZ4 surface materials, and tailings (e.g., metallurgical testwork samples):

- TZ3 – 3 drill core samples: Data available for between 12 to 13 months of testing.
- TZ4/RSSZ – 3 drill core samples: Data available for 13 months.
- Weathered grab samples from a road cutting at CIT (1 sample – TZ4) and historic mullock piles at RAS and RSSZ (2 samples) with 11 months of available data.
- A composite metallurgical tailings sample with 13 months of available data.

All samples are classified as NAF and acid rock drainage is not expected.

CLT results indicated that the following PCOC are elevated. It is recommended that compliance monitoring should be undertaken for:

- Al, As, Co, Cu, Fe, Sb, and Zn.

Performance monitoring of seepage from the ELF, TSF and underground should be undertaken as these PCOC could become concentrated when there is a large volume of rock interacting with seepage waters:

- Boron (B), Cr, Molybdenum (Mo), Selenium (Se), and V.

Further CLT data will be gathered over the project life to confirm and improve other geochemical assumptions (for instance, classification thresholds for high As and Low As materials: Table 4)

3.6 Source Term Definition Report Bendigo-Ophir Gold Project

This report by MWM (2025e) is provided as Appendix I.

3.6.1 Key Findings

The purpose of this report is to define and present the relevant data that have been used to derive the key water quality source terms to be used in the WLBM for the BOGP (Appendix N), which is developed using the GoldSim Modelling platform.

Source terms have been derived for the following components of the mine domain and surrounds:

- Baseline streams within the BOGP area
- Groundwater
- ELF seepage
- Pit voids
- Ore stockpile
- TSF
- Hardstand areas, ELF surfaces, and roads (e.g., mine impacted surfaces)
- Underground workings
- Rehabilitated surfaces

Water quality source terms were developed from a variety of sources including analogue data sources, baseline studies at the BOGP, and laboratory derived data from environmental geochemistry testing. This report provides an explanation of how the source terms for modelling were developed for the WLBM. Source terms need to be validated through performance monitoring that should be ongoing through the operational and closure phases of the project.

3.6.2 Nitrogenous Compounds

A review was provided on nitrogenous compounds associated with ANFO and cyanide. Navarro-Valdivia et al. (2023) noted that pit lakes can also be elevated in nitrogenous compounds due to the presence of blasting residues, with nitrate nitrogen concentrations peaking in the Golden Bar Pit Lake (Macraes Gold Mine) at 30 mg/L due to an initial nitrate load of 400 kg yet steadily decreasing at 20-30% per year due to biogeochemical processes. The study indicated that the quantity of nitrogen as NH_4NO_3 was estimated to be 5.35 g/m^2 once the Golden Bar Pit Lake started to fill. Recent work in 2020 identified that nitrate can be elevated up to 10.5 mg/L in waste rock seepage (WRS) (OceanaGold, 2020). MWM (2024a) noted that NO_3-N can be up to 35 – 40 mg/L in seepage from waste rock stacks at the Macraes Gold Mine.

Other studies, explained in MWM (2025h) indicate that the effects of elevated nitrogenous compounds in drainage from waste rock storage facilities can last for many decades (e.g., Borden et al., 2022).

Elevated nitrate without any mitigation could be expected from BOGP materials for many decades and this will require management.

3.7 Proposed Consent Conditions

Based on the work presented in this section the following should be considered in framing consent conditions:

Geochemistry Assessment:

- A materials classification system for waste rock is required. Table 4 provides a system to separate waste rock materials into High As and Low As materials (e.g., 30 mg/kg). This should be included in the ELF Management Plan or variations to this classification scheme if updated based on future learnings. A QA/QC process is required to confirm materials are correctly classified. This is discussed in the ELF Management Plan.
- As and S rich materials should be placed within the core of any engineered landform away from oxygen. A QA/QC process should be developed as part of the ELF Management Plan to ensure these materials are placed in the correct location.
- The development of the source term for tailings process water is based on one sample. Further metallurgical testwork is ongoing to validate the water quality signature and confirm PCOC as being elevated or not.
- Large field trials are recommended to validate water quality and source terms used in the geochemical models and the WLBM. It is recommended that lysimeters are installed within ELFs during the first 1-2 years of operations to validate waste rock seepage water quality and quantity. This should include areas that are operational waste rock disposal areas and rehabilitated surfaces.

Performance Monitoring:

- Performance monitoring is required to confirm the source terms used in the WLBM are appropriate. Performance monitoring is discussed in Section 7.
- Performance monitoring is required to confirm the PCOC identified through the geochemical testing are correct.

4 PREVENTION AND MINIMISATION

This section assesses the engineering controls required to minimise the effects of waste rock storage on mine waters at the proposed BOGP.

4.1 Introduction

Engineering controls are required for the BOGP to prevent the mobilisation of PCOC (source hazard) from the proposed ELFs. This includes identifying the landform design concepts that will:

- Prevent oxygen ingress into the landform that causes the oxidation of sulfide minerals; and
- Minimise the ingress of water into the landform that mobilises the stored oxidation products.

Prevention and minimisation utilise source control technologies that are industry proven approaches, which are in alignment with international guidance documents (e.g., INAP, 2014; DFAT, 2016) of how to manage the potential effects of sulfide mineral oxidation.

MGL has committed to proactive source control, using engineered landforms, which provides a foundation for sustainable waste rock management, aligning with INAP (2024) principles for long-term environmental stewardship.

Three reports have been completed to understand opportunities for source control at the BOGP including:

- Engineered Landform Design Philosophy Report
- Net Percolation Assessment memorandum
- Engineered Landform Water Quality Forecast Report

These reports are discussed in the following sections.

4.2 Engineered Landform Design Philosophy

This report by MWM (2025f) is provided as Appendix J.

4.2.1 Key Findings

Studies indicate that a number of PCOC will be elevated in the ELFs at the proposed BOGP including As, SO_4, Fe, and trace metals that could have an effect on the downstream environment if not managed correctly.

One aspect of NMD management is source control to prevent sulfide mineral oxidation and mobilisation of these oxidation products from the ELFs. A key aspect of source control is the design and construction of ELFs to minimise oxygen and water ingress.

The objectives of this study were to:

- Summarise literature and provide industry proven methods for the design of ELFs.
- Provide recommendations to prevent and minimise the potential NMD risks associated with sulfide oxidation by the use of source control technologies.

- Provide preliminary recommendations on how waste rock could be managed within an ELF at the proposed BOGP.

The ELF design philosophy report proposes the following design concepts (Table 5) to minimise oxidation of sulfide minerals and mobilisation of sulfide (and other) oxidation products.

Table 5: BOGP ELF Design Objectives.

DESIGN FEATURE	ATTRIBUTE
Foundation Earthworks	• Clean water diversion to minimise water/rock interaction. • Inert – low S basal materials (3 m thick) to minimise PCOC mobilisation due to basal seepage from natural springs etc. Note: Low S materials (<0.02 wt% S) have been identified in drill holes near the surface of the RAS deposit to approximately 10-15 m depth and these materials should be used for this basal layer where practicable (MWM, 2025). • Basal underdrainage network to minimise water/rock interaction using the low S (< 0.02 wt% S) materials where practicable. • ELF toe bund (or similar) to prevent advective oxygen ingress.
Clean Water Management	• Clean water diversion to minimise water/rock interaction. • ELF design to shed water as quickly as practicable. • Compaction to shed water.
Materials Management	• Development of a material classification management process. • Development of a material management process. • Minimise time between blasting and placement. • Maximise blasting opportunities to maximise grainsize of waste rock – e.g., reduce reactive surface area of higher risk materials (e.g., TZ4 / RSSZ).
Lift Height	• Commence construction using a 4-6 m lift height. • Confirm grainsize segregation does not occur for lift heights of 4-6 m via test pitting or tip head inspections. • Maximise paddock dumping where possible. • Undertake studies to confirm whether higher lifts can be used (e.g., >4-6 m) yet advective oxygen ingress is prevented and diffusion of oxygen is limited to ~20 m horizontal depth into the ELF. • Limit long term diffusive oxygen ingress to < 20 m horizontally and 15 m vertically. Confirm by performance monitoring. Avoid advective oxygen ingress (high airflow). • Validate oxygen flux rates (e.g., cover system trials) to confirm long term sulfide oxidation processes and geochemical model reliability.

DESIGN FEATURE	ATTRIBUTE
Encapsulation	• Placement of RSSZ, TZ4, and High As TZ3 waste rock in the core of the ELF surrounded by lower risk TZ3 materials. • Development of perimeter bund (advective oxygen barrier) and lower permeability running surfaces constructed from TZ3 materials. • Construction of a drainage layer between the bulk waste rock and the soil to enable lateral seepage (along running surfaces) to drain to the ELF toe without compromising rehabilitation surface water quality objectives. This will be the brown rock layer.
Nitrogenous Compounds	• General health, safety, and environmental hazards associated with ANFO will be managed by health and safety processes. • This will include management processes for housekeeping (e.g., spill management) and optimising blast efficacy (to maximise volatilisation of nitrogenous compounds) to minimise nitrogen loads within the BPCP ELFs.
Cover System	• Topsoil/subsoil • Moderately weathered mine rock (commonly referred to as 'Brown Rock') • Develop a cover system to limit net percolation to <20% of annual rainfall and limit oxygen flux such that closure objectives can be achieved. Further work is required.
Progressive Rehabilitation	• Up-valley construction of the ELF where practicable, to provide immediate surfaces for rehabilitation (cover system installation). • Placement of compacted brown rock, soils, and vegetation to reduce net percolation of rainfall.
Performance Monitoring	• Geochemical characterisation and quality assurance / quality control (QA/QC) • Grainsize segregation and lift height • Oxygen ingress depth • Net percolation rates • Seepage water quality and quantity

4.3 Net Percolation Assessment

This report by MWM (2025g) is provided as Appendix K.

4.3.1 Key Findings

Higher net percolation (NP) is typically associated with higher PCOC load from waste rock storage facilities and will therefore be a key influence on NMD water collection and treatment requirements to meet closure objectives at the BOGP. This assessment produces NP estimates which are used in the WLBM (Appendix N). Key findings from the NP assessment include:

- During operations, the uncovered ELF, with relatively coarse texture and higher permeability material will result in high NP, estimated (based on literature) to be in the region of 60 to 80 % of annual precipitation.

- The proposed cover system for the ELF can be categorised as a water store-and-release cover system. The main driving factors are the climate and texture of the proposed cover materials. Landform and vegetation aspects are not expected to significantly influence NP.
- NP for the covered ELF and TSF could be between 20% and 50% of annual precipitation.
- Data from Macraes (MWM, 2024b) suggest lower NP may be possible, in the region of 10 to 20% of annual rainfall, but further work is required to demonstrate this is achievable.

The WLBM (Appendix N) uses 20% NP as the basis for assessment of effects of the project, which is considered reasonable. Performance monitoring is required to validate the NP, which should be undertaken with the first 1-2 years of the BOGP commencing. Higher NP rates will mean a longer active treatment period.

4.4 Engineered Landform Water Quality Forecast Model Report

This report by MWM (2025h) is provided as Appendix L.

4.4.1 Key Findings

This report presents the results of geochemical modelling of the proposed ELFs at the BOGP to understand the potential effects on water quality from these mine domains. This includes developing a conceptual geochemical model for each ELF, estimating water quality seepage from the ELFs during operations and during the active closure and post closure phases of the BOGP, and providing recommendations for the management of ELF seepage based on model results.

The study identified the following recommendations for management opportunities to minimise the long-term risks to water quality for waste rock storage at the BOGP:

- Proceed with the proposed ELF design, ensuring low S and low As TZ3 materials encapsulate high-sulfur materials (RSSZ, TZ4, high As TZ3) to minimise oxygen ingress.
- Proceed with short lift heights at 4-6 m height and confirm that grainsize segregation is minimised and that oxygen is reduced to < 5% after ~20 m horizontal distance into the ELF and that the oxygen profiles (from oxygen probe monitoring) demonstrate that oxygen ingress is diffusion controlled (e.g., Ritchie, 1994). Ensure advective oxygen ingress is prevented (provides high air flow for sulfide mineral oxidation). Higher heights may be possible if advective oxygen ingress is prevented by engineering controls.
- Install cover systems to further mitigate risks as the final landform is created. Cover systems need to minimise NP to < 20% as this is a key driver of long term PCOC load. The cover system should also minimise oxygen flux. Flux rates (water and oxygen) should be validated by cover system trials to confirm ELF water quality estimates are suitable.
- Establish a comprehensive monitoring program for water quality, oxidation rates, and cover system performance. Adapt management strategies based on observed trends and evolving conditions.
- Continue validating laboratory-to-field scaling factors using site-specific data, particularly for TZ3 and TZ4 materials, to refine long-term predictions.

By adopting these recommendations, the project can effectively manage geoenvironmental risks while aligning with best-practice approaches for sustainable waste rock management (e.g., INAP, 2024).

4.5 Proposed Consent Conditions

Based on the work presented in this section the following should be considered in framing consent conditions:

ELF Design Requirements:

The design objectives proposed in Table 5 for the ELF are critical to ensure that the effects of sulfide mineral oxidation and stored mobile PCOC are minimised and that geochemical models to forecast effects remain valid. The following recommendations are provided:

- Wherever practicable, clean water should be diverted away from facilities that contain waste rock and tailings.
- Where practicable, inert – low sulfur basal materials[14] (3 m thick) should be used to minimise PCOC mobilisation due to basal seepage from natural springs etc. Such material should also be used for the basal underdrainage network where practicable. The material classification process described in Section 3.7 will support the appropriate classification of these materials.
- An ELF toe bund (or similar) should be constructed to prevent advection of oxygen.
- ELF surfaces should be constructed to shed water as quickly as possible. Sediment sumps should not be located on the ELF. If this is essential, then sediment sumps need to be lined with low permeability materials to reduce NP from these structures.
- Construction of the ELF should commence using lift heights of 4-6 m. MGL should confirm that grainsize segregation does not occur and that oxygen is excluded within the core of the ELF. Higher lifts are possible if oxygen remains excluded at depth (e.g., <5% oxygen beyond ~20 m horizontal distance into the ELF) with a clear oxygen diffusion profile (e.g., Ritchie, 1994). The principal objective is to exclude advective oxygen ingress that provides high volumes of air of sulfide oxidation.
- Placement of RSSZ, TZ4, and high As TZ3 waste rock in the core of the ELF surrounded by lower risk TZ3 materials.
- Construction of a drainage layer between the bulk waste rock and the soil to enable lateral seepage (along running surfaces) to drain to the ELF toe without compromising rehabilitation surface water quality objectives. This will be the brown rock layer.
- Develop a cover system to limit net percolation and oxygen flux such that closure objectives can be achieved (e.g., < 20% net percolation).
- Up-valley construction of the ELF where practicable, to provide immediate surfaces for rehabilitation (cover system installation).

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[14] *Materials should be < 0.02 wt% S as identified by drill hole data.*

Performance Monitoring:

- Geochemical characterisation to determine appropriate materials placement is required. This will be addressed by the appropriate management processes described in the ELF MP.
- An assessment of grainsize segregation should be undertaken to validate the lift height is appropriate. If grainsize segregation is occurring the lift height should be reduced or a perimeter bund should be established including lower permeability running surfaces. This may require maximising blasting opportunities to generate finer grained materials.
- Oxygen probes should be used to confirm that the design objectives exclude oxygen into the core of the ELF (e.g., < 5% oxygen beyond ~20 m horizontally) with a clear oxygen diffusion profile (e.g., Ritchie, 1994). Data should confirm advective oxygen ingress is eliminated.
- Net percolation (NP) rates need to be validated to confirm that NP is < 20%. Lysimeters should be installed in the first 1-2 years of the operation to monitor NP and quality. Lysimeters should be installed into operational waste rock disposal areas and rehabilitated surfaces. If these NP rates are not achieved, then further work is required to validate the effects of the waste rock storage on downstream waterways at closure. Higher NP rates might require a longer active treatment phase.
- Performance monitoring of water quality and quantity at the discharge of the ELF underdrain (e.g., Shepherds ELF, SRX ELF, West ELF, CIT backfill) to understand water quality effects, confirm net percolation rates, and validate water quality models as being suitable.
- Monitoring of groundwater downgradient of each ELF to confirm that basal seepage is not significant.

5 CONTROL AND TREATMENT

This section discusses the control and treatment of MIW, specifically NMD and nitrogenous compounds.

5.1 Introduction

The WLBM (MWM, 2025j) indicates that treatment of MIW is required for the base case model (e.g., a NP of 20%) where:

- Active water treatment is required for ~50 years post closure due to some PCOC being elevated on a yearly basis (SO_4, Mo, Sb,): Active Closure Phase.
- Passive water treatment is required after ~50 years as part of the post closure phase: Post-Closure Phase.

A water treatment study has been completed to explain the principles and processes associated with active and passive treatment.

5.2 Water Treatment Study Bendigo-Ophir Gold Project

This report by MWM (2025i) is provided as Appendix M.

5.2.1 Key Findings

The WLBM and other studies indicate that the BOGP needs to focus on the management and treatment of MIW that will contain PCOC. Specifically:

- Water management to minimise the amount of water that requires treatment during the closure phases.

Treatment of MIW by a water treatment plant (WTP) during the active closure phase until a passive treatment system (PTS) can be successfully established (~ 50 years).

- PTS are likely to be operational for many decades after they are installed.

The following PCOC may require treatment by the WTP and PTS to achieve the proposed water quality limits for the BOGP (Ryder, 2025):

- Nitrogenous compounds that include nitrate (NO_3) and ammoniacal-N (Amm-N).
- Sulfate (SO_4).
- Metals and metalloids that may include Al, As, Cd, Co, Cu, Cr, Fe, Mn, Mo, Ni, Pb, Sb, Se, Sr, and Zn
- Cyanide (CN) within the tailings water.

Flow rates that require treatment are presented in Table 6. Flow rates are based on a NP of 20% of rainfall. It is proposed that a NP rate of 20% may be achievable, with appropriate engineering controls (i.e., an engineered cover system), which would halve the flow rates in Table 6.

Table 6: Estimated water quantity per mine domain.

MINE DOMAIN	WTP DESIGN CRITERIA (L/s)	PTS (L/s)	COMMENTS
Shepherds ELF	4	4	20% Net percolation (MWM, 2025b)
SRX ELF [1,2]	-	1	20% Net percolation (MWM, 2025b)
West ELF [2]	1	1	20% Net percolation (MWM, 2025b)
Shepherds TSF	13.4	3	Flow is expected to be ~13.4 L/s decreasing to 3 L/s after 5 years (MWM, 2025c).
RAS Underground Portal	6	6	Flow from the RAS Underground is not expected for 20-30 years after closure (MWM, 2025c).
CIT Pit Backfill	1.5	1.5	Further details are available in MWM (2025c).
SRX Pit	-	8	Further details are available in MWM (2025c). It is assumed this water will not require active treatment. Passive treatment is required.
SCK Fill [2]	1	1	20% Net percolation (MWM, 2025b)
Non-NMD impacted water	-	-	Managed for TSS separate to the active WTP. At closure rehabilitated surfaces are assumed to be suitable for discharge with TSS management.

1. *Active treatment for SRX ELF and SRX Pit is not anticipated.*
2. *Flow rates rounded up to 1 L/s*

5.2.2 *Active Water Treatment*

Active treatment is expected from Year 11 for ~50 years. During this period, the BOGP processing plant would be disestablished and the PTS established. Process Flow (2025) note that the WTP will include the following processes:

- Surge sump
- Pontoon mounted pumps for plant feed
- Metal hydroxide precipitation and settling
- Gypsum precipitation and settling
- Ettringite precipitation and settling
- Carbonation and pH trimming
- Treated water sump
- Sludge management

Other processes that will likely be needed in addition to the active WTP are:

- Cyanide destruct on the Shepherds TSF influent stream.
- Potential additional nitrate removal after WTP via biological processes.

Process Flow indicate that the proposed water quality objectives (Ryder, 2025) can be achieved, although further work is required to develop the order of magnitude study to a feasibility study (FS) level. The WTP will operate until passive treatment systems can be installed to successfully treat MIW.

5.2.3 Passive Treatment System

Based on the identified PCOC at the BOGP a multi-stage PTS is expected. This would include:

- Sediment management to mitigate any residue sediment and prevent the PTS from being overwhelmed with sediment.
- Oxidation to encourage $Fe(OH)_3$ precipitation and adsorption of metals such as As and V.
- Anaerobic treatment to remove nitrate, reduce sulfate concentrations, and precipitate metals as sulfides.
- A polishing pond to remove secondary contaminants generated in the anaerobic treatment stage (e.g., sulfide (HS^-), ammoniacal nitrogen, and low dissolved oxygen).

Preliminary treatment efficiencies for the multi-stage PTS are provided in Table 7. These efficiencies are applied in the WLBM to determine whether passive treatment will achieve compliance with water quality limits. If passive treatment cannot achieve compliance with water quality limits, then the WTP must operate for a longer time period.

Table 7: PTS Treatment Efficiencies

PARAMETER	REMOVAL EFFICIENCIES
Calcium	-43.2%
Magnesium	8%
Aluminium	83.3%
Arsenic	99%
Iron	99.1%
Nickel	97.9%
Zinc	99.8%
Manganese	86.4%
Cadmium	85.2
Cobalt	98.4%
Copper	85.6
Uranium	74%
Vanadium	90%
Other metals	98%
Sulfate	30%
Nitrate nitrogen	99%
Ammoniacal nitrogen	99%
Cyanide	90%

5.3 Treatment Summary

Modelling (MWM, 2025o) indicates that the transition from active to passive treatment could occur within ~50 years of the cessation of mining. The transition point is a function of:

- Cover system performance (e.g., NP being 20% of rainfall or higher/lesser).
- Flow rate and quality (seasonal variations that influence NP and surface flows).
- PTS treatment efficiency.

- Dilution within Shepherds Creek and Bendigo Creek catchments
- Dilution within the Bendigo alluvial aquifer.

There remains a level of uncertainty with regards to the exact treatment requirements for MIW. However, technologies are available to treat the proposed MIW by active and passive treatment technologies. Model uncertainties may require a longer period of active treatment or for the WTP to be constructed during the operational phase of the mine if a water surplus is anticipated.

5.4 Proposed Consent Conditions

Based on the work presented in this section the following should be considered in framing consent conditions:

Water Treatment Studies:

- Further studies should be undertaken within the first few years of operations to confirm the WTP requirements and the treatment efficiencies. Early completion of studies will mean that the ability to transition to active treatment can be rapid if required and if the WTP is required later in the Operational Phase of the BOGP it can be constructed quickly.
- Further studies are required to confirm the PTS requirements and the treatment efficiencies. This should include:
  - Oxidation to encourage $Fe(OH)_3$ precipitation and adsorption of metals such as As, V, and other trace metals.
  - Anaerobic treatment to remove nitrate, reduce sulfate concentrations, and precipitate metals as sulfides.
  - A polishing pond to remove secondary contaminants generated in the anaerobic treatment stage (e.g., hydrogen sulfide (HS^-), BOD, ammoniacal nitrogen, and low dissolved oxygen).
- Further studies need to be completed to determine the quantity and quality of water treatment residues (sludge) and identify appropriate disposal locations. The sludge should be disposed off-site at a suitable facility, or studies should be undertaken to confirm suitable onsite management options.
- The technology development pathway should include bench-scale trials to validate study assumptions; site-based pilot trials as a part of the pre-feasibility study for water treatment; and operational trials as part of the feasibility study for water treatment.

Performance Monitoring:

Performance monitoring will be required for the treatment of MIW in the active- and post- closure phases and to also confirm when treatment is not required (i.e., treatment is not required to achieve water quality objectives). This should include influent and effluent quality/quantity monitoring to understand treatment performance. Performance monitoring should be developed as part of future studies.

6 ASSESSMENT OF POTENTIAL EFFECTS

This section discusses the potential effects of the BOGP on water quality and quantity based on the WLBM (MWM, 2025j).

6.1 Introduction

The primary objectives of the modelling exercise were as follows:

- Forecast operational and closure phase water balance conditions for the BOGP.
- Forecast instream water quality at the proposed resource consent compliance locations as compared to proposed water quality limits for the operational and closure phases.
- Forecast changes in stream flows as a result of the BOGP for the operational and closure phases.

6.2 Water Load Balance Model Report

This report by MWM (2025j) is provided as Appendix N.

6.2.1 Findings -Operational Phase

The Operational Phase calculations suggest the following:

- Water balance calculations suggest that the site will be in a water deficit condition up to Year 8. After this point, dewatering from satellite pits (i.e., SRX and to a lesser extent CIT) may push the site to a water surplus condition for the last few years of mine life without additional controls. Engineering controls (e.g., construct the water treatment plant prior to closure) are available to manage potential water surpluses, and can be evaluated during detailed design phases. Ongoing site water balance reconciliation for the BOGP will be required to confirm water balance conditions remain in a water deficit condition.
- Based on mine features that will retain water on site and not be discharged to the receiving environment during operations, mean flows at SC01 and RS03 are estimated to be reduced by approximately 17% and 13% respectively, at the full life of mine project footprint. Low flow conditions will also increase, showing the seven day mean annual low flow decreasing by approximately 27% and 15%, for SC01 and RS03 respectively.
- Interpretation of the mixing model results suggests surface water quality at SC01 and RS03 will remain below the proposed compliance limits for both surface and groundwater if groundwater is used for dust suppression.

6.2.2 Findings - Post-Closure Phase

The Post-Closure WLBM results suggest the following:

- Pit voids will fill with water and discharge mine-impacted water (MIW) at average rates of approximately 6 L/s, 8 L/s and 1.5 L/s, from the RAS[15] Pit (via the RAS underground workings),

[15] *Rise and Shine Pit*

SRX Pit, and CIT Pit, respectively. RAS Pit Lake will reach a stable condition at ~25 years, and SRX and CIT pits will do so in <5 years.

- Of the mine waste storage facilities (MWSFs), using a net percolation rate of 20%, Shepherds engineered landform (ELF) will have the highest average seepage rate of MIW of approximately 4 L/s, followed by the TSF[16] seepage rate of approximately 2 L/s on average. SRX ELF, WELF[17], and SCK Fill[18] all had seepage rates of approximately 1 L/s or less.
- In the post closure phase, creek flows will increase, with average flows increasing by approximately 60% at Shepherds Creek (at SC01) and 50% at Rise and Shine Creek (at RS03). Low flow conditions will also increase, with the seven day mean annual low flow increasing by approximately 530% and 280%, for SC01 and RS03 respectively.
- Model results suggest that active water treatment within the Shepherds Creek catchment will be needed for 50 years, when concentrations of SO_4, Mo, and Sb after passive treatment are below the surface water and groundwater limits, for the base case model scenario.
- Water quality findings for the base case model at RS03 indicate:
    - No limits are exceeded after partial passive treatment of the average flow (8 L/s) from SRX Pit.
    - Active treatment of MIW from SRX Pit and SRX ELF is not required.

6.2.3 *Operational Management Recommendations*

- Back-to-back wet years and changes of water balance assumptions (e.g., dust suppression water sources) may move the site into a water surplus condition. As such, detailed water balance modelling by mine stage and that includes rainfall variability is recommended to support detailed mine design and improve confidence in a water deficit being maintained. Development of an adaptive management process related to the site water balance would also support proactive management of identified risks.
- A site water balance reconciliation should be completed regularly (e.g., annually or more frequent) to confirm water balance model results are appropriate, and/or make model updates to improve confidence in model results projected into the future.
- Clean water sources (i.e., bore water) should be used for dust suppression.
- Pit sump water could potentially be used for dust suppression early on in mine life. Adaptive management processes should be developed to proactively manage and respond if performance and/or compliance monitoring data suggests use of pit sump water may begin to provide a risk of non-compliance (i.e., potential to cause exceedance of water quality limits at SC01 and RS03).

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[16] *Tailings Storage Facility*

[17] *West ELF*

[18] *Shepherds Creek*

- Other water management options include the early construction, during operations, of the water treatment plant if prolonged water surplus conditions eventuate.

6.2.4 Closure Management Recommendations

The following management recommendations are proposed for the active- and post- closure phases:

- Active water treatment in the Shepherds Creek catchment through a water treatment plant (WTP) is required until passive treatment systems can achieve the proposed water quality compliance limits.
- Passive treatment of the SRX Pit Lake is required to achieve water quality limits at RS03. Noting that passive treatment is modelled at 8 L/s (average SRX Pit flow rate) with higher flows being untreated.
- Active and passive water treatment systems need to be developed to a detailed design level:
    - For the WTP, these studies need to be completed within the first few years of the mine commencing so that the technology is ready for operations and closure. Early design of the WTP would mean it is ready as part of any adaptive management process for water management.
    - Passive water treatment systems should be designed once the project is operational using actual water quality from the project mine domains to confirm the proposed approach is appropriate.
- The majority of PCOC loads originate from Shepherds ELF and the TSF; therefore, performance monitoring of both flow rates and water quality is recommended at these locations.
- Model results suggest that active water treatment within the Shepherds Creek catchment will be needed for 50 years, when concentrations of SO_4, Mo, and Sb after passive treatment are below the surface water and groundwater limits, for the base case model scenario.
- Diverting Shepherds ELF and TSF seepage to the RAS Pit Lake for dilution was also assessed as a management option. Results indicate that at closure of the BOGP, the proposed water quality limits can be achieved without active treatment. The exception to this is molybdenum. Active treatment is required until Mo decreases to a concentration that can be managed by passive treatment technologies.
- Performance monitoring is necessary to assess whether treatment is required using these management mechanisms.

6.3 Proposed Consent Conditions

Based on the work presented in this section the following should be considered in framing consent conditions:

- A transient operational site wide water and load balance model needs to be developed prior to mine commencing to improve confidence in water accumulation or losses over time and water quality, particularly for seasonal dynamics. Such a model will support detailed design of the TSF.

- Additional ground investigations, groundwater monitoring, and detailed modelling will be required at the detailed design to confirm mine waste storage facility seepage collection systems will achieve anticipated collection requirements.
- The collection of performance monitoring data to improve model input data reliability is required, including:
  - Water quantity and quality data from mine domains and water movement around the site.
  - Water quantity and quality data as compliance locations.
  - Records of pit lake filling levels over time.
- Once the mine is operational, collection of water quantity and quality data (obtained as part of performance monitoring) should be compared to the developed operational site wide water balance model periodically to confirm model results remain reasonable. Model revisions and/or re-calibration may be required if material differences are apparent.
- A cover system trial should be established early on in mine life to demonstrate that a NP of 20% of mean annual rainfall can be achieved. Such a study would provide confidence that water quality closure objectives can be achieved and support closure planning.

7 PERFORMANCE MONITORING

Comprehensive performance monitoring needs to be developed to ensure the mine will achieve its operational and closure objectives. Specific performance monitoring relating to each MIW management step has been discussed in those specific sections.

7.1 Water Quality Database QA/QC

An important component of MIW performance monitoring is QA/QC of data. MWM has provided a QA/QC memorandum for water data as Appendix O.

7.1.1 Key Findings

This memo provides advice for key processes and recommendations for QA/QC of data imported into the BOGP water quality database. It is recommended that the following issues are considered for quality assurance / quality control (QA/QC) of the water quality data:

- Quality assurance (QA) of data is required. Including comparison of field and laboratory pH and EC, time series of PCOC, evaluation of sulfate concentrations vs PCOC, pH vs metal concentrations and total N measurements against the sum of nitrogenous compounds.
- Quality control (QC) including duplicate samples, replicate testing, blanks, and water reference standards should be used.
- Quality assurance of data is required.
- Management of limits of reporting (LOR).
- Ensuring the LOR is appropriate for the PCOC to confirm whether they are elevated against recommended water quality guidelines.
- Analysis of data to confirm whether further ongoing testing is required if results are consistently lower than the recommended water quality guidelines

7.2 General MIW Performance Monitoring

The following performance monitoring, which is explained in detail in the Water Management Plan is proposed

- Comparison of water quality data and trends against agreed BOGP water quality compliance limits as proposed by Ryder (2025).
- Continue monitoring of groundwater for the project at MDD015 until mining commences to confirm baseline groundwater conditions.
- Once pit lakes have evolved, it is assumed that nitrogenous compounds will be at low concentrations due to biogeochemical processes. The pit lakes should be monitored for the decay of nitrogenous compounds to validate model assumptions.
- Pit sumps should be monitored to confirm water quality trends for PCOC, particularly if these sumps are used for dust suppression during the early phases of the project.

- A piezometer to confirm groundwater levels in the decline should be installed to provide guidance on when discharge from the RAS underground portal might occur (with comparison to RAS Pit Lake water levels)
- Monitor the underground workings seepage water quality prior to it discharging to validate management requirements.
- Monitoring of water quality and flow rates of runoff from mine impacted surfaces such as haul roads and the ELF (e.g., monitoring of runoff within sediment sumps).
- Monitoring of water quality from rehabilitation surfaces (e.g., measurement of runoff water quality)
- Validate the process water quality including the geochemistry of the tailings on a monthly basis to confirm water quality inputs to the WLBM and validate assumptions on the geoenvironmental hazards for the solids stream.

Undertake monthly sampling of the TSF and ELF seepage for water quality to improve the source term for modelling of effects.

- This should also include continuous monitoring for EC, pH, and flow to improve the WLBM.
- Performance monitoring for B, Ni, Se, Tl, and V, should be undertaken based on the MIW studies presented in this report.
- Performance monitoring should be undertaken monthly within 3 months of construction commencing for a period of 2 years (to align with ANZG, 2018 expectations). If data indicates that these PCOC are not elevated, then the monitoring should cease.
- Performance monitoring will be reported in the Annual Monitoring Report.

8 SUMMARY

This overview report has summarised all the documents relating to geoenvironmental hazards and the potential effects on water quality.

8.1 Findings

Studies indicate that the environmental risks associated with MIW at the proposed BOGP can be successfully managed if the correct management processes are utilised, appropriate engineering controls are implemented, and performance monitoring is undertaken to support adaptive management principles if there is variation from the expected case.

The key issues relating to water that need to be managed are:

- Elevated total suspended solids (TSS) in surface waters.
- Neutral metalliferous drainage (NMD) that may have elevated potential constituents of concern (PCOC) such as arsenic (As), sulfate, (SO_4), and trace metals.
- Nitrate-rich drainage due to the use of ammonium nitrate fuel oil (ANFO) explosives and cyanide (due to gold recovery) that may also include ammoniacal nitrogen.

Collectively these waters are referred to as MIW to acknowledge the different potential contributions to poor water quality within the project area.

The key PCOC that are likely to be associated with MIW include: TSS, aluminium (Al), antinomy (Sb), As, cobalt (Co), copper (Cu), chromium (Cr), iron (Fe), molybdenum (Mo), nickel (Ni), lead (Pb), SO_4, strontium (Sr), zinc, (Zn), cyanide (CN), ammoniacal nitrogen (Amm-N) and nitrate nitrogen (NO_3-N). Water quality monitoring also includes pH, cadmium (Cd), manganese (Mn), selenium (Se), and uranium (U) as a more comprehensive dataset to ensure all potential risk are monitored (Ryder, 2025).

8.2 Report Structure

This overview report summarises all the documents relating to geoenvironmental hazards and the potential effects on water quality. These documents are summarised in Table E2 and are provided as appendices to this report. Recommendations provided in these reports, and this overview report are addressed in the WMP.

Due to the size of the reports (>50 Mb) these appendices have been split into:

- Attachment 1: Appendix B to G
- Attachment 2: Appendix H
- Attachment 3: Appendix I to O

Table 8: Geochemistry and Water Effects Report Summary

REPORT NAME	APPENDIX
Site Visit and Preliminary CSM	B
Preliminary Site Investigation	C
Baseline Water Quality Report	D

REPORT NAME	APPENDIX
Sampling and Analysis Plan for Geochemical Characterisation	E
Geoenvironmental Hazards Factual Report	F
SPLP and SEM EDS Analysis	G
Factual Report: Column Leach Test	H
Source Term Definition Report	I
Engineered Landform Design Philosophy	J
Net Percolation Assessment	K
Engineered Landform Water Quality Forecast Report	L
Water Treatment Study	M
Water Load Balance Model Report	N
Water Quality Database QA/QC	O

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10 LIMITATIONS

Attention is drawn to the document "Limitations", which is included in Appendix P of this report. The statements presented in this document are intended to provide advice on what the realistic expectations of this report should be, and to present recommendations on how to minimise the risks associated with this project. The document is not intended to reduce the level of responsibility accepted by Mine Waste Management, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in doing so.

APPENDIX A ABBREVIATIONS

ABBREVIATION	DEFINITION
ABA	Acid base accounting
ANC	Acid neutralisation capacity
ANFO	Ammonium nitrate fuel oil
ANZG	Australian and New Zealand guidelines for fresh and marine water quality
BOD	Biochemical oxygen demand
BOGP	Bendigo-Ophir Gold Project
CIT	Come in time deposit
CLT	Column Leach Test
CSM	Conceptual site model
DSI	Detailed site investigation
EDS	Energy Dispersive Spectrometry
ELF	Engineered landform
ELFMP	Engineered Landform Management Plan
HAIL	Hazardous Activities and Industries List
LOR	Limit of reporting
MEQ	Metal ecotoxicity quotient
MGL	Matakanui Gold Limited
MIW	Mine impacted water
MWM	Mine Waste Management Limited
MWSF	Mine waste storage facility
NAF	Non-acid forming
NAG	Net Acidity Generation
NAPP	Net acid production potential
NESCS	National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.
NMD	Neutral metalliferous drainage
NP	Net percolation
PAF	Potentially acid forming
PCOC	Potential constituents of concern
PSI	Preliminary site investigation
PTS	Passive treatment system
QA/QC	Quality Assurance / Quality Control
RAS	Rise and Shine deposit
ROM	Run-of-mine
RSSZ	Rise and shine shear zone geological unit.
SAP	Sample and Analysis Plan
SEM	Scanning Electron Microscopy
SPLP	Synthetic Precipitation Leaching Procedure
SRE	Srex East

ABBREVIATION	DEFINITION
SRX	Srex
TSF	Tailings Storage Facility
TSS	Total suspended solids
TZ3	Lower greenschist facies textural zone 3 rocks of the Otago Schist.
TZ4	Upper greenschist facies textural zone 4 rocks of the Otago Schist.
UTL	upper tolerance limit
WLBM	Water and Load Balance Model
WMP	Water Management Plan
WRS	Waste Rock Stack
WTP	Water treatment plant

APPENDIX B SITE VISIT AND CSM

APPENDIX C PRELIMINARY SITE INVESTIGATION

APPENDIX D BASELINE WATER QUALITY REPORT

APPENDIX E SAMPLING ANALYSIS PLAN FOR GEOCHEMICAL CHARACTERISATION

APPENDIX F GEOENVIRONMENTAL HAZARDS FACTUAL REPORT

APPENDIX G SPLP AND SEM EDS ANALYSIS

APPENDIX H FACTUAL REPORT: COLUMN LEACH TEST

APPENDIX I SOURCE TERM DEFNITION REPORT

APPENDIX J ENGINEERED LANDFORM DESIGN PHILOSOPHY

APPENDIX K NET PERCOLATION ASSESSMENT

APPENDIX L ENGINEERED LANDFORM WATER QUALITY FORECAST REPORT

APPENDIX M WATER TREATMENT STUDY

APPENDIX N WATER AND LOAD BALANCE MODEL

APPENDIX O WATER QUALITY DATABASE QA/QC

APPENDIX P LIMITATIONS

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MINE WASTE
MANAGEMENT

GREENROAD GROUP