Boffa Miskell

Memorandum

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Attention:	Cheryl Low, Environmental Manager
Company:	Matakanui Gold,
Date:	30 January 2026
From:	Dr Ian Boothroyd
Message Ref:	Bendigo Ophir Gold Project: Assessment of freshwater ecological effects
Project No:	BM250590

Introduction

Matakanui Gold Limited ("MGL") have applied for approvals under the Fast Track Approvals Act (FTAA) for the Bendigo-Ophir Gold Project ("BOGP"), a new gold mine, ancillary facilities and environmental mitigation measures on Bendigo and Ardgour Stations in the Dunstan Mountains of Central Otago.

The Otago Regional Council have raised a question regarding the overall effects of the mining activities on freshwater values:

> *Please provide an overall synthesis report which summarises the overall effects of the mining activities on freshwater values once all adverse effects are realised and mitigations deployed. This report should consider the most up-to-date information available and should specifically include any new information that is produced in response to the letter RMFT25.007 Request for Information – GW, modelling, geochemistry 18 Dec 2025_with appendix.pdf.*

Response

Catchment Overview

Catchments within the Project Site footprint have relatively small surface water features, which drain to either Bendigo Creek or the Lindis River. Shepherds Creek is representative of a low gradient Dunstan Mountains perennial small stream. The upper reaches of Shepherd Creek have moderate to high ecological value while downstream of the gorge section ecological values are moderate. This is due to increasing habitat modification with various impacts including water abstraction, channel modifications (e.g., the dam), crack willow, and stock impacts evident. The Rise and Shine Creek catchment has a range of ephemeral, intermittent and perennial streams that support a fauna of high to low ecological value. Ecological surveys of these streams found no benthic invertebrate species that are classified as threatened and no kōura (freshwater crayfish) or kākahi (freshwater mussel) were detected.

Potential effects on freshwater values

Four potential adverse effects on freshwater values and stream habitat resulting from the development and operation of the proposed mine are considered:

- Complete loss of habitat;
- Permanent diversion of streams;
- Long term changes to stream flow; and
- Potential water quality changes.

Water quality

Potential sources of mine contaminants and Potential Constituents of Concern (PCOC) are detailed in reports prepared by MWM (2025) as:

- Elevated total suspended solids ("TSS") in surface waters.
- Neutral metalliferous drainage ("NMD") that may have elevated PCOC such as arsenic (As), sulphate (SO4) and potentially lesser amounts of trace metals; and
- Nitrate-rich (NO3-N) drainage due to the use of Ammonium-Nitrate Fuel Oil ("ANFO") explosives and cyanide (due to gold recovery) that may also include ammoniacal nitrogen.

The ORC reviewer (at section 3.1.13 of their review) contends that the proposed water quality compliance limits set forward by Ryder (2025) and adopted in the proposed conditions in D.03 – Schedule One - Central Otago District Council and Otago Regional Council Common Conditions allow for contaminant concentrations far beyond what the proposed activity as described in the application is expected to generate. In the opinion of the reviewer, full implementation of these limits would degrade water quality to the extent that there would be a risk of more than minor or significant adverse effects on aquatic life. It is a common practice to apply the ANZG DVG limits, accepting that the DVGs are set to reduce the risk to and for the protection of aquatic life. Therefore, with respect to PCOC in water, such as dissolved metals, ammonia and nitrate, 90% species protection is considered an acceptable level of protection for these freshwater ecosystems given their historic and current level of disturbance. Accordingly, it is very unlikely that adverse effects will occur even if actual instream quantities reach these set water quality compliance limits.

Changes to stream flow

Komanawa (2025) conclude that overall, the proposal for mining activities in the current location is assessed to have environmental effects in terms of catchment flows, surface water depletion and groundwater resource allocation that are less than minor.

During operations Shepherds Creek would lose perhaps 20% to 30% of previous upper catchment flow contribution and be affected by RAS pit dewatering related groundwater depletion. The proposed diversion of Shepherds Creek around these impact zones and removal of irrigation abstraction from Shepherds Creek (currently below the Project Site footprint) would remedy or offset these temporary operational catchment losses.

SRX pit dewatering would briefly draw off a significant portion of creek flow passing the immediate vicinity of the SRX pit's northwest corner in the latter operational stages of mine life, although upstream diversions above the SRX pit would preserve the bulk of upper Rise and Shine Creek flows. The loss of Rise and Shine flood flows, which could not pass the straddle culvert to the RAS pit sump, would be of low impact. The active closure and post-closure creek network would be significantly restored to their former hydrological function, except for the RAS pit lake and drainage to lower Shepherds Creek through flooded underground workings, altered former ELF and TSF substrates, and the former SRX pit lake.

Post-closure catchment hydrology for both Shepherds and Rise and Shine Creeks would be affected by the change in substrates and retention of soil moisture, resulting in higher catchment flow yields and more stable creek flow.

Higher flows may result in changes in the aquatic communities but are unlikely to result in loss or adverse effects on equivalent ecological values; a change does not constitute an adverse effect. The stream diversions will be designed to accommodate a range of flows, both for operational and for post-closure phases.

Groundwater seepage

Mine waste storage facilities (MWSFs), including the Tailings Storage Facility (TSF) and Engineered Landforms (ELFs), are planned to be situated within the deeply incised valleys at the BOGP. Given the hydrogeological conditions at the BOGP and the planned seepage collection elements included in the MWSF designs, it is reasonable to expect high levels of seepage collection (or low rates of bypass) (MWM/HGG 2026). Seepage control elements are planned to enhance seepage collection, including underdrains, a chimney drain, and a cutoff drain at the TSF; and underdrains and a toe sump at the MWSF. These drains will convey collected seepage to a lined sump.

Loss of habitat

Whilst complete loss of freshwater habitat is listed as a potential adverse effect, it is remedied through the diversion of Shepherds Creek and watercourses within the Rise and Shine Creek. In effect the habitat is moved, and new habitat is created aimed to provide equivalent habitat features.

The ORC review (at 3.1.4 in their review) acknowledge that that the performance monitoring will show an increase in habitat and ecological reporting indices due to a planned increase in woody riparian vegetation, the establishment of pool run riffle sequences, the construction of a hard bed, and a reduction in summer drought effects and a necessary increase in the amount of habitat provided by the stream due to higher flows.

Ecological values

Freshwater ecological values vary across the project area, ranging from moderate to high values in the Shepherds Creek catchment, and low to moderate in the Rise and Shine Creek catchment. No fish were recorded in either Shepherds Creek or Rise and Shine Creek.

The proposed BOGP comprises mine components that affect the watercourses. The proposed activities give rise to direct impacts in the manner of reclamation of some 10,626 m of perennial stream.

With the proposed rehabilitated stream diversions plus provision of stream enhancement, and additional compensation (management of willows and rehabilitation of Bendigo and Clearwater Creeks) along with the proposed BOGP activities, there is no permanent loss of streams or any loss of extent of watercourses. Streams are either replaced within a short timeframe (ecologically functional diversions) or re-established and rehabilitated later (Mt. Mocha Creek) or separately, Bendigo Creek and Clearwater Creek are subject to specific management (willow management and rehabilitation). Accordingly, the effects management hierarchy is satisfied and the outcome of the BOGP provides for a no net loss of stream extent and ecological values.

Synthesis

The potential effects of the proposed BOGP on freshwater values are addressed through implementation of the effects management hierarchy and avoid, minimise or remedy any potential adverse effects with an outcome that results in no significant adverse effects. The overarching potential effects and the project response are provided in Table 1.

Conclusion

The application of the effects management hierarchy means that potential adverse effects are either avoided, minimised or remedied.

References

Boffa Miskell 2025a. Bendigo Ophir Gold Project: Assessment of Freshwater Ecological Effects. Report dated 20 October 2025.

Boffa Miskell 2025b. Bendigo Ophir Gold Project: Freshwater Ecology Management and Monitoring Plan. Report dated 23 October 2025.

Kōmanawa Solutions 2026. Responses to ORC Technical Review in terms of the Fast-Track Approvals Act and RMA. Memo dated 28 January 2026.

MWM/HGG 2026. Otago Regional Council Clarifications. Mine Waste Management and Hydro Geochem Group Letter dated 29 January 2026.

Ryder 2025. Recommended water quality compliance limits for the Bendigo-Ophir Gold Project. Report dated 30 July 2025.

Ryder 2026. ORC Request For Further Information – Matakanui Gold Limited fast-track application for the Bendigo-Ophir Gold Project. Memo dated 27 January 2026.

Table 1. Summary of overall effects and the response to the mining activities on freshwater values.

Effect	Comment	Mitigation/Effects management	Outcome	Effects Management	Reference
Water quality	Potential toxic effects from constituents of concern: • Elevated total suspended solids. • NMD arsenic, sulphate, and potentially low amounts of trace metals. • Nitrate-rich (NO3-N) drainage that may also include ammoniacal nitrogen.	In-river compliance limits established for 90% species protection for freshwater ecosystems given their historic and current level of disturbance. Site-specific limit for sulphate based on	Nationally accepted ANZG DGVs and/or NPS-FM NOF bands have been applied. Compliance limits recommended as a hard limit as a further conservative measure to limit effects. Compliance limits protect aquatic ecosystem values. No adverse effects.	Minimise	Ryder (2025) Ryder (2026)
	Ammoniacal-N and nitrate-N compliance limits. Ammoniacal-N and nitrate-N compliance limits proposed were to protect aquatic species from the toxic effects of these compounds, not ecosystem effects.	Monitoring of benthic algae be undertaken as a part of routine monitoring that would fall under conditions proposed in the substantive application	Freshwater Ecology Management and Monitoring Plan (FEMMP, Proposed Condition 20) includes monitoring of periphyton cover in diversion channels. Recommend adding periphyton threshold to the FEMMP.	Minimise effect Remedy – adaptive monitoring	Boffa Miskell (2025b)
	Contamination from groundwater seepage.	Seepage collection, including underdrains, chimney drain, toe sump and cutoff drain.	No adverse effects on downstream receptors and environment.	Avoid	MWM/HGH (2026)
	Turbidity performance target	Instream turbidity target of 5 NTU (= approximately 2 mg/L suspended sediment).	Very conservative in stream compliance limit avoids adverse effects. Erosion-and-Sediment-Control-Management-Plan recommends turbidity	Minimise effect Remedy – adaptive monitoring	Ryder (2025) Ryder (2026)

			monitoring of silt pond inflows and outflows during rainfall trigger events plus review of performance.		
Water quantity	Stream depletion effect from the underlying RAS underground workings activities on Shepherds Creek is anticipated to be minor.	Nil required	Negligible effects on water quantity.	Avoid	Responses to ORC Technical Review in terms of the Fast-Track Approvals Act and RMA
	Loss of upper catchment (20-30% of water source)	Diversion of Shepherds Creek clean water around these impact zones and removal of irrigation abstraction will remedy or offset these temporary operational catchment losses.	Remedied through diversion and removal of land use practices. No adverse effects.	Remedy	Komanawa (2025)
	During and after mine closure the hydrology of Shepherds Creek will be significantly altered. Post-closure catchment hydrology for both Shepherds and Rise and Shine Creeks have higher catchment flow yields and more stable flow.	Creation of Shepherd Creek diversion will be designed to accommodate a range of flows and within a range of habitats. Increased flow may change ecological communities but unlikely to decrease ecological values. The same aquatic ecological communities e.g., species composition) are not expected but the equivalent or better ecological values are anticipated (and as measured by relevant and accepted ecological metrics).	Any change in ecological community is not an adverse effects if the same or better ecological values and function are retained or enhanced. No adverse effect. Effects management hierarchy satisfied.	Remedy through diversion design No adverse effects.	Komanawa (2025) Boffa Miskell (2025a)
Extent of stream length	Direct and indirect effects of the BOGP is remedied through intensive rehabilitation of stream diversions. Connectivity up and downstream in the catchment is retained. Additional compensation through improvements to other watercourses.	Creation of some 7,643 m rehabilitated stream diversion (7,643 m^{2*}) in Shepherds Creek and 1,599 m (800 m^2) of stream in Rise and Shine Creek catchment.	No net loss and overall gain in aquatic ecosystem extent. No adverse effect. Effects management hierarchy satisfied.	Remedy through diversion design	Boffa Miskell (2025a)

Stream habitat	The Shepherds Creek diversion is not intended to exactly match habitat conditions in the existing stream but to provide for no net loss of ecological values.	Design and implementation of FEMMP	No adverse effect	Remedy through diversion design	Boffa Miskell (2025a) Boffa Miskell (2025b)