Macraes Phase Four – Water Treatment Plant Discharges

04 September 2026

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Project name	Macraes Phase 4 - Fast Track Approvals Project		
Subject	Water Treatment Plant Discharges		

1. Introduction

GHD has undertaken surface and groundwater modelling associated with Macraes Phase 4 Project (the Project) as presented in GHD (2026)[1]. The modelling includes representation of a seepage capture system (SCS) that intercepts mine affected waters before reaching the environment. This intercepted water is represented as being treated through a proposed water treatment plant (WTP) (design and performance outlined by ProcessFlow (2026)[2]) prior to discharging to receiving waters.

It is identified in GHD (2026) that there are likely discharge arrangements that can offer improved environmental outcomes when compared to the modelled arrangement which returns intercepted waters to the same location following treatment.

This report proposes rules for governing the WTP discharge flow rates and proposed water quality limits on these discharges.

1.1 Purpose of this report

This report outlines the proposed discharge arrangement for the Water Treatment Plant/s (WTP) associated with the Macraes Phase 4 Project (the Project). The intent is to:

- Enable operation of the proposed seepage capture and treatment system with treated water returning to the environment.
- Maintain flexibility to adjust discharge regimes over time, responding to monitoring of receiving waters.
- Provide discharge flow and water quality envelopes suitable for consenting purposes.
- Provide input to a WTP Discharge Management Plan.

[1] GHD (2026). Macraes Phase 4 FTA – Surface and Groundwater Assessment. Report Prepared for OceanaGold (New Zealand) Limited. 21 August 2026. 13642240-REP-REVC.
[2] Process Flow (2026). Macraes Phase Four Project (MP4) - Active Water Treatment Study. Report Prepared For OceanaGold (New Zealand) Limited. 2/07/2026. PFL-2517-PRJ-RPT-00001

2. Scope and limitations

2.1 Scope of work

The scope of this report is to:

– Present proposed water quality limits for discharges from the WTP proposed for the MP4 Project.
– Present proposed discharge flow conditions for the WTP proposed for the MP4 Project.

2.2 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 this report.

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. Without limiting the foregoing, this report is intended to support OceanaGold (New Zealand) Limited 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.

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

3. Operating Principles

The following principles are outlined to provide basis for the SCS and WTP operation and should be represented in any compliance conditions implemented.

– The SCS are generally designed as passive receivers of mine impacted water, with the ability to convey to a WTP for treatment prior to discharge. On this basis, conditions should recognise the environmental benefit of capturing and treating flow and not artificially restrict capture and treatment through limiting discharge of the treated water.
– The seepage capture systems and WTP will have maximum design flow rates, ultimately limiting the flow rates that can be captured and treated. Capture rates have been determined through modelling presented in GHD (2026) and are expected to be refined and updated through proposed flow monitoring of existing seepage locations and new SCSs. Hence, conditions relating to WTP discharges should represent actual flow measurements, rather than modelled rates.
– Discharges are to be released to the catchments based on a volume proportional to the captured volume from each catchment, with a discretionary tolerance. These catchments are generally defined as:
    - Mare Burn, including all tributaries,
    - Deepdell Creek and the Shag River, including all tributaries
        – Sub catchment allocation applied to Top Tipperary Creek
    - Waikouaiti River North Branch
        – Sub catchment allocation applied to Murphys Creek

Where flows within these catchments are above the receiving waters median flow rate (or threshold subsequently defined by an ecological impact assessment), the WTP discharges have a reduced influence on flow and water quality metrics. Under these circumstances, proactive management of the discharges could be used to enable improved water quality outcomes in subsequent seasons or within other catchments. A key management strategy could be to discharge treated water to flow augmentation dams or silt ponds with storage capability. This is to assist water storage recovery of augmentation dams between dry periods.

– The primary objective for operating the WTP is to meet in stream water quality and ecology targets.

4. WTP Discharge Arrangement

A process flow diagram outlining the operation of the seepage capture, treatment and discharge system is shown in Figure 1. Section 4.1 describes the 'water quality testing' aspect of this diagram, providing limits on the discharge water quality. Section 4.2 describes the 'distribution' aspect of this diagram, providing an operating envelope for the discharges.

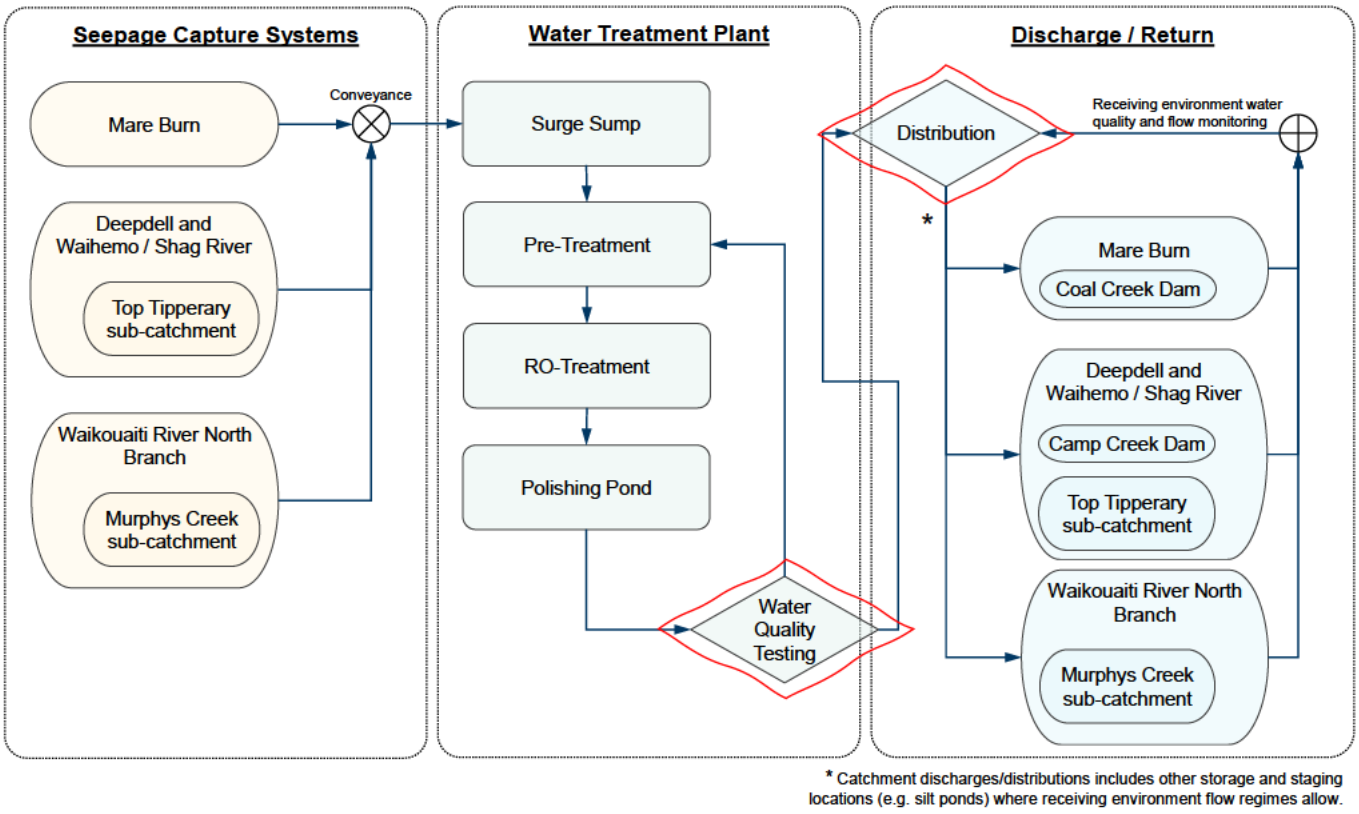


Figure 1 Seepage capture – Treatment – Discharge process flow diagram

4.1 Water Quality

It is suggested that discharge water quality is monitored from a WTP outlet prior to return flows being split to the discharge locations. This water quality should meet the limits generally defined by the receiving water quality trigger values as defined in Viridis (2026)[3].

[3] Viridis (2026). Macraes Phase 4 Project. Recommended Surface Water Quality Compliance Framework. Prepared for OceanaGold (New Zealand) Limited. June 2026. 10023-010-E.

Table 1 Proposed WTP discharge water quality limits (Source: modified from Viridis (2026)).

Parameter	Toxicity modifiers	Proposed discharge water quality limit
pH (unitless)	-	6.5-9.0
Turbidity (NTU)	-	5
Sulphate (g/m³)	-	100 g/m^3
Ammoniacal nitrogen (g N/m^3)	pH, temperature (T)	Refer to *Viridis (2026) lookup Table A1 in Appendix A* for TV adjustment Equivalent to 0.52 when the pH is 7.8 and T is 20 °C.
Nitrate nitrogen (g N/m^3)	Hardness	1.1 g N/m^3 (when <30 g/m^3 hardness) 2.6 g N/m^3 (when ≥30 g/m^3 hardness)
Arsenic (g/m³)	-	0.013 g/m^3
Boron (g/m³)	-	0.94 g/m^3
Copper (g/m³)	DOC[2]	$TV = 0.00047 \times \left(\frac{DOC}{0.5}\right)^{0.977}$ Equivalent to 0.004 when DOC is 4.5 g/m^3
Iron (g/m³)	-	0.28 g/m^3
Lead (g/m³)	Hardness[1]	$TV = 0.0034 \times \left(\frac{Hardness}{30}\right)^{1.27}$ Equivalent to 0.045 g/m^3 when hardness is 220 g/m^3
Nickel (g/m³)	Hardness[1], pH, DOC[2]	Refer to *Viridis (2026) lookup Table A2 in Appendix A* for TV adjustment Equivalent to 0.008 g/m^3 when DOC is 4.5 g/m^3, pH is 7.8, and hardness is 220 g/m^3
Zinc (g/m³)	Hardness[1], pH, DOC[2]	Refer to *Viridis (2026) lookup Table A3 in Appendix A* for TV adjustment Equivalent to 0.016 g/m^3 when DOC is 4.5 g/m^3, pH is 7.8, and hardness is 220 g/m^3
Cyanide WAD (g/m³)	pH, temperature (T)	$TV = 0.007 \times (1 + 10\text{^}(pH - (9.721 - 0.0194 \times T)))$ Equivalent to 0.0072 g/m^3 when the pH is 7.8 and T is 20 °C.

[1]. A minimum hardness of 30 g/m³ is to be applied in trigger value (TV) modification.
[2]. A minimum dissolved organic carbon (DOC) of 0.5 g/m³ is to be applied in TV modification.

4.2 Return Water Distribution

The proposed SCS and discharge locations are shown in a map in Appendix A. It is proposed that WTP discharges be operated on the following basis:

1. The primary performance objective is to maintain receiving environment water quality below the trigger values at the monitored compliance locations. WTP discharge allocations should prioritise this objective.
2. WTP discharges are distributed such that the following metrics are met:
    a. The discharge does not exceed three times the median flow for the receiving water course (refer to site specific descriptions in Table 2), except where this value is exceeded by the seepage capture flow rate upstream of the discharge in the preceding 7 days.
    b. A minimum discharge to each of the major catchments is maintained, unless:
        i. the water quality compliance sites within that catchment are below the defined trigger values, and
        ii. those catchments are exceeding the median flow rate calculated based on flow records from the three proposed flow monitoring stations (Mare Burn, Deepdell and Waikouaiti River North Branch).
    c. Discharge volumes to each of the three main catchments and two sub catchments will generally be proportional to the captured seepage flow rate within each catchment recognising that approximately 15% of captured volume will be managed as a brine waste. It is suggested that; for the benefit of achieving point (1); retaining flows for flushing purposes; and system repairs and maintenance, an operational flexibility envelope of ±50% of the rolling 12 month capture volume is allowed for (or an alternate envelope defined by an ecological assessment at the time of implementation). Discharges to in catchment stores and the Camp Creek and Coal Creek Dams are included in this volume calculation.
3. Return flows will not be reduced or redirected to a point that causes a naturally continuous waterway to lose flow continuity. Permanent seepage flows that are the result of mine features and those that are naturally intermittent or ephemeral waterways are not subject to this.
4. The physical discharge points will be designed to minimise scour at the discharge location.

Table 2 Proposed discharge locations

Discharge location	Maximum discharge flow rate[1]	Description
Māori Hen	The greater[3] of: – 3×median flow as determined by the median flow rate for the prior 12 months of seepage flow monitoring at the Māori Hen seepage capture bund and Trimbells Gully T1-T3 seepage capture bunds. – The peak daily average seepage capture rate from Māori Hen seepage capture point for the preceding 7 days.	Discharge to or immediately below the Māori Hen silt pond.
Coal Creek Dam	No maximum flow rate where Coal Creek Dam is below the dam spill level	Discharge directly to the Coal Creek Dam water body, or a tributary of the dam provided a maximum flow of 3×median flow is observed for that tributary.
Trimbells Gully	The greater[3] of: – 3×median flow as determined by the median flow rate for the prior 12 months of seepage flow monitoring at the Trimbells Gully seepage capture bund (as per the proposed location based on MP4 extensions to the WRS). – The peak daily average seepage capture rate from Trimbells Gully seepage capture point for the preceding 7 days.	Discharge to or immediately below the Trimbells Gully silt pond.

Discharge location	Maximum discharge flow rate[1]	Description
Coronation silt pond / Camp Creek	3×median flow as determined by the median flow rate for the prior 12 months of seepage flow monitoring at the Coronation seepage capture bund.	Discharge to the silt pond or Camp Creek immediately below the Coronation silt pond or upstream of the pond towards monitoring point CC03.
Camp Creek Dam	No maximum flow rate where Camp Creek Dam is below the dam spill level	Discharge directly to the Camp Creek Dam water body, or a tributary of the dam provided a maximum flow of 3×median flow is observed for that tributary.
Deepdell Creek	The greater[3] of: – 3×median flow as determined by the median flow rate at the Golden Point flow gauge. – The peak daily average seepage capture flows summed within the Deepdell Catchment upstream of DC08 for the preceding 7 days.	Discharge either directly to Deepdell Creek or to Deepdell Creek via Māori Tommy silt pond.
Waikouaiti River North Branch (NBWR)	The greater[3] of: – 3×median flow as determined by the median flow rate for the prior 12 months of seepage flow monitoring from Frasers West S1-S3 sumps[2], and Frasers East seepage. – The peak daily average seepage capture rate from Frasers West S1-S3 sumps[2], and Frasers East seepage capture points for the preceding 7 days. – No less than 10 L/s.	Discharge to the Waikouaiti River North Branch upstream of NBWRRB, or via any of the tributaries or Frasers West silt pond.
Waikouaiti River North Branch Tributary (NBWR)	3×median flow as determined by the median flow rate for the prior 12 months of seepage flow monitoring from Frasers West S4 sump. No less than 2 L/s.	Discharge to the Waikouaiti River North Branch tributary upstream of NBWRTR.
Murphys Creek	The greater[3] of: – 3×median flow as determined by the median flow rate for the prior 12 months of seepage flow monitoring at Murphys Creek seepage capture bunds T1-T2, less any discharge to the Murphys Creek Tributary if used. – The sum of seepage capture flows from Murphys Creek Seepage Capture T1, T2 and Clydesdale Creek Seepage.	Discharge to or immediately below the Murphys Creek silt pond.
Murphys Creek Tributary	3×median flow as determined by the median flow rate for the prior 12 months of seepage flow monitoring at Murphys Creek seepage capture bunds T2.	Discharge to or immediately below the Murphys Creek silt pond.
Tipperary Creek	The greater[3] of: – 3×median flow as determined by the median of seepage flows discharging to TTTSF Seepage Collection Sump for the prior 12 months flow monitoring. – The peak daily average seepage capture flows discharging to TTTSF Seepage Collection Sump for the preceding 7 days.	Discharge between TTTSF base sump and TT01.

[1]. The maximum discharge flow rates are not intended to limit or control any flushing flow operations.
[2]. Subject to detailed design of the seepage capture system, intent is to represent all regular seepage flows that would otherwise report upstream of NBWRRB.
[3]. Scope for discharges higher than 3×median flows is allowed to avoid a potential outcome where the sum of captured flows within a catchment is greater than the allowed discharge.

Table 3 summarises the maximum discharge rates that would be applied based on modelling undertaken for the work presented in GHD (2026). These results are outlined to provide indicative flow rates only and it is intended that future discharge limitations would be informed by flow monitoring undertaken.

Table 3 Modelling informed discharge rates (not intended for consent conditions)

Discharge location	Maximum flow rate (3×Median) (L/s)
Māori Hen	18.7
Trimbells Gully	5.8
Coronation silt pond / Camp Creek	4.0
Deepdell Creek	26.8 (96)[1]
Waikouaiti River North Branch (NBWR)	9.7 (10)[2]
Waikouaiti River North Branch Trib. (NBWR)	1.8 (2)[3]
Murphys Creek (Inc. MC Trib.)	13.7
Tipperary Creek	66

[1]. Based on 3×median flow at the Golden Point flow gauge.
[2]. Based on providing certainty for flow and water quality mitigation in the upper Waikouaiti River North Branch in dry years.
[3]. Based on a practical lower discharge limit, should seepage capture rates be lower.

4.3 Performance Monitoring

The performance of the WTP is to be monitored by:

- Monitoring the WTP discharge water quality, proposed to be a discrete monitoring point prior to WTP flows being distributed to multiple receiving discharge points. Water quality sampling would be carried out via daily samples, or a sampling frequency less than the retention time of the WTP polishing pond (i.e. the final staging pond in the treatment circuit where recirculation through the plant would be enabled). Where correlation of WTP performance with a continuous auto sampler or a reference metric (i.e. electrical conductivity) can be demonstrated post-commissioning, the water quality sampling frequency could be reduced to a weekly or monthly sample.
- Recording of seepage capture flows at the sources to identify the volumes intercepted within each catchment and determine the allowable discharge flow rates (refer GHD 2026a[4] for detail monitoring schedules).
- Monitoring of flows and live water quality metrics (electrical conductivity) at the proposed flow monitoring gauges on the Mare Burn (downstream of MB02), Deepdell Creek (near DC08) and Waikouaiti River North Branch (near NB03).
- Responses to the monitoring outcomes are to be detailed in a WTP discharge management plan that outlines how discharges should be distributed to best achieve the receiving environment water quality outcomes.

[4] GHD (2026a). Macraes Phase 4. Surface Water and Groundwater Monitoring Plan – Report Prepared for OceanaGold (New Zealand) Limited. 12682240-GHD-RPT-REV0_MP4_Water_Monitoring_Plan.

5. Recommendations

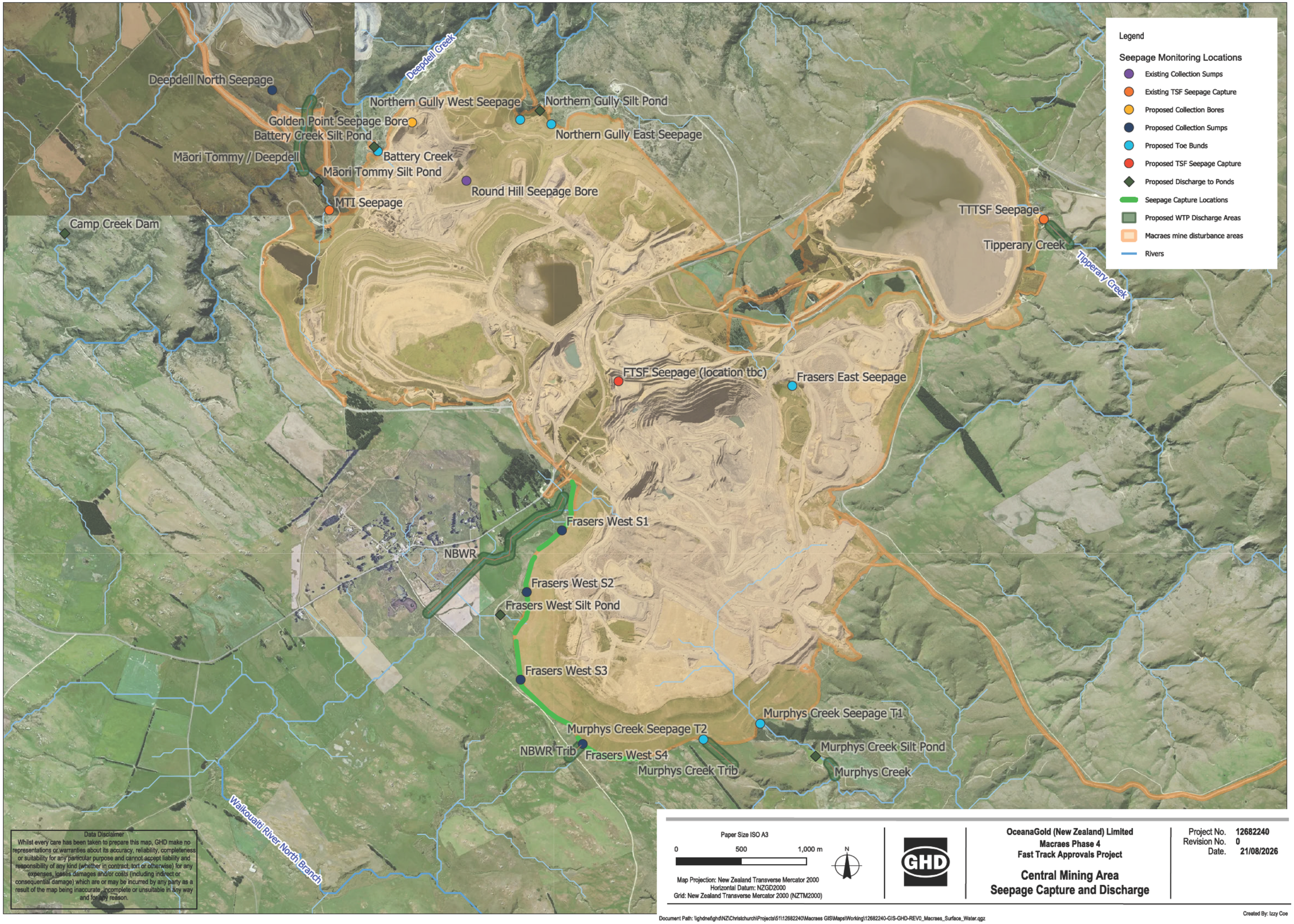
The following recommendations are made.

1. Where practical it is recommended that discharges to the receiving waters are made through existing silt ponds with decant pipes (without floating, flow controlled decants), such that the ponds offer a buffer volume smoothing changes in flow rates.
2. Flow monitoring at seepage capture locations and within the receiving environment is undertaken prior to commissioning of the WTP to provide baseline data.
3. Site investigations are carried out to inform detailed design of discharge points that prevent localised scour.
4. A water treatment plant discharge management plan is developed through plant commissioning that outlines how flows are distributed and response plans should the discharge water quality not meet the discharge criteria. This may include:
    - Recirculating through the WTP (if there is capacity to do so without reducing seepage capture rates),
    - Evaluation of receiving environment flows, water quality and capacity to receive discharges without exceeding other downstream trigger values and/or compliance criteria,
    - Temporary storage within ponds on site, or
    - Discharge to large water bodies (i.e. pit lakes) where there is significant diluting capacity, or the treated water may result in an overall improvement to the water quality of that water body.

Appendices

Appendix A

Seepage Capture Systems and Water Treatment Plant Discharge Locations



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Grid: New Zealand Transverse Mercator 2000 (NZTM2000)

GHD

OceanaGold (New Zealand) Limited
Macraes Phase 4
Fast Track Approvals Project

Central Mining Area Seepage Capture and Discharge

Project No. **12682240**
Revision No. **0**
Date. **21/08/2026**

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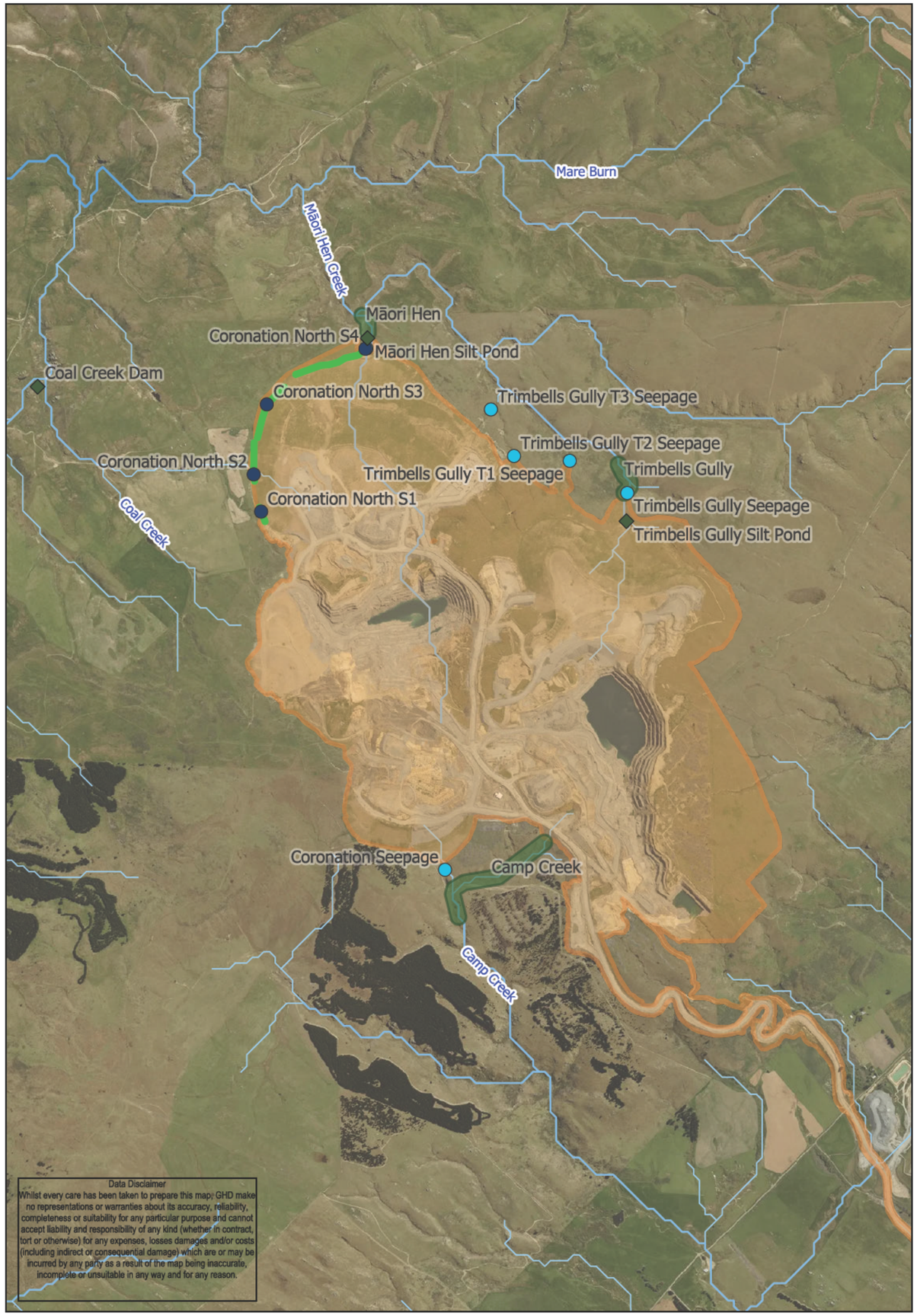

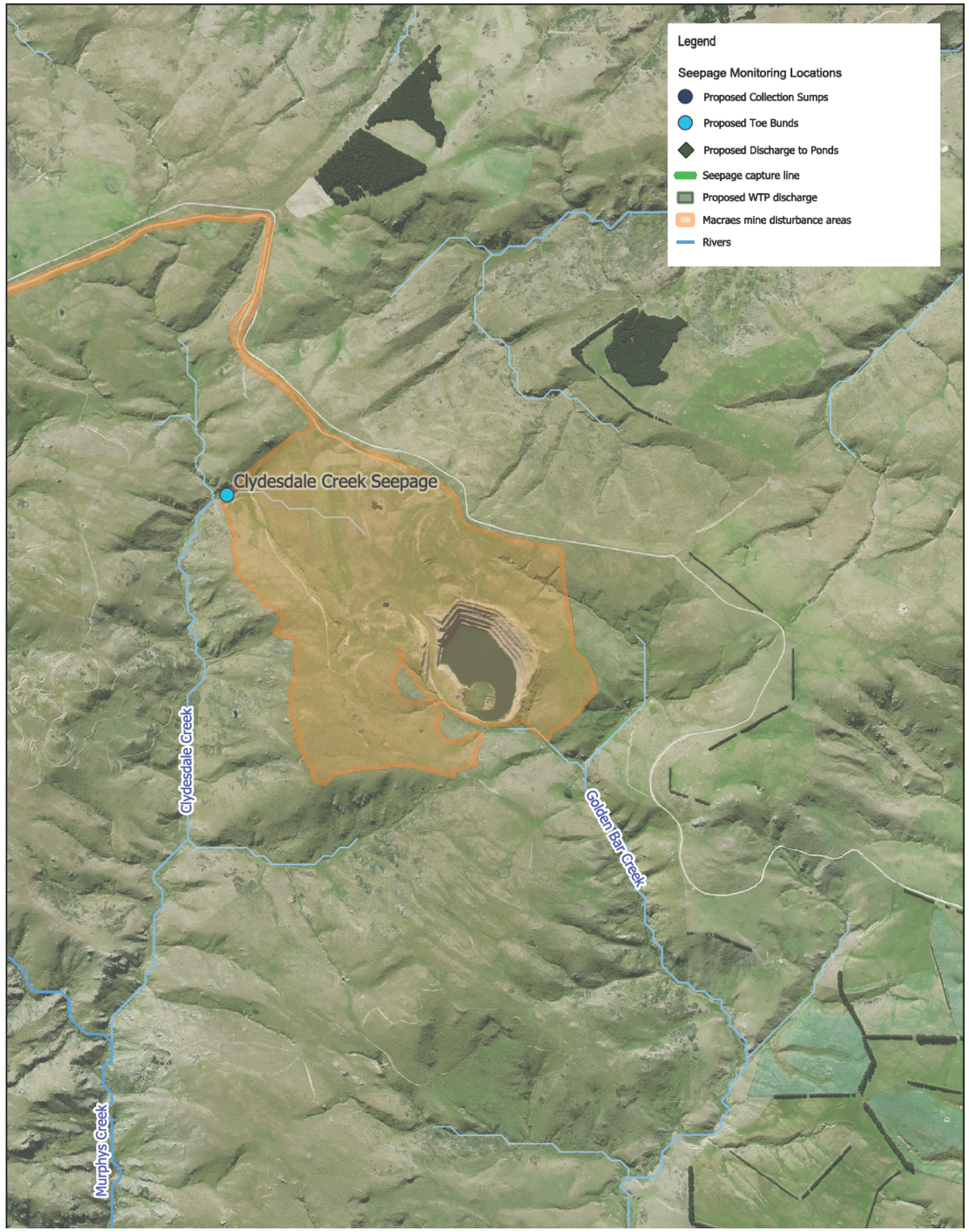

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OceanaGold (New Zealand) Limited
Macraes Phase 4
Fast Track Approvals Project

Coronation Mining Area
Golden Bar Mining Area
Seepage Capture and Discharge

Project No. **12682240**
Revision No. **0**
Date. **21/08/26**

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