



Macraes Phase Four

DRAFT - Water Monitoring Plan

OceanaGold (New Zealand) Limited

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→ The Power of Commitment



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1. Introduction

OceanaGold (New Zealand) Limited (“**OGNZL**”) currently undertakes open pit and underground gold mining operations at the Macraes Operation located at Golden Point Road, Macraes Flat, East Otago. As part of their ongoing operations, OGNZL continually review the remaining life of the Macraes Operation in light of updated knowledge of the gold resource and the economics of mining.

Reflecting recent exploration success and optimisation work, together with higher gold prices, the Macraes Phase Four Project (“**MP4**” or “**the Project**”) seeks to extend the life of mining at the Macraes Operation until at least 2039. The Project, which will enable ongoing gold production at a rate of approximately 130,000 ounces per annum, is identified as a Listed Project in Schedule 2 of the Fast-track Approvals Act 2024 (“**FTAA**”) as a project providing significant national or regional benefits.

To support the development of the substantive application for the Project, OGNZL has engaged **GHD** to provide a surface and groundwater monitoring plan to outline monitoring provisions proposed for the project.

This scope of this report is to provide a draft surface and groundwater monitoring plan that outlines existing and proposes new monitoring locations and schedules, where these schedules inform data capture that supports ongoing water management associated the Project. The scope includes:

- surface water flow monitoring,
- mine water flow monitoring,
- surface water quality monitoring,
- mine water quality monitoring,
- groundwater level monitoring, and
- groundwater quality monitoring.

1.1 Purpose of this plan

The purpose of this plan is to outline the proposed surface water and groundwater monitoring provisions for the Project. This includes existing monitoring regimes and proposed monitoring regimes for the site.

This Surface and Groundwater Monitoring Plan (SWGMP) is developed for MP4 and outlines the following provisions proposed for MP4:

1. Compliance locations (based on Viridis (2026)).
2. Water quality monitoring sites, including,
 - a. Surface water sites - receiving environment water bodies,
 - b. Mine water sites – mine water management features,
 - c. Groundwater sites – monitoring bores (performance bores),
3. Flow monitoring sites, including:
 - a. Receiving water flow rates,
 - b. Mine water flow sites,

The plan identifies existing monitoring locations to be retained, monitoring locations to be adjusted to align with MP4 Project developments and proposes new monitoring locations to improve the understanding of water flows and water quality across the site.

The purpose of the monitoring plan is to:

1. Provide baseline data for current and future environmental affects assessments at the site,
2. Provide ongoing validation of modelling outcomes from this project to identify where re-evaluation of potential outcomes is necessary.
3. Simplify the monitoring programme with standardised analytical suites and sampling frequency where appropriate to make implementation achievable for site staff while still enabling the collection of a robust data set.

1.2 Relationship to Other Project Documents

This Plan should be read in conjunction with:

- Macraes Phase 4 FTA Surface and Groundwater Assessment (GHD, 2026)
- Macraes Phase 4 FTA Assessment of Environmental Effects (AEE) (Viridis, 2026)
- Macraes Phase 4 FTA Site Water Management Plan (WGA, 2026)
- Macraes Phase 4 FTA Erosion and Sediment Control Plan (SouthernSkies, 2026)

1.3 Limitations

This report: has been prepared by GHD for OceanaGold (New Zealand) Limited and may only be used and relied on by OceanaGold (New Zealand) Limited for the purpose agreed between GHD and OceanaGold (New Zealand) Limited as set out in section 1.1 of this report. Without limiting the foregoing, this report is intended to support OceanaGold (New Zealand) Limited's application under the Fast-track Approvals Act 2024 and may be relied upon by the Expert Panel and relevant administering agencies for the purposes of assessing the application.

GHD otherwise disclaims responsibility to any person other than OceanaGold (New Zealand) Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by OceanaGold (New Zealand) Limited and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

This document has been produced for New Zealand consenting purposes only. Information contained herein must not be relied on for investment purposes.

1.4 Assumptions

- This plan does not address all aspects of operational water management on site, including;
 - Water within the process circuit,
 - TSF operation,
 - Erosion and Sediment control (SouthernSkies, 2026)
 - On-site potable water and sewage, and
 - Operational water uses including, but not limited to, truck washes and concrete batching.
- It is assumed that the seepage flow and water quality monitoring systems in place for the tailings storage facilities are appropriate and adjustments will be made to this plan as the facilities are modified.

2. Project description

The MP4 Project comprises expansion of existing mining areas and development of new infrastructure including open pits, waste rock stacks, and tailings storage facilities.

2.1 Site location and description

OGNZL owns and operates the Macraes Operation at Macraes Flat, approximately 30 km northwest of Palmerston in the Otago Region. The Macraes Operation is the largest gold mine in New Zealand and, since commissioning in 1990, has produced more than 6 million ounces of gold.

Macraes Flat is situated on an elevated plateau at approximately 500 m above sea level. The plateau is flanked by the Taieri Ridge to the northwest, Shag Valley and Horse Range to the east, and the coastal hills and extinct volcanic cones of Palmerston and Waikouaiti to the southeast. Macraes Road provides access to Macraes Flat and the Macraes Operation, connecting to State Highway 85 to the east and State Highway 87 (SH87, the Middlesmarch–Hyde Road) to the west.

The environment within and surrounding the Macraes Operation has been shaped by historic and current mining activities undertaken in accordance with existing (and elapsed) resource consents. Figure 2.1 shows the arrangement of the major mine features at the Macraes Operation. In summary, the current components of the Macraes Operation include:

- Numerous open pits (both operational and non-operational);
- Two underground mines (Fraser's, now closed, and Golden Point, which is actively mined);
- Waste rock stacks at various stages of operation and rehabilitation;
- A network of haul roads and general mine service tracks;
- A Processing Plant;
- Five tailings storage facilities (three inactive, one active but nearing capacity, and one under construction and currently receiving tailings);
- An extensive network of water management infrastructure, including diversion drains, silt ponds, sumps, pit lakes, and freshwater storage reservoirs;
- Two consented but not yet constructed water storage reservoirs (Camp Creek Dam and Coal Creek Dam); and
- Associated infrastructure supporting ongoing operations, including district roads, powerlines, workshops, offices, and associated water and amenity facilities.

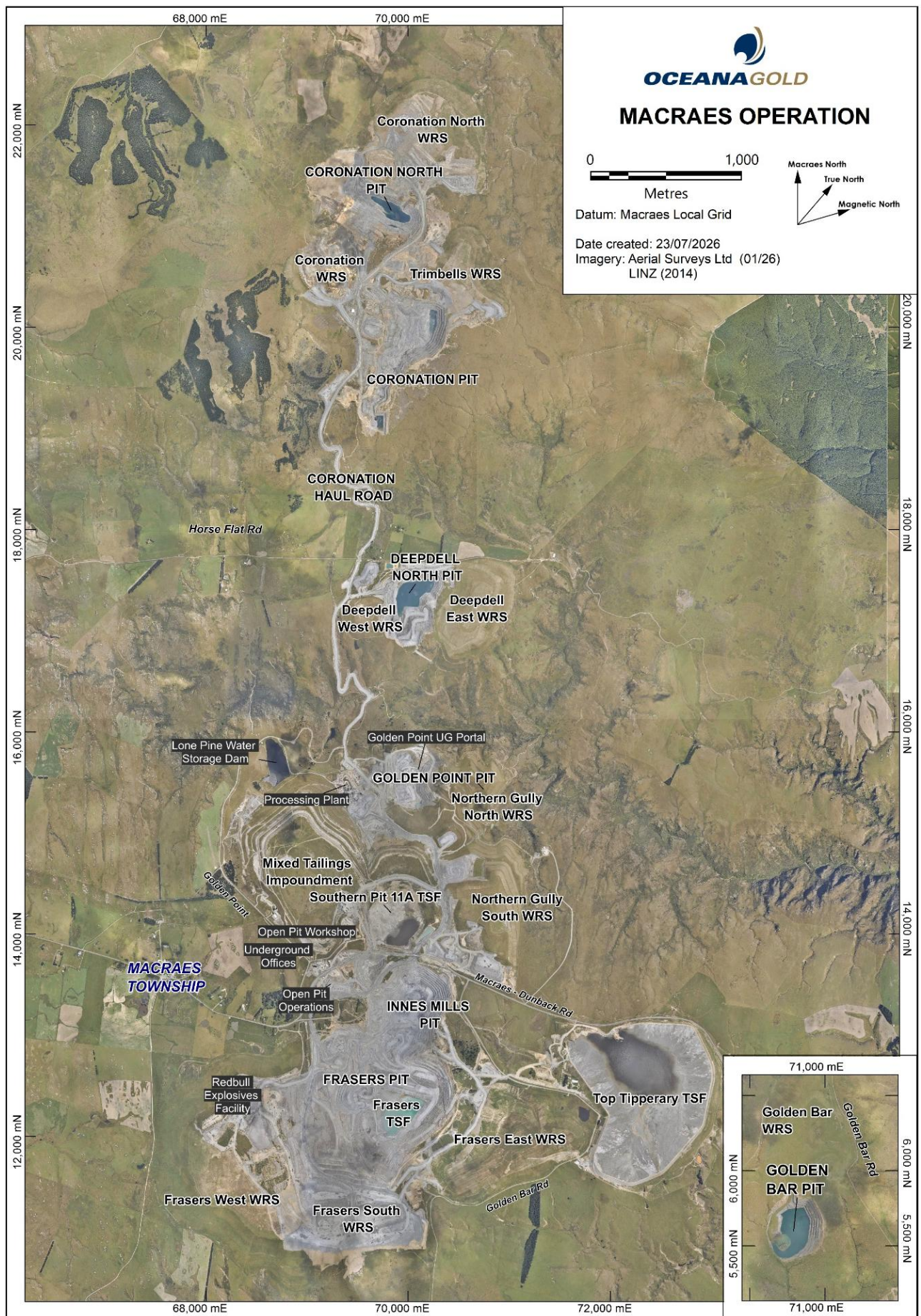


Figure 2.1 Existing site layout at the Macraes Operation as of July 2026 (Source: OGL)

2.2 Project overview

The Project is made up of the following proposed key activities:

- **Open pit extensions** Coronation, Coronation North, Innes Mills, and Golden Bar.
- **Underground mine expansion** through further development of the Golden Point Underground mine (“GPUG”).
- **Tailings management**, including:
 - Construction of the Frasers Tailings Storage Facility (“FTSF”) Stage 3 to accommodate a total tailings storage of up to 153 Mt; and
 - Hydraulic mining and relocation of tailings from the Mixed Tailings Impoundment (“MTI”), Southern Pit Option 10 TSF (“SP10”), and Southern Pit Option 11A TSF (“SP11”) to FTSF.
- **Waste rock disposal**, including increased storage capacity within open pits and at existing waste rock stacks at Coronation, Coronation North, Innes Mills, Golden Bar, Golden Point, and Frasers.
- **Water management infrastructure and operations**, including:
 - Construction of Camp Creek and Coal Creek water storage dams for flow and water quality management;
 - Construction, operation and maintenance of a Water Treatment Plant; and
 - Ongoing operation and maintenance of the Mine Water Management System (“MWMS”).
- **Infrastructure and roading works**, including:
 - Realignment of Macraes Road in two stages; and
 - Relocation of the Open Pit Mining Workshop.
- **Ecological enhancements**, including establishment of:
 - Murphys Ecological Enhancement Area (“MEEA”) near Murphys Creek, including predator fencing, access tracks, and site facilities;
 - Mt Highlay restoration area;
 - Cranky Jims Link shrubland enhancement area;
 - Murphys Link tussock protection area; and
 - Additional offset and compensation measures for residual ecological impacts.
- **Mine closure and rehabilitation activities**, including rehabilitation of mining landforms, creation of pit lakes, dry capping of tailings storage facilities, and revegetation in accordance with closure objectives.

An overview of the proposed activities which make up the Project is shown in Figure 2.2 below.

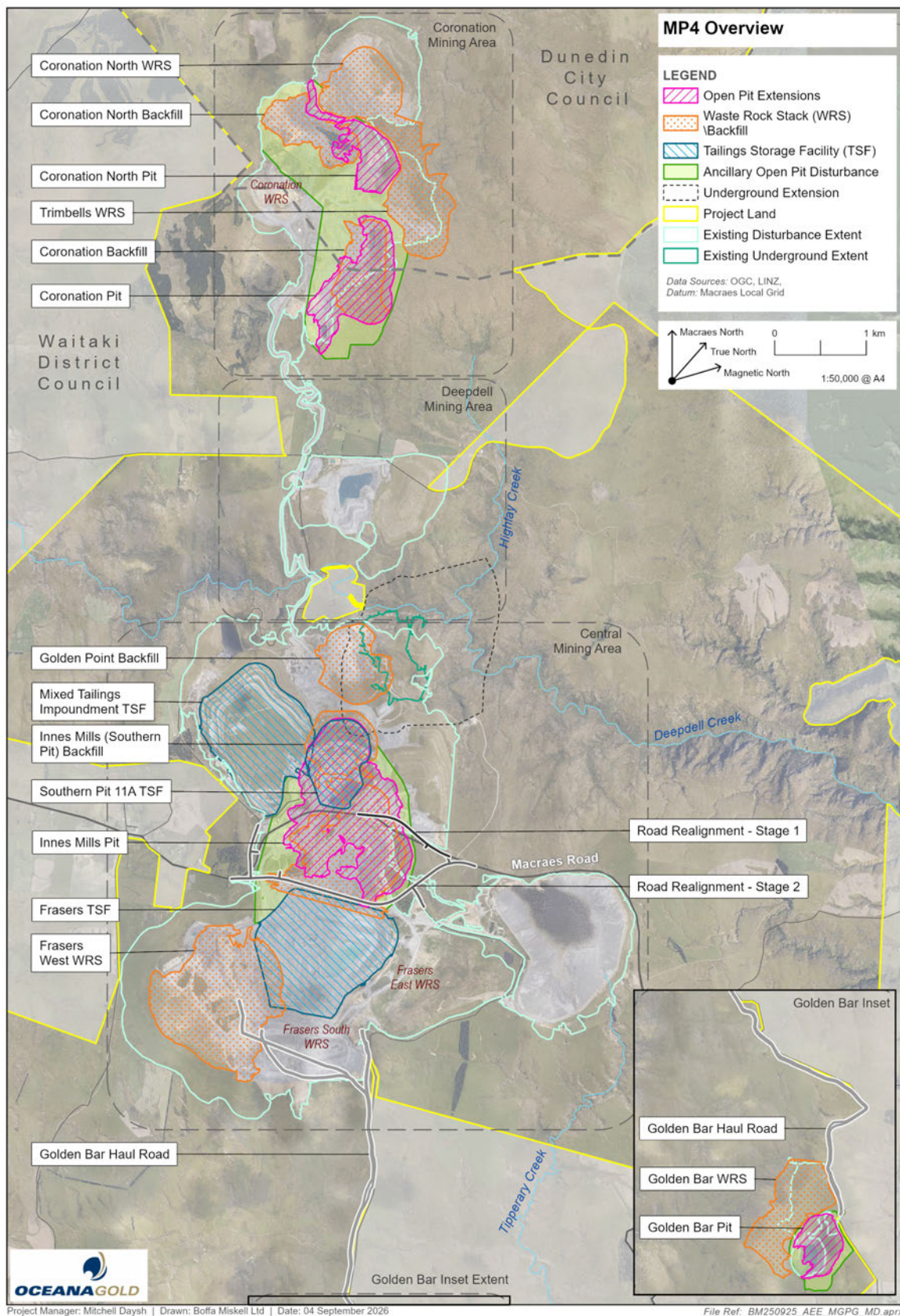


Figure 2.2 MP4 Overview Plan (Source OGL)

3. Monitoring Framework Overview

3.1 Monitoring Objectives

Monitoring aims to:

1. Demonstrate compliance with receiving environment water quality objectives and limits,
2. Provide data for ongoing environmental effects assessments, and
3. Provide early detection of adverse trends.
4. Inform mine development and ongoing water management

3.2 Regulatory Framework

This Plan has been prepared to support consent conditions under the Otago Regional Council framework, including discharge permits and water permits associated with the Project.

3.3 Monitoring Types

Monitoring includes (surface water):

- Compliance monitoring – Undertaken at set intervals and locations to satisfy the proposed compliance regime and provide basis for performance monitoring to ORC (Viridis, 2026).
- Operational monitoring – Undertaken at set intervals and locations to build OGLs reference data base and provide early performance monitoring of potentially adverse water quality developments.
- Investigative monitoring – Undertaken as a response to identified adverse outcomes or following exceedance of compliance trigger levels (Refer WGA, 2026).

The Water Monitoring Plan (this plan) addresses the recommended operational monitoring.

- Control monitoring – up gradient/upstream sampling point
- Groundwater monitoring that will be undertaken to characterise the groundwater quality and to compare against groundwater model predictions (performance monitoring).

3.4 Adaptive Management Approach

Monitoring results are to be used to trigger planned mitigation responses and inform adaptive management responses through the Trigger Action Response Plan (TARP). The TARPs are addressed in the Water Management Plan (WMP) (Refer WGA, 2026).

4. Monitoring Programme

The monitoring programme is presented in terms of surface flow, surface water quality (both receiving surface water environments and mine waters, and groundwater. Climate monitoring is also outlined to support future hydrological analyses and performance evaluation.

For the purpose of this plan the following key categories are used:

- **Surface Water** – describing the receiving environment, that is, natural streams and water bodies outside of the mine disturbance footprint,
- **Mine Water** – describing mine affected waters within or discharging from the Macraes Operation site,
- **Ground Water** – describing water below ground inside and outside of the Macraes Operation.

4.1 Climate Monitoring

Site hydrology and climate inputs are primarily determined by flow monitoring in Deepdell Creek and Climate monitoring at Macraes and Golden point weather stations. It is expected that there is variability in the climatic conditions given the spatial and topological distribution of the site. To improve certainty on model calibrations and environmental assessments going forward it is recommended that electronic weather stations including evaporation measurements be maintained near Coronation North, Golden Point and Frasers South areas. These locations are at approximately 5 km intervals with 300 m of elevation difference between them. Approximate locations are described in Table 4.1 and Appendix A (Map 1).

In addition to these climate monitoring stations, re-establishment of the pap-evaporation measurements near Top Offices are recommended.

Table 4.1 Climate Monitoring

Site	Type	Description	Status	Location (x,y)
Golden Point	Electronic Weather station	Near process plant location	Proposed	TBC
Coronation North	Electronic Weather station	On Coronation North WRS	Proposed	TBC
Frasers South	Electronic Weather station	On Frasers South WRS	Proposed	TBC

4.2 Flow Monitoring

4.2.1 Surface Water Flow Monitoring

The recommended flow monitoring locations are outlined in Table 4.2 and are shown Appendix A. Where locations are proposed, these locations are subject to both access and suitability and final monitoring locations may need amendment. The intended locations are described in the table to inform site investigation. All flow data is to be monitored continuously with data recording intervals ≤ 10 min.

These proposed monitoring locations are established before 2029.

Table 4.2 Receiving Surface Water Flow monitoring locations

Site	Type	Description	Status	Location
Golden Point flow gauge	Stream flow	Deepdell Creek flow gauge	Existing	DC03
AHC – Above Highlay Creek flow gauge ¹	Stream flow	Deepdell Creek flow gauge before Highlay Creek confluence	Existing	Between DC06 and DC07
Top Tipperary Creek at Rock Weir	Stream Flow	Tipperary Creek near TC01	Existing	Above TC01
Mare Burn flow gauge	Stream flow	Representative flow measurement contiguous with water quality compliance location	Proposed	Appropriate site near MB02 TBC, downstream of Coal Creek Confluence.
Deepdell Creek Flow Gauge (DC08)	Stream flow	Representative flow measurement contiguous with water quality compliance location	Proposed	Appropriate site near DC08, downstream of all mine influences to Deepdell Creek
Waikouaiti River North Branch flow gauge	Stream flow	Representative flow measurement contiguous with water quality compliance location	Proposed	Appropriate site near NB03, downstream of Golden Bar Creek confluence.

¹. Flow monitoring at these sites is to be undertaken for 1 year following implementation of the upgradient/upstream monitoring, then re-assessed for removal from the monitoring programme.

4.2.2 Mine Water Flow Monitoring

The recommended seepage flow monitoring locations are outlined in Table 4.3 and are shown in Appendix A. Where locations are proposed, these locations are subject to both access and suitability and final monitoring locations may need amendment.

Where silt ponds / collection ponds are typically pumped to the mine water management system, it is recommended that either a recording overflow alarm is installed, such that the overflow/discharge status is recorded, or flow monitoring be installed on the overflow (likely in the form of a constructed flow monitoring flume, or flow control weir and level sensor), and discharge pipework if installed and used. This would apply to Māori Tommy, Northern Gully and Murphy's Creek silt ponds until upstream seepage capture systems are in place.

Where monitoring of the seepage flow into a pond is not assessed as being practical to implement, then it is recommended that the pond discharge is monitored instead. An initial indication of this is made in the 'type' column in Table 4.3.

Table 4.3 Captured seepage and flow monitoring locations

Site	Type	Description	Status	Method ³	Frequency ⁴	Location (x,y)
Central Mining Area						
MTI	Seepage flow, under drains, chimney drains, mattress drains	All flow monitoring associated with MTI	Existing – To be retained as per existing monitoring schedule.	As per existing	As per existing	
SP11	Seepage flow, under drains, chimney drains, mattress drains	All flow monitoring associated with SP11	Existing – To be retained as per existing monitoring schedule.	As per existing	As per existing	
TTTSF	Seepage flow, under drains, chimney drains, mattress drains	All flow monitoring associated with TTTSF	Existing – To be retained as per existing monitoring schedule.	As per existing	As per existing	
Sump B	Seepage Flow	Refer MTI	Existing	-	-	
Tipperary Seepage collection sump	Seepage flow	Refer TTTSF	Existing	-	-	
Deepdell North silt pond ²	Pond decant discharge	Flow from the existing decant pipe	Proposed	Pipe based flow meter or weir.	Daily	See Table 4.7 - Deepdell North Silt Pond
Battery Creek silt pond ²	Pond decant discharge	Flow from a decant pipe or pond discharge	Proposed	Pipe based flow meter or weir.	Daily	See Table 4.7 - Battery Creek Drain
Northern Gully silt pond	Seepage flow	Captured seepage from Northern East and West WRS seepages	Proposed	Pipe based flow meter or weir.	Daily	See Table 4.7 - N Gully Seep West/East
Golden Point Adit	Seepage discharge (visual monitoring)	Discharge from Golden Point Adit	Existing	Visual	Monthly, or Daily if Golden Point Seepage Capture Bore level exceeds 344 mRL.	See Table 4.7 – Golden Point Adit
Murphys Creek Silt Pond ²	Silt pond pumped discharge	Return pumping from silt pond	Existing	Pipe based flow meter	Daily	See Table 4.7 - Murphy's Creek Silt Pond

Site	Type	Description	Status	Method ³	Frequency ⁴	Location (x,y)
Murphys Creek seepage bund T1,2	Seepage flow	Captured seepage from Frasers South and West WRSs	Proposed at constructed toe bund	Pipe based flow meter or weir.	Daily	
Frasers East Sump	Seepage flow	Captured seepage from Frasers East WRS	Proposed at constructed toe bund	Pipe based flow meter or weir.	Daily	See Table 4.7 - Frasers East WRS Seepage
Frasers West S1,2,3,4	Seepage flow	Captured seepage from Frasers West WRS	Proposed via constructed seepage capture drains	Pipe based flow meter or weir.	Daily	
Golden Point and Roundhill seepage capture bores	Pumped flow	Bores within Golden Point Sump	Proposed to be constructed in GPBF	Pipe based flow meter	Daily	
Coronation Mining Area						
Trimbells Gully silt pond	Pond discharge	Captured seepage from Trimbells WRS, will be removed and discontinued as Trimbells WRS expands	Existing	Pipe based flow meter	10 min	See Table 4.7 - Trimbells Gully Silt Pond
Māori Hen silt pond ¹	Pond discharge	Seepage and surface runoff from Coronation North WRS	Existing	Pipe based flow meter	10 min	See Table 4.7 - Māori Hen Gully Seepage
Coronation silt pond	Seepage flow	Captured seepage from Coronation WRS	Proposed at constructed toe bund	Pipe based flow meter	Daily	See Table 4.7 - Coronation Silt Pond
Trimbells Gully silt pond (Relocated)	Seepage flow	Captured seepage from Trimbells WRS (MP4)	Proposed at constructed toe bund	Pipe based flow meter	Daily	
Trimbells Gully T1,2,3 Toe bund seepage collection	Seepage Flow	Combined monitoring of Trimbells Gully tributary seepage collection toe bunds	Proposed at constructed toe bund	Pipe based flow meter	Daily	
Māori Hen seepage bund	Seepage flow	Captured seepage from Coronation North WRS	Proposed at constructed toe bund upstream of existing silt pond	Pipe based flow meter	Daily	
Coronation North S1,2,3,4	Seepage flow	Combined monitoring of Coronation North	Proposed collection drains and toe bunds	Pipe based flow meter	Daily	

Site	Type	Description	Status	Method ³	Frequency ⁴	Location (x,y)
Collection Drain Sumps		WRS West seepage collection drains.				
Golden Bar Mining Area						
Clydesdale Creek silt pond	Seepage flow	Captured seepage from Clydesdale WRS	Proposed at constructed toe bund	Pipe based flow meter	Daily	See Table 4.7 - Clydesdale Creek Silt Pond

¹. Flow monitoring at these sites is to be undertaken for 1 year following implementation of the upgradient/upstream monitoring, then re-assessed for removal from the monitoring programme.

². Construction of seepage capture bunds at these locations (silt ponds) are considered to be impractical based on an initial high level assessment, where isolated monitoring of toe seepage cannot be undertaken, monitoring of the associated silt pond discharge will be implemented.

³. Method to be confirmed on detailed design of capture and monitoring systems.

⁴. Minimum proposed recoding frequency

4.3 Pit Lake Monitoring

For pit lakes, once dewatering of pits ceases and pit lakes begin to form; it is recommended that pit lake development rates, are monitored by taking water level readings at monthly intervals (or more frequent) (Table 4.4). Through lake development this can be either a monthly manual recording, or captured via installed water level sensors. Where the pit lakes are nearing the long-term overflow level it is recommended that a discharge weir be constructed at the outlet and level monitoring be installed such that ongoing flow rates may be recorded. It is recommended that all flow is monitored continuously (10 min intervals).

Table 4.4 Pit Lake Level monitoring locations

Site	Type	Description	Status	Location (x,y)
Proposed pit lake level monitoring				
Golden Bar	Water level		Proposed	TBC
Innes Mills				
Deepdell North				
Coronation North				
Coronation	Water level / Groundwater level	Level monitoring to be undertaken from a bore installed within the pit backfill until permanent lake established.	Proposed	TBC

4.4 Surface Water Quality

4.4.1 Receiving Surface Water Quality

Continuous surface water quality monitoring is proposed at the three key compliance water quality monitoring locations associated with the three distinct surface water catchments draining the site and are outlined in Table 4.5. These locations encompass the majority of the site discharges to surface water. The locations are shown on maps in Appendix A.

In addition, real time sampling equipment is also available that can capture the full array of compliance parameters. It is recommended that these are investigated for application for the following reasons:

- EC currently maintains as strong relationship with sulphate concentrations and can be used as an indicator of mine water discharges, this relationship may not hold once WTP discharges commence, and
- A track record of the technology applied on site may allow for less labour-intensive sampling programs later in mining or closure. It is not recommended that this sampling replaces physical monthly sampling for compliance.

Table 4.5 Surface water quality monitoring locations

Site	Sample type	Frequency	Description	Location (x,y)
MB02 (approx.)	In-situ / real-time	Continuous	Electrical conductivity (EC), pH, temperature and turbidity. Data recording intervals ≤1hr.	Align with flow monitoring locations detailed in Table 4.2
DC08 (approx.)				
NB03 (approx.)				

Table 4.6 outlines the existing and proposed surface water quality monitoring locations. These are considered in three categories:

- Compliance Sites** – sites with assigned compliance criteria,
- Control Sites** – sites not influenced by mining, used to characterise background water quality and non-mining influences on compliance.
- Monitoring Sites** – sites used to provide early indication of water quality trends and inform environmental affects assessments.

Table 4.6 Surface water quality monitoring sites

Site	Sample Type	Analysis	Frequency	Description	Catchment	NZTM (Northing)	NZTM (Easting)
Surface Water – Compliance Sites (ref. Viridis 2026)							
MB01	Grab	Type A	Monthly	Mare Burn between Māori Hen and Coal Creek confluences	Mare Burn	4980418	1393885
MB02				Mare Burn below Coal Creek confluence	Mare Burn	4980552	1392955
DC08				Lower Deepdell Creek surface water sample	Deepdell	4975887	1401178
Shag @ Loop				Shag River at Loop Road - immediately upstream of the ford	Shag River	4978310	1409432
Shag River @ McCormicks Creek				Shag River, 5m downstream of McCormicks Creek confluence	Shag River	4970733	1415078
MC01				Murphy's Creek tailings ford	Waikouaiti River North Branch	4969560	1403023
MC02				Murphy's Creek downstream of confluence with Clydesdale Creek	Waikouaiti River North Branch	4966924	1405418
GB02				Golden Bar Creek	Waikouaiti River North Branch	4967911	1407089
NBWRRF				NBWR Ross Ford	Waikouaiti River North Branch	4967166	1401021
NB03				NBWR downstream of confluence with Golden Bar Creek	Waikouaiti River North Branch	4964562	1405803
Surface Water – Compliance Sites – Outside of MP4 scope							
CJ01	Grab	As per existing consent	Monthly	Cranky Jims Creek	Shag River	4976074	1404232
HC02				Highlay Creek upstream of confluence with Deepdell Creek	Deepdell	4975772	1399487
TC01				Tipperary Creek	Shag River	4972414	1404388
Surface Water – Control Sites							
MB00	Grab	Type A	Monthly	Mare Burn upstream of confluence with Māori Hen Creek	Mare Burn	4980498	1394306

Site	Sample Type	Analysis	Frequency	Description	Catchment	NZTM (Northing)	NZTM (Easting)
WD01				Wild Dog Creek upstream of confluence with Mare Burn	Mare Burn	4980429	1393616
DC00C				Deepdell Creek upstream of confluence with Camp Creek	Deepdell	4973083	1396661
Shag Control				Shag River upstream of confluence with Deepdell Creek	Shag River	4980606	1402803
NBWR Control				Proposed control sites to be added to tributaries un-influenced by Macraes Operations above NB03	Waikouaiti River North Branch	Tbc	Tbc
HC00				Proposed control site in upper Highlay Creek	Deepdell	Tbc	Tbc
Surface Water – Monitoring Sites							
TG02	Grab	Type A	Monthly	Trimbells Gully	Mare Burn	4979511	1395142
CCMP01				Coal Creek	Mare Burn	4980236	1392985
CC03				Camp Creek below the Coronation Haul Rd	Deepdell	4976936	1395342
CC04				Camp Creek below the Coronation WRS Silt Pond	Deepdell	4976771	1394983
DC01				Deepdell Creek, 1500m upstream of Deepdell culvert	Deepdell	4973770	1397275
DC02				Deepdell Creek, 450m upstream of Deepdell Culvert	Deepdell	4973962	1397299
DC03				Deepdell Creek, 150m upstream of Deepdell Culvert	Deepdell	4974679	1398036
DC04				Deepdell Creek, 40m downstream of Deepdell Culvert	Deepdell	4974842	1398079
DC05				Deepdell Creek, downstream of bridge by historic battery & Battery Creek confluence	Deepdell	4974889	1398456
DC06				Deepdell Creek, 600m downstream of historic reserve & where DDSSP outlet enters DDC	Deepdell	4975304	1399018
DC07				Deepdell Creek, 1400m downstream of historic reserve	Deepdell	4975529	1400210

Site	Sample Type	Analysis	Frequency	Description	Catchment	NZTM (Northing)	NZTM (Easting)
HC01				Highlay Creek	Deepdell	4977154	1398583
GB01				Immediately downstream of Clydesdale Silt Pond	Waikouaiti River North Branch	4968827	1405780
Frasers East Sump				Above Frasers TSF eastern highway	Waikouaiti River North Branch	4972790	1401492
NBWRGR				NBWR Gifford Road	Waikouaiti River North Branch	4971767	1399946
NBWRTR				NBWR Tributary 01	Waikouaiti River North Branch	4969873	1400078
NBWRRB				NBWR Redbank Road	Waikouaiti River North Branch	4970961	1398983
MC100				Downstream of Murphys Creek silt pond	Waikouaiti River North Branch	4969680	1402110
NB01				Golden Bar Creek upstream of confluence with NBWR	Waikouaiti River North Branch	4964619	1405830
NB02				NBWR upstream of confluence with Golden Bar Creek	Waikouaiti River North Branch	4964676	1405805
Camp Creek Dam	Grab	Type A	Monthly	At the proposed location of Camp Creek Dam, then at the dam outlet once commissioned	Deepdell	Tbc	Tbc
Coal Creek Dam	Grab	Type A	Monthly	At the outlet from Coal Creek Dam once commissioned	Mare Burn	Tbc	Tbc

4.4.2 Mine Water Quality

Table 4.7 provides a summary of existing and proposed mine water quality monitoring locations. This table includes locations for:

- **Pit water quality sampling locations** – for both operation sumps and developing pit lakes,
- **Tailings storage facilities** – including impoundment waters, drains and seepages,
- **Mine waters** – including WRS seepages, operational sumps and additional features of interest, and
- **Proposed seepage capture systems** – including collection sumps and bunds.

Grab samples are to be collected from the surface of the collection ponds, seepage collection sumps and pit lakes on a monthly basis. Samples are to be collected from locations closest to the overflow locations for consistency and to ensure water quality is representative of water pumped to the WTP, or discharged to the receiving surface water environment.

In addition, continuous EC measurement is to be recorded at each flow monitoring location associated with the seepage capture systems.

For the seepage collection sumps and bunds, it is noted that these are subject to detailed design and their configuration, placement may change. Locations are shown in maps in Appendix A.

In addition, once the pit lakes are formed, pit water profiling via depth sampling and/or the introduction of temperature and/or oxygen probes with depth may be considered to determine the development of any thermal / oxygen gradients and to understand how stratification is affecting discharge water quality.

Table 4.7 Mine water quality monitoring sites

Site	Sample Type	Analysis	Frequency	Description	Catchment	NZTM (Northing)	NZTM (Easting)
Pit Waters							
Innes Mills Pit	Grab	Type B	Monthly	From sump or developing lake surface, at outlet once overflow reached	Deepdell		
Coronation Pit					Deepdell		
Coronation North Pit					Mare Burn		
Golden Bar Pit					Waikouaiti River North Branch	4968298	1406753
Golden Point Pit					Deepdell		
Deepdell North Stage 3 Pit					Deepdell		
TSF – Mixed Tailings Impoundment							
Mixed Tailings Impoundment	Grab	Type D	Monthly	Mixed Tailings Dam - previously called Floatation Tailings (Flot_Dec_Pd)	Deepdell	4973469	1399162
Sump B - CDE				Chimney Drain East discharging into Sump B		4974043	1398205
Sump B - CDW				Chimney Drain West discharging into Sump B		4974043	1398205
Sump B - SSF				Sub Surface Flow discharging into Sump B		4974043	1398205
Western UD/USCO				Western underdrain/upstream cut-off drain outlet reporting to western manhole		4973383	1398126
Western CDBC				Western chimney drain base collector outlet reporting to western manhole		4973383	1398126
Far Eastern UD/USCO				Far eastern underdrain/upstream cut-off drain outlet reporting to far eastern manhole		4973737	1399211
TSF – Southern Pit 11 ²							
Southern Pit Impoundment	Grab	Type D	Monthly	SP11 Tailings Impoundment	Deepdell	4973653	1399575
CDBC Eastern Outlet				Eastern chimney drain base collector outlet reporting to SP11 manhole		4974026	1399187
UD/USCO Eastern Outlet				Eastern underdrain/upstream cut-off drain outlet reporting to SP11 manhole		4974026	1399187

Site	Sample Type	Analysis	Frequency	Description	Catchment	NZTM (Northing)	NZTM (Easting)
UD/USCO Western Outlet				Western underdrain/upstream cut-off drain outlet reporting to SP11 manhole		4974026	1399187
TSF – Top Tipperary Tailings Storage Facility							
TTTSF Impoundment	Grab	Type D	Monthly	TTTSF Impoundment	Shag River	4974259	1402254
TTTSF Seepage Collection Sump				Sample collected by opening valve from blue pump pipeline immediately past flow meter.		4973973	1403699
TTTSF Surface Runoff Drain				Reports to TTTSF eastern manhole		4974011	1403635
TTTSF Base Sump				Sump downstream of the seepage collection sump		4973926	1403696
TTTSF Sub-Soil Drain/Bore				Sample collected by opening valve on pipeline immediately below seepage collection sump crest on downstream shoulder.		4973962	1403678
TTCDN				North chimney drain base collector outlet reporting to TTTSF eastern manhole		4973987	1403634
TTCDs				South chimney drain base collector outlet reporting to TTTSF western manhole		4973983	1403634
TTTSF South USCO				Southeast upstream cut-off drain outlet reporting to TTTSF western manhole		4973983	1403633
TTTSF North USCO				North upstream cut-off drain outlet reporting to TTTSF eastern manhole		4973987	1403633
TTTSF South Seepage				Sample from sump located in the gully between groundwater bores TT13 and TT14		4973377	1403536
Cattleyard Seepage				Sample from Cattleyard sump located at western side of TTTSF off Golden Bar Road		4973613	1402401
New Surface Drain				Sample from pipe reporting to open drain south west of seepage collection sump		4973977	1403642
South USCO & CBCD				South upstream cut-off and chimney drain base collector outlet		4973984	1403633
TTTSF Central/North UD				Central/North underdrain outlet reporting to TTTSF eastern manhole		4973986	1403633

Site	Sample Type	Analysis	Frequency	Description	Catchment	NZTM (Northing)	NZTM (Easting)
TTTSF South UD				South underdrain outlet reporting to TTTSF western manhole		4973984	1403634
Cranky Jims Seepage				Sample from the pipe labelled east seep reporting to the tank next to the eastern manhole if pump operating otherwise from Cranky Jims Sump at eastern side of TTTSF next to Macraes Road.		4974734	1403235
West US & CBCD				West upstream cut-off and chimney drain base collector reporting to TTTSF eastern manhole		4973986	1403633
Mine Waters							
Māori Hen Gully Seepage	Grab	Type C	Monthly	Coronation North WRS Seepage. To be replaced by a measurement in the Māori Hen silt pond once the seepage capture system is implemented.	Mare Burn	4979604	1394528
Coal Creek Seepage 2				Northern seep from western aspect of Coronation North WRS	Mare Burn	4978992	1393807
Coal Creek Seepage 1				Southern seep from western aspect of Coronation North WRS	Mare Burn	4978784	1393874
Trimbells Gully Silt Pond				To be relocated as WRS is expanded	Mare Burn	4978697	1395886
Trimbells Gully Drain				Drain from TG WRS – to be relocated as WRS is expanded.	Mare Burn	4978697	1395886
Coronation Standpipe Sump				Staging pond to north-west of Coronation Pit	Deepdell	4977737	1395424
Coronation Silt Pond					Deepdell	4976802	1394947
Deepdell East WRS Silt Pond					Deepdell	4976716	1398193
Deepdell North Silt Pond					Deepdell	4974986	1397675
Deepdell South Silt Pond					Deepdell	4975296	1398755
N Gully Seep West					Deepdell	4974757	1399654
N Gully Seep East					Deepdell	4974717	1399908

Site	Sample Type	Analysis	Frequency	Description	Catchment	NZTM (Northing)	NZTM (Easting)
Battery Creek Silt Pond					Deepdell	4974531	1398057
Battery Creek Drain				Pipe coming out of hillside across dam at Battery Creek silt pond	Deepdell	4974526	1398515
GPUG Discharge				Discharge from underground dewatering	Deepdell	4974470	1399066
Round Hill Pit Sump				Round Hill pit sump or dewatering bores	Deepdell	4974339	1399210
MTSP Sump				Māori Tommy Silt Pond Sump	Deepdell	4974337	1398008
Māori Tommy Silt Pond				Māori Tommy Silt Pond	Deepdell	4974320	1398041
Lone Pine WSR				Lone Pine Dam - sampled near pontoon	Deepdell	4973622	1398068
Frasers East WRS Seepage					Waikouaiti River North Branch	4972693	1401765
Frasers West Silt Pond				Silt pond collecting runoff from Frasers West Rock Stack	Waikouaiti River North Branch	4970932	1399520
Murphy's Creek Silt Pond					Waikouaiti River North Branch	4969800	1401998
Clydesdale Creek Silt Pond				Clydesdale Creek Silt Pond at Golden Bar	Waikouaiti River North Branch	4968855	1405799
Clydesdale WRS Seepage				Coronation North WRS Seepage	Waikouaiti River North Branch		
Golden Point Adit				Historic Golden Point Adit discharge (if flowing)	Deepdell Creek		

Mine Waters – Seepage Capture System – To be implemented once commissioned'

Māori Hen Seepage Bund	Grab	Type C	Monthly	Sample from collection manhole. Replaces 'Māori Hen Gully Seepage'	Mare Burn	Tbc on construction	Tbc on construction
Coronation North SCS Sumps				Combined sample (tbc on completion of detailed design). Replaces 'Coal Creek Seepage1/2'	Mare Burn		
Trimbells Gully Bund				Sample from collection manhole. Replaces 'Trimbells Gully Drain'	Mare Burn		
Trimbells Gully SCS Sumps				Combined sample (tbc on completion of detailed design)	Mare Burn		
Deepdell silt pond				Sample from collection manhole.	Deepdell		

Site	Sample Type	Analysis	Frequency	Description	Catchment	NZTM (Northing)	NZTM (Easting)
Battery Creek silt pond				Sample from collection manhole.	Deepdell		
Golden Point and Roundhill seepage capture bores				Replaces 'Round Hill Sump'.	Deepdell		
Murphys Creek SCS Bund				Combined sample	Waikouaiti River North Branch		
Frasers East SCS Bund				Replaces 'Frasers East WRS Seepage'	Waikouaiti River North Branch		
Frasers West SCS Sumps				Combined sample	Waikouaiti River North Branch		
Clydesdale Creek SCS Bund				Replaces 'Clydesdale Creek Silt Pond' and 'Clydesdale Creek WRS Seepage'.	Waikouaiti River North Branch		

¹. Seepage capture system water quality sampling to replace existing WRS seepage water quality sampling locations where applicable. Locations are preliminary and subject to detailed design and construction. Monitoring of these locations is to begin within one month of the feature being commissioned.

². All monitoring associated with Southern Pit Tailings Impoundments to cease once the TSF has been disestablished (removed) as proposed for the MP4 project.

4.5 Groundwater

The proposed groundwater monitoring programme incorporates both existing monitoring wells and new groundwater monitoring wells to allow for characterisation of groundwater influenced by the MP4 project.

The following information was reviewed to determine the suitability of groundwater monitoring locations in relation to current and future site activities:

- MP4 project description
- Water Quality Management Plan, dated April 2025 (MAC-207-EMP-000) and existing consent requirements
- Groundwater monitoring data collected over the past ~35 years
- Results of the groundwater modelling assessment for MP4 project and the predicted effects on groundwater quality

Based on this review, the groundwater monitoring programme was revised, including:

- Addition of new monitoring wells in areas identified in gaps within the monitoring network
- Removal of selected wells from the monitoring schedule where there is sufficient coverage (spatially and depth) and the water quality monitoring data shows similar trends (e.g. Māori Tommy Gully)
- Simplification of the sampling schedule to the same frequency and monitoring suite for most wells
- Installation of data loggers in selected wells to record water daily (or more frequent) groundwater levels and electrical conductivity.

No changes are proposed for the Top Tipperary TSF monitoring wells which are outside of area affected by MP4 project. The proposed sampling frequency is quarterly with exception of TTTSF monitoring bores which will retain the current monitoring schedule as outlined in the TTTSF consents.

Groundwater monitoring shall be undertaken as outlined in sections 4.5.1 and 4.5.2. Groundwater monitoring wells are detailed in Table 4.8.

4.5.1 High frequency monitoring – data loggers

Combined pressure transducers and electrical conductivity meters (with data logging capabilities) will be installed in selected monitoring wells to record groundwater levels and groundwater electrical conductivity. The measurement frequency will set to record every 6 to 12 hours or as a minimum daily.

Electrical conductivity can be used as an indicator for changes in groundwater quality and/or interaction with different water types (e.g. surface water). Conductivity probes should be installed at a representative depth (mid piezometer screen or main groundwater flow zone) or as advised by a hydrogeologist.

Pressure transducer (loggers) records will be converted to a groundwater depth using manual measurements of static water level when the loggers are installed and removed from the wells to be downloaded.

Data loggers should be downloaded at regular intervals (at least every 3 months, coinciding with quarterly sampling event) to reduce the risk of extended periods without measurements should data logger malfunction occur. Alternatively, telemetry systems may be utilised.

Groundwater level-only loggers will be installed in GW27, GW42, P5, and PDH70 to monitor groundwater levels and provide contextual hydrogeological data for the surrounding area.

4.5.2 Groundwater sampling

Groundwater sampling shall be undertaken by a suitably trained professional. Samples shall be collected using groundwater sampling methodology consistent with NEMS guidance¹. Groundwater levels should be measured prior to sampling.

¹ NEMS (2019): National Environmental Monitoring Standards Water Quality. **Water Quality Part 1 - Sampling, Measuring, Processing and Archiving of Discrete Groundwater Quality Data » National Environmental Monitoring Standards (NEMS)**

Field parameters (pH, temperature, electrical conductivity, oxidation-reduction potential and dissolved oxygen) shall be monitored during purging. Groundwater samples should be collected after the measured parameters have stabilised.

Samples shall be collected in laboratory provided bottles and analysed for the parameters listed in Table 4.9. Samples for dissolved metal analysis should be field filtered using laboratory provided filter kits.

With the exception of the TTTSF monitoring wells, a standardised quarterly sampling frequency and analytical suite is proposed for all MP4 monitoring wells, as outlined in Table 4.8 and Table 4.9.

Four wells will be monitored for groundwater levels only.

Table 4.8 Groundwater monitoring locations

Monitoring well ID	Existing / Proposed	Depth*	Existing Status	Revised status	Location (X)	Location (Y)	Logger installed	Purpose	Sampling / Download of logger schedule	Parameters
Central Site / Mixed Tailings										
GP01	Existing	33	Compliance Bore	Performance Bore	1398508	4974483		Groundwater level and quality monitoring near Golden Point Backfill	Quarterly	GW standard suite
GW1	Existing	20	Surrounding Bore	Performance Bore	1399485	4972478		Groundwater level and quality monitoring upgradient of MTI – (Background monitoring well)	Quarterly	GW standard suite
GW2	Existing	20	Surrounding Bore	Performance Bore	1398302	4972526		Groundwater level and quality monitoring upgradient of MTI (Background monitoring well)	Quarterly	GW standard suite
GW3	Existing	25	Compliance Bore	Performance Bore	1397819	4973213		Groundwater level and quality monitoring west of MTI to validate sulphate plume modelling predictions	Quarterly	GW standard suite
GW4	Existing	20	Surrounding Bore	Performance Bore	1397690	4973730		Groundwater level and quality monitoring downgradient of MTI to validate sulphate plume modelling predictions,	Quarterly	GW standard suite
GW18	Existing	16.6	Compliance Bore	Performance Bore	1398034	4974333		Groundwater level and quality monitoring in Māori Tommy Gully, downgradient of MTI. The monitoring programme was reduced from eight wells to four wells because bore depths and water quality trends measured to date have shown similar characteristics across these eight monitoring wells. Additional high frequency monitoring (loggers) proposed for one shallow (GW20) and one deep (GW25) well.	Quarterly	GW standard suite
GW19	Existing	14.9	Compliance Bore	Not monitored	1398031	4974329			N/A	N/A
GW20	Existing	13.5	Compliance Bore	Performance Bore	1398026	4974324	x		Quarterly	GW standard suite
GW21	Existing	13.5	Compliance Bore	Not monitored	1398021	4974318			N/A	N/A
GW22	Existing	26	Compliance Bore	Not monitored	1398033	4974334			N/A	N/A
GW23	Existing	25	Compliance Bore	Performance Bore	1398030	4974330			Quarterly	GW standard suite
GW24	Existing	25	Compliance Bore	Not monitored	1398025	4974325			N/A	N/A
GW25	Existing	26	Compliance Bore	Performance Bore	1398018	4974320	x		Quarterly	GW standard suite
GW27	Existing	34	Water level only	Water level only	1397989	4974225	x	Groundwater level monitoring only	Quarterly	N/A
GW30	Existing	26	Detection Bore	Performance Bore	1398072	4973381		Groundwater level and quality monitoring northwest of MTI, data to be used to validate sulphate plume modelling predictions	Quarterly	GW standard suite
GW31	Existing	40	Detection Bore	Performance Bore	1398079	4973377		Groundwater level and quality monitoring northwest of MTI, data to be used to validate sulphate plume modelling predictions	Quarterly	GW standard suite
GW32	Existing	24	Detection Bore	Performance Bore	1398173	4973047		Groundwater level and quality monitoring northwest of MTI, data to be used to validate sulphate plume modelling predictions	Quarterly	GW standard suite
GW33	Existing	40	Detection Bore	Performance Bore	1398174	4973039		Groundwater level and quality monitoring northwest of MTI, data to be used to validate sulphate plume modelling predictions	Quarterly	GW standard suite
GW38	Existing	19	Compliance Bore	Performance Bore	1398019	4972897		Groundwater level and quality monitoring northwest of MTI, data to be used to validate sulphate plume modelling predictions	Quarterly	GW standard suite
GW42	Existing	TBC	Water level only	Water level only	1398066	4974403	x	Groundwater level monitoring only	Quarterly	N/A
GW43	Existing	38	Detection Bore	Performance Bore	1398272	4974224		Groundwater level and quality monitoring downgradient of MTI, data to be used to validate sulphate plume modelling predictions	Quarterly	GW standard suite
GW46	Existing	21	Detection Bore	Performance Bore	1398199	4974096			Quarterly	GW standard suite
GW49	Existing	21	Detection Bore	Performance Bore	1398189	4974083			Quarterly	GW standard suite
GW50	Existing	19	Detection Bore	Performance Bore	1398189	4974071			Quarterly	GW standard suite
GW52	Existing	32	Detection Bore	Performance Bore	1398145	4974094			Quarterly	GW standard suite
GW53	Existing	39	Detection Bore	Performance Bore	1398086	4974031			Quarterly	GW standard suite
MMCL_HB	Existing	TBC	Surrounding Bore	Performance Bore	1399338	4971606		Groundwater level and quality in Macraes village	Quarterly	GW standard suite
P1	Existing	14.5	Compliance Bore	Performance Bore	1399298	4972484		Groundwater level monitoring only (Background monitoring well)	Quarterly	GW standard suite
P5	Existing	TBC	Water level only	Water level only	1398734	4972476	x	Groundwater level monitoring only (Background monitoring well)	Quarterly	N/A
PV518	Existing	30	Compliance Bore	To be removed during MP4	1398721	4974036		N/A	N/A	N/A
PDH70	Existing	TBC	Water level only	Water level only	1399753	4972330	x	Groundwater level monitoring only	Quarterly	N/A
Vickery_HB	Existing	25	Surrounding Bore	Performance Bore	1398585	4971471		Groundwater level and quality in Macraes village	Quarterly	GW standard suite

Monitoring well ID	Existing / Proposed	Depth*	Existing Status	Revised status	Location (X)	Location (Y)	Logger installed	Purpose	Sampling / Download of logger schedule	Parameters
Deepdell /Northern Gully										
DDB01	Existing	24	Surrounding Bore	Performance Bore	1397101	4975935		Groundwater level and quality monitoring west of Deepdell Pit/WRS. Data to be used to validate sulphate plume modelling predictions.		
DDB03	Existing	17	Surrounding Bore	Performance Bore	1397073	4975143		Groundwater level and quality monitoring south-west of Deepdell Pit/WRS. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
DDB04	Existing	58	Surrounding Bore	To be removed during MP4	1398153	4975566		N/A	N/A	N/A
DDB05	Existing	57	Surrounding Bore	Performance Bore	1397661	4974934		Groundwater level and quality monitoring south of Deepdell Pit/WRS. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
DDB06	Existing	45	Surrounding Bore	Performance Bore	1397789	4975042	x	Groundwater level and quality monitoring south of Deepdell Pit/WRS. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
SPMW5	Existing	20	Detection Bore	Performance Bore	1398716	4974920	x	Located downgradient of Golden Point Backfill and Northern Gully West WRS, monitoring of groundwater level and quality discharging to Deepdell Creek.	Quarterly	GW standard suite
SPMW6	Existing	20	Compliance Bore	Performance Bore	1398946	4975142	x		Quarterly	GW standard suite
SPMW7	Existing	20	Compliance Bore	Performance Bore	1398826	4975022	x		Quarterly	GW standard suite
SPMW8	Existing	18	Compliance Bore	Performance Bore	1398516	4974737	x		Quarterly	GW standard suite
SPMW12	Existing	TBC	Detection Bore	Performance Bore	1399838	4974747	x	Located close to Northern Gully Silt Pond, downgradient of Northern Gully East WRS, monitoring of groundwater level and quality discharging towards Deepdell Creek. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
BRB02	Proposed	45*	N/A	Performance Bore	1400490	4974987		Located east of Northern Gully East WRS, monitoring of groundwater level and quality discharging towards Deepdell Creek. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
Fraser's West										
FDB02	Existing	10	Operational Bore	Performance Bore	1400094	4969938		Characterise groundwater likely discharging to Waikouaiti North Branch. Located southwest of Fraser West WRS. Paired shallow/deep well with FDB11.	Quarterly	GW standard suite
FDB03	Existing	10	Surrounding Bore	Performance Bore	1399198	4970838		Characterise groundwater discharging to wetlands and surface water of Waikouaiti North Branch. Water quality influenced by Fraser's West WRS. Monitoring water quality changes with implementation of seepage capture drains in this area.	Quarterly	GW standard suite
FDB04	Existing	5	Surrounding Bore	Performance Bore	1399301	4970933	x		Quarterly	GW standard suite
FDB05	Existing	5	Surrounding Bore	Performance Bore			x		Quarterly	GW standard suite
FDB06	Existing	5	Surrounding Bore	Performance Bore	1399569	4971203	x		Quarterly	GW standard suite
FDB07	Existing	10	Surrounding Bore	Performance Bore			x		Quarterly	GW standard suite
FDB08	Existing	5	Surrounding Bore	Performance Bore	1399915	4971570	x		Quarterly	GW standard suite
FDB10	Existing	21	Operational Bore	Performance Bore	1400003	4971697			Quarterly	GW standard suite
FDB11	Existing	21	Operational Bore	Performance Bore	1400092	4969944		Characterise groundwater likely discharging to Waikouaiti North Branch. Quality influenced by Fraser West WRS. Paired shallow/deep well with FDB02. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
FDB13	Existing	27	Operational Bore	Performance Bore	1401908	4969779		Characterise groundwater likely discharging to Murphys Creek. Quality influenced by Fraser WRS. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
FDB14	Proposed	25*	N/A	Performance Bore	1402422	4970561	x	Groundwater quality upstream of MC01 SW monitoring site. Likely influenced by Fraser's WRS seepage. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
FDB15	Proposed	10*	N/A	Performance Bore	1402525	4971304	x	Additional well to cover gap in monitoring network around Fraser's WRS. Characterise groundwater likely discharging to Murphys Creek catchment. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite

Monitoring well ID	Existing / Proposed	Depth*	Existing Status	Revised status	Location (X)	Location (Y)	Logger installed	Purpose	Sampling / Download of logger schedule	Parameters
FDB16	Proposed	10*	N/A	Performance Bore	1400873	4969771		Additional well to cover gap in monitoring network around Frasers WRS. Characterise groundwater likely discharging to Murphys Creek catchment. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
FDB17_S	Proposed	10*	N/A	Performance Bore	1399644	4970292	x	Additional well to cover gap in monitoring network around Frasers WRS. Characterise groundwater likely discharging to Waikouaiti River North Branch catchment. Paired deep and shallow monitoring wells. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
FDB17_D	Proposed	20*	N/A	Performance Bore	1399644	4970292	x		Quarterly	GW standard suite
Top Tipperary TSF / Frasers East										
TT01	Existing	12	Compliance Bore	Compliance Bore	1403913	4973752		Current compliance bore on Tipperary Creek, shallow groundwater	Monthly/Quarterly	TTTSF suites
TT02	Existing	13	Compliance Bore	Compliance Bore	1403895	4973763			Monthly/Quarterly	TTTSF suites
TT03	Existing	26.7	Compliance Bore	Compliance Bore	1403773	4974968		Current compliance bore on Cranky Jims Creek, shallow groundwater	Monthly/Quarterly	TTTSF suites
TT04	Existing	21	Compliance Bore	Compliance Bore	1403825	4974928		Current compliance bore on Cranky Jims Creek, shallow groundwater	Monthly/Quarterly	TTTSF suites
TT05	Existing	24.5	Detection Bore	Detection Bore	1402965	4974845		Groundwater monitoring associated with TTTSF	Monthly/Quarterly	TTTSF suites
TT06	Existing	24.5	Detection Bore	Detection Bore	1403249	4974724			Monthly/Quarterly	TTTSF suites
TT07	Existing	21	Detection Bore	Detection Bore	1403478	4974502			Monthly/Quarterly	TTTSF suites
TT08	Existing	19.2	Detection Bore	Detection Bore	1403632	4973932			Monthly/Quarterly	TTTSF suites
TT09	Existing	21.2	Detection Bore	Detection Bore	1403686	4974025			Monthly/Quarterly	TTTSF suites
TT10	Existing	14.8	Detection Bore	Detection Bore	1403770	4973875			Monthly/Quarterly	TTTSF suites
TT11	Existing	6	Detection Bore	Detection Bore	1403711	4973896			Monthly/Quarterly	TTTSF suites
TT12	Existing	9.5	Detection Bore	Detection Bore	1403663	4973801			Monthly/Quarterly	TTTSF suites
TT13	Existing	24.6	Detection Bore	Detection Bore	1403529	4973408			Monthly/Quarterly	TTTSF suites
TT14	Existing	13.2	Detection Bore	Detection Bore	1403498	4973374			Monthly/Quarterly	TTTSF suites
TT15	Existing	17.4	Detection Bore	Detection Bore	1403163	4973151			Monthly/Quarterly	TTTSF suites
TTB16_S	Proposed	30*	N/A	Performance Bore	1402732	4972571	x	Downgradient of Frasers East WRS. Paired shallow and deep piezometers to characterise groundwater quality effects at different depths. Within Tipperary Creek catchment.	Quarterly	GW standard suite
TTB16_D	Proposed	50*	N/A	Performance Bore	1402732	4972571	x		Quarterly	GW standard suite
TTB17_S	Proposed	40*	N/A	Performance Bore	1404781	4973016	x	Located between OGL operations and nearest neighbouring well (domestic and stockwater). Paired shallow and deep piezometer to target shallow aquifer and a deeper well at a similar depth to neighbouring well.	Quarterly	GW standard suite
TTB17_D	Proposed	60*	N/A	Performance Bore	1404781	4973016	x		Quarterly	GW standard suite
BRB01_S	Proposed	20*	N/A	Performance Bore	1401922	4974647	x	Downgradient of TTTSF. Paired shallow and deep piezometers to characterise groundwater quality effects at different depth, upgradient of Deepdell Creek	Quarterly	GW standard suite
BRB01_D	Proposed	40*	N/A	Performance Bore	1401922	4974647	x		Quarterly	GW standard suite
FE02	Existing	TBC	Surrounding Bore	Performance Bore	1402665	4973509		Downgradient of Frasers East WRS	Quarterly	GW standard suite
FE03	Existing	TBC	Surrounding Bore	Performance Bore	1402448	4971996		Downgradient of Frasers East WRS	Quarterly	GW standard suite
Coronation Area										
CP03	Existing	TBC	Surrounding Bore	Performance Bore	1395180	4977278		Located between CO WRS, likely to be influenced by current and future activities	Quarterly	GW standard suite
CP04	Existing	TBC	Surrounding Bore	Performance Bore	1395004	4976790		Downgradient of CO WRS, likely to be influenced by current and future activities	Quarterly	GW standard suite
CAB01	Proposed	TBC*	N/A	Performance Bore	1395186	4976891	x	Paired deep or shallow well with CP04 (pending confirmation of depth) – characterise groundwater quality effects from CO WRS	Quarterly	GW standard suite
CAB02	Proposed	40*	N/A	Performance Bore	1394326	4977122		Potential for groundwater quality effects from CO WRS seepage. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite

Monitoring well ID	Existing / Proposed	Depth*	Existing Status	Revised status	Location (X)	Location (Y)	Logger installed	Purpose	Sampling / Download of logger schedule	Parameters
CCB01_S	Proposed	10*	N/A	Performance Bore	1393890	4978087		Downgradient of CN backfill, paired shallow and deep piezometers to characterise groundwater quality effects at different depths. Shallow groundwater likely to discharge to Coal Creek Tributary. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
CCB01_D	Proposed	30*	N/A	Performance Bore	1393890	4978087			Quarterly	GW standard suite
CCB02_S	Proposed	10*	N/A	Performance Bore	1393734	4979262	x	Downgradient of CN WRS, paired shallow and deep piezometers to characterise groundwater quality effects at different depths. Shallow groundwater likely to discharge to Coal Creek Tributary in this area.	Quarterly	GW standard suite
CCB02_D	Proposed	30*	N/A	Performance Bore	1393734	4979262	x		Quarterly	GW standard suite
CCB03	Proposed	10*	N/A	Performance Bore	1393919	4978729		Northern extent of future groundwater plume. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
TGB01	Proposed	40*	N/A	Performance Bore	1396434	4977888		Background well. Modelling indicates no impact from MP4.	Quarterly	GW standard suite
TGB02	Proposed	40*	N/A	Performance Bore	1395440	4979026		Downgradient of CN/Trimbells WRS, monitoring to characterise groundwater quality effects. Shallow groundwater likely to discharge to Māori Hen Creek Tributary in this area.	Quarterly	GW standard suite
TGB03	Proposed	15*	N/A	Performance Bore	1394453	4979663	x	Downgradient of CN WRS, likely to be influenced by current and future activities. Shallow groundwater likely to discharge to Māori Hen Creek Tributary in this area.	Quarterly	GW standard suite
HCB01	Proposed	40*	N/A	Performance Bore	1398603	4976550		Groundwater quality near Highlay Creek. Potentially influenced by WRS seepage. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
Golden Bar										
RCH2585	Existing	71.2	Surrounding Bore	Performance Bore	1407028	4968253		Characterise groundwater quality near Golden Bar pit. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
RCH3004	Existing	TBC	Surrounding Bore	Performance Bore	1404013	4969721		Characterise groundwater quality near Golden Bar pit. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
MKB01	Proposed	40*	N/A	Performance Bore	1406249	4969054	x	Located within northern extension of groundwater plume towards McCormicks Creek. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
CDB01	Proposed	80*	N/A	Performance Bore	1406071	4967834	x	Shallow groundwater near Murphys Creek Tributary. Downgradient of GB WRS, groundwater quality likely to be influenced by current and future activities. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
GBB01	Proposed	50*	N/A	Performance Bore	1406833	4967972		Downgradient of Golden Bar WRS to characterise groundwater quality effects. Data to be used to validate sulphate plume modelling predictions.	Quarterly	GW standard suite
Notes	*Depth for proposed wells are approximate only – to be confirmed following drilling									

4.6 Parameters

Surface and groundwater should be analysed for the parameters as outlined in Table 4.9. Surface water is defined into four types; Type A replicates the proposed compliance monitoring as per Viridis, 2026. Type B is recommended for pit lake waters, Type C for waste rock seepage collection and Type D for tailings seepage collection. Field parameters should be measured in the field at the time of sample collection with calibrated probes.

Table 4.9 Summary of water quality sampling parameters

Parameter ²	SW – Type A ¹	SW – Type B	SW – Type C	SW – Type D	GW Std. Quarterly	TTTSF Monthly	TTTSF Quarterly
Calcium	*	*	*	*	✓	✓	
Magnesium	*	*	*	*	✓	✓	
Potassium	*	*	*	*	✓	✓	
Sodium	*	*	*	*	✓	✓	
Bicarbonate	*	*	*	*	✓	✓	
Carbonate	*	*	*	*	✓	✓	
Chloride	*	*	*	*	✓	✓	
Sulphate	*	*	*	*	✓	✓	
Hardness	*	*	*	*	✓		
Dissolved Arsenic	*	*	*	*	✓	✓	
Dissolved Boron	*	*	*	*			
Dissolved Copper	*	*	*	*	✓		✓
Total Iron	*	*	*	*			
Dissolved Iron					✓		✓
Dissolved Lead	*	*	*	*	✓		✓
Dissolved Nickel	*	*	*	*	✓		
Dissolved Zinc	*	*	*	*	✓		
Dissolved Antimony	*	*	*	*	✓		✓
Cyanide (WAD)	*			*			✓
Total Suspended Solids		*					
Dissolved non-purgable organic carbon (DNPOC)	*						
Total Nitrogen					✓		✓
Nitrate Nitrogen	*	*	*	*	✓		
Ammoniacal Nitrogen	*	*	*	*	✓		
Phosphorous	*	*	*	*			
pH	*	*	*	*	✓	✓	
Electrical Conductivity (EC)	*	*	*	*	✓	✓	
Temperature	*	*	*	*	✓		
Turbidity	*	*					

¹. As per Viridis 2026 compliance monitoring

². Dissolved metals should be field filtered.

4.7 Sampling Methods and QA/QC

All sampling will be undertaken in accordance with approved protocols, with appropriate quality assurance and quality control procedures.

5. References

NEMS (2019): National Environmental Monitoring Standards Water Quality. Water Quality Part 1 - Sampling, Measuring, Processing and Archiving of Discrete Groundwater Quality Data » National Environmental Monitoring Standards (NEMS)

SouthernSkies (2026). Erosion and Sediment Control Management Plan. Prepared for OceanaGold (New Zealand) Limited. 26 August 2026.

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WGA (2026). Macraes Phase 4 Water Quality Management Plan. Prepared for OceanaGold (New Zealand) Limited. WGA260144-RP-HY-0001. 24 July 2026.

Appendices

Appendix A

Surface Water Maps

This Appendix contains surface water monitoring site maps:

Surface Water Flow Monitoring

1. Stream Flow and Climate Monitoring
2. Seepage Capture and Discharge
 - i. Central Mining Area
 - ii. Coronation and Golden Bar Mining Areas

Surface Water Quality Monitoring

3. Water Quality Monitoring (Compliance and Control Points)
4. Water Quality Monitoring (Monitoring Locations)
 - i. Central Mining Area
 - ii. Central Mining Area – TTTSF pullout
 - iii. Coronation and Golden Bar Mining Areas

Appendix B

Groundwater Maps

This Appendix contains groundwater monitoring site maps:

Groundwater Flow Monitoring

1. Overview Map
2. Central Mining Area – Proposed and Existing GW Monitoring Locations
3. Deepdell Mining Area – Proposed and Existing GW Monitoring Locations
4. Golden Point Area – Proposed and Existing GW Monitoring Locations
5. MTI Area – Proposed and Existing GW Monitoring Locations
6. Frasers West Area – Proposed and Existing GW Monitoring Locations
7. Top Tipperary Area – Proposed and Existing GW Monitoring Locations
8. Northern Gully Area – Proposed and Existing GW Monitoring Locations
9. Golden Bar Mining Area – Proposed and Existing GW Monitoring Locations

