

Report

October 2, 2026

To	EPAs' Panel Chair – Matthew Muir	Contact No.	
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From	Dr Dora Avaniidou	Project No.	12687863
Project Name	FTA – Matakanui Gold		
Subject	Review of Groundwater related reports and data		

1. Introduction

1.1 Purpose of this Report

This report is provided under our agreement with the New Zealand Environmental Protection Authority (EPA). It is provided as independent groundwater and hydrogeological expert advice to support the Panel's consideration of the Bendigo-Ophir Gold Project under the Fast track Approvals Act 2024.

Matakanui Gold Limited (Applicant) is proposing to establish a new gold mining operation called the Bendigo-Ophir Gold Project on the Bendigo and Ardgour Stations in the Dunstan Mountains of Central Otago, located approximately 20 km north of Cromwell. This application by the Applicant which is made under the Fast-track Approvals Act 2024 seeks to authorise the integrated development of four identified gold deposits - through the establishment of staged open pits and an underground mine - together with a modern gold processing plant and associated infrastructure and ancillary activities.

2. Limitations

This report has been prepared by GHD Limited, in accordance with the agreed scope of work. It is intended to support the NZ Environmental Protection Authority (EPA) application under the FTAA and may be relied upon by the Expert Panel and relevant administering agencies for the purposes of assessing the application.

While GHD Limited has exercised due care in preparing this report, it does not accept liability for any use of the report beyond its intended purpose. Where information has been supplied by the Client or obtained from external sources, it has been assumed to be accurate unless otherwise stated.

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 throughout this report and particularly in this report (refer section(s) 10 and 11 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

3. Documents considered

GHD has been engaged to peer review groundwater and hydrogeological assessments, modelling, and associated technical documentation, and the provision of expert advice to assist the Panel in interpreting technical evidence, understanding risks and uncertainties, and responding to issues raised through consultation, submissions, and statutory processes.

Applicant's Response to RFI 11

1. RFI 11 – Question 2a – Water – Hydrological Report; prepared by HGM (dated 17 August 2026)
2. RFI 11 – Question 2b and 2c – Water – Updated Groundwater Modelling for Bendigo Ophir Gold Deposit; prepared by KSL (dated 14 August 2026)
3. RFI 11 – Question 5 – Water – Bendigo-Ophir Gold Project – Assessment of Environmental Effects; prepared by HGM, Boffa Miskell, MWM, KSL, GEOCONTAM RISK MANAGEMENT (dated 17 August 2026). The appendices listed are missing - have not been included in the document online
4. RFI 11 – Question 6 – Report on Compliant Aquifer Test at BOGP Water Supply Bore Field; prepared by KSL (dated 17 August 2026)

Comments Received on Applicant's Response

5. Response to RF11 – Technical Review by Alexandra Badenhop (dated 7 September 2026)
6. Response to RF11 – Supplementary statement of Evidence of Dr Leanne Morgan (dated 7 September 2026)

Applicant's Response to comments Received

7. RFI 11 – Responses to RFI Responses by Other Parties – Memo prepared by KSL, dated 11 September 2026
8. RFI 11 – RFI Responses for groundwater modelling - Memo prepared by KSL, dated 14 September 2026
9. RFI 11 – Assessment of Groundwater user Drawdown Effects in Surrounding Bendigo Aquifer
10. Response to RF11 – Memorandum by Mr Ryan Burgess – Hydro Geochem Group (dated 14 September 2026)
11. Supplementary Statement of Evidence of Dr Leanne Morgan - Response to Burgess memorandum (dated 18 September 2026)
12. BOGP FTAA minute 53 Response by Mr Ryan Burgess – Hydro Geochem Group (dated 23 September 2026)

Applicant Response to RFI 12

13. RFI 12: Water – TSF and Shepherds ELF Seepage, Santana Minerals, Engineering Geology Ltd (EGL), Hydro Geochem Group (HGG), Komanawa Ltd (KSL) (dated 23 September 2026)

4. Comments on reports reviewed

RFI 11 – Question 2a – Water – Hydrological Report by HGG (1)

Ten (10) standpipe monitoring wells have been installed, and 3 VWP sensors have been placed at 5 locations (3 sensors in different depths in each of the 5 boreholes). Hydraulic conductivity testing has been undertaken in the standpipe piezometers. The hydrogeological investigations and additional data presented in HGG(1) are mainly within the Shepherds Creek Valley.

Hydraulic Conductivity testing of the weathered schist identified hydraulic conductivity (K) values higher than those adopted in the seepage modelling undertaken by HGG (2026b). HGG (1) note that the primary seepage collection system will incorporate a low-permeability (low-K) toe barrier designed to intercept groundwater flow through the weathered bedrock. While this is a reasonable conceptual approach, its effectiveness remains to be demonstrated through updated seepage modelling during the detailed design phase. Additional site-specific hydrogeological investigations and long-term groundwater monitoring downgradient of each mining feature will also be required to confirm the performance and viability of the proposed engineering controls.

RFI 11 – Question 2b and 2c – Water – Updated Groundwater Modelling for Bendigo Ophir Gold Deposit; prepared by KSL (2)

A coupled 3D groundwater model was developed comprising a larger scale deep groundwater model and a higher-resolution (smaller domain) shallow groundwater model for assessment of the TSF and ELF within the Shepherd Creek catchment. While the deep groundwater model was optimised/calibrated against the data available during model development, the modelling was undertaken concurrently with the hydrogeological investigations reported by HGG (1). Consequently, the model was not able to incorporate all site investigation data collected during that programme as noted Dr Leanne Morgan (6). KSL (2) therefore recommends that the model be updated as additional hydrogeological information becomes available. I agree that periodic model updates are warranted, particularly where new data have the potential to refine key hydrogeological parameters, improve calibration performance, or influence predictions of seepage and groundwater effects.

KSL (11) notes that the range of hydraulic conductivity values adopted in the groundwater model generally encompasses the range of values reported by HGG (1). The principal exception relates to hydraulic conductivity testing undertaken in fresh bedrock at monitoring location GW02C, which returned a value of approximately 1×10^{-5} m/s. This value is one order of magnitude greater than the maximum hydraulic conductivity assigned to the equivalent fresh bedrock unit in the groundwater model (1×10^{-6} m/s) that can lead to much higher percentage of seepage through it. KSL (11) considers that the elevated hydraulic conductivity measured at GW02C is more likely to be representative of the Thompson Gorge Fault zone rather than the surrounding fresh TZ4 bedrock unit. Confirmation of the validity of that interpretation would require additional hydrogeological data to demonstrate that the test interval at GW02C is hydraulically connected to, and principally influenced by, the Thompson Gorge Fault. If the higher hydraulic conductivity value measured at GW02C is not confined to the fault zone, the implications for groundwater flow pathways, seepage migration, and contaminant transport may differ from those currently assumed. In that case, the conceptual hydrogeological model and associated groundwater modelling would require revision, as suggested by KSL (11). Future model updates should consider incorporation of these structural features (faults) where these are demonstrated to exert a significant influence on groundwater flow through elevated hydraulic conductivity.

For optimisation of the deep groundwater model, KSL (2) utilised groundwater level data collected from both standpipe piezometers (manual water-level measurements) and vibrating wire piezometers (VWPs), which they considered to provide high-confidence observations of groundwater levels and hydraulic gradients. Dr Morgan (6) correctly identified discrepancies in the hydraulic head data from two VWPs (GW04 and GW05) that were used as calibration targets. In response, KSL (8) advised that the discrepancies arose from a typographical error in the HGG (1) report and a unit conversion error in the

groundwater modelling report prepared by KSL (2). The corrected GW04 & GW05 values (KSL (8)) showed a better agreement with the values reported in HGG (1).

KSL (8) reported that the unit conversion error affected all VWP calibration target values and subsequently presented a comparison of mean groundwater levels and measurement elevations for both standpipe piezometers and vibrating wire piezometers (VWPs). Following this review, KSL (8) expressed concerns regarding the accuracy of the VWP-derived hydraulic head data and considered the manually measured groundwater levels from standpipe piezometers to provide a more reliable representation of the groundwater system. Therefore, although the model optimisation was focused on the VWP data, no changes were made to the deep groundwater model, as KSL, (8) considers that the original optimisation achieved a good fit to the groundwater level data collected from the standpipe piezometers as well. I agree that further investigation of the VWP data is warranted. If the reported hydraulic head measurements are correct, they indicate a downward vertical hydraulic gradient in the vicinity of the SHELF and SHFILL, rather than the upward gradient simulated by the model. In combination with the presence of a thicker weathered bedrock unit and the relatively high hydraulic conductivity values measured at GW03B and GW06B (10^{-5} to 10^{-4} m/s), this could influence groundwater flow pathways and seepage migration, and may therefore affect the seepage predictions reported by KSL (2 & 8).

As per RFI12 response (Santana et al (13)), MGL proposes to remove the weathered schist at the TSF embankment and toe of shepherds ELF/ Seepage collection sump and a grout curtain and interception wells beneath the downstream extent of the Shepherds Valley infill as measures to encourage collection of seepage in the groundwater system. KSL (2) modelling showed the importance of underdrainage and Santana et al (13) notes the consent conditions that have been proposed for underdrainage over the full length of TSF, Shepherds Valley Infill and toe of Shepherds ELF. I concur that these engineering design measures are positive measures to reduce the percentage of uncaptured seepage that may reach the aquifers downgradient. Santana (13), notes that modelling will be updated to inform detailed design.

In addition to the above engineering design measures and updates of modelling a comprehensive fence monitoring network is required. KSL(2) conclude that uncovered seepage will be detected by the proposed monitoring network however the proposed monitoring network is not detailed in the reports that I have reviewed. KSL(2) highlights the need of the monitoring network with particular attention to the monitoring of surface water at SCO1, groundwater near SCO1, and the silt pond.

As noted by Ms Alexandra Badenhop (5) in the Groundwater JWS all experts agreed that groundwater monitoring is required at several locations:

- a) Shepherds ELF;
- (b) Western ELF;
- (c) SREX ELF;
- (d) Shepherds Service Corridor valley infill
- (e) Pit lakes and underground mine portals and decline;
- (f) Process plant and ROM pad;
- (g) STSF.

At each location, monitoring wells should be screened in the alluvium, weathered bedrock and deeper fractured rock.

Finally, I don't consider that the groundwater modelling undertaken is highly conservative (as stated in Santana (13) memorandum for the reasons detailed above and because of the filtering and reweighting of the combination of the underlying parameters that was detailed and used in KSL(2).

RFI 11 – Question 6 – Report on Compliant Aquifer Test at BOGP Water Supply Bore Field prepared by KSL (4)

A four-step Step Rate Test (SRT) up to 88 L/s was undertaken in the PB. A 6-days Constant Rate Test (CRT) Pumping test for 97.1 L/s (from 2 bores with IDs 400mm & 150mm) less than the requested 110 L/s. Two observation bores 75 m and 136 m away (plus ORC's monitoring well further away).

The KSL (4) report concludes that the recommended transmissivity (T), hydraulic conductivity (K), and specific yield (Sy) values are approximately 9% lower than those adopted in the B.02 assessment. However, no updated quantitative assessment was presented to evaluate the implications of these revised aquifer parameters. Instead, the report qualitatively states that groundwater drawdown effects are expected to increase as a result of the lower parameter values. KSL (4) recommends that an additional pumping test be undertaken following installation of the second production bore, together with an updated assessment of groundwater drawdown effects as a consent condition.

In response to comments from Ms Badenhop (5) regarding the lack of assessment of effects on other groundwater users, KSL submitted a memorandum dated 14 September 2026 (9) presenting an updated assessment of potential effects on neighbouring groundwater users. The assessment notes that the proposed consent conditions would limit groundwater abstraction from the borefield to 97 L/s (8,380 m³/day), consistent with the maximum pumping rate achieved during the compliant constant-rate aquifer test (CRT).

KSL (9) utilised both the Theis analytical solution, consistent with the approach outlined in the ORC Regional Plan, and a simplified MODFLOW numerical model to assess potential drawdown effects on neighbouring groundwater users. The MODFLOW model enabled the incorporation of boundary conditions, including the edge of the alluvial aquifer and the Clutha River, which are not readily represented using the Theis equation alone. I concur that the use of a numerical groundwater model that allows the incorporation of boundary effects is an appropriate and defensible approach for assessing drawdown effects associated with abstraction from the MGL borefield due to the location of the borefield.

The assessment provides details of the distances between the MGL borefield and neighbouring wells, together with the consented abstraction rates and volumes for those users, and the predicted drawdown at each location. While this information is useful, additional context regarding the practical significance of the predicted drawdown effects on neighbouring groundwater users would have been beneficial. For example, for wells where predicted drawdown exceeds 1 m, the assessment could have included the remaining available water column, remaining groundwater level above pump intake, or the percentage reduction in available head attributable to pumping from the MGL borefield. I understand however that the publicly available data may not contain construction details of the existing bore (i.e. bore depth and screen length etc) that one needs to undertake these calculations. Notwithstanding this, approaches to assessing and managing groundwater-user interference vary between regional councils, and the level of assessment required is often jurisdiction-specific.

Response to RFI 11 – HGG Memorandum dated 14 September 2026 (10)

A summary of the available hydraulic conductivity data is presented in the HGG (10) memorandum. The memorandum further concludes that unrecovered seepage migrating down the Shepherd Creek Valley through the alluvium and/or weathered bedrock is likely to discharge upstream of the SC01 monitoring location and the Bedrock Gap. The memorandum also outlines additional seepage management measures, including the installation of low-permeability cut-off walls keyed into bedrock beneath the seepage collection sump at the Shepherds Engineered Landform (SHELF) and beneath the Tailings Storage Facility (TSF) embankment. HGG (10) note that in their professional experience with similar systems unrecovered seepage fractions of 5% to 1% could be achieved and recommend additional investigations and 3D modelling to inform detailed design of these systems.

I concur with the recommendation that further investigations and modelling be completed during the detailed design phase to improve understanding of the hydrogeological setting at the proposed location, including the hydraulic properties of the weathered and fractured bedrock and the influence of structural

features on groundwater flow and to optimise the location and design of the proposed seepage interception system.

Furthermore, HGG (10) discusses the narrowing of the valley at the Bedrock Gap and interprets this geomorphic feature as indicating a thinner alluvial sequence and shallower groundwater conditions in the vicinity of the gap. In their interpretation they note the presence of a wetland immediately upstream of the Bedrock Gap. HGG also suggests that groundwater flow may exhibit an upward vertical hydraulic gradient in this area. In addition, the memorandum presents a Darcy's Law calculation indicating that groundwater flow through the alluvial aquifer between monitoring locations GW03 and GW02 is less than 0.01 L/s, which is substantially smaller than the estimated uncaptured seepage volumes. On this basis, HGG concludes that the Bedrock Gap area, or alternatively a location immediately upstream near GW03, may provide favourable conditions for the installation of a contingency seepage interception system. However, the memorandum contains an error in the conversion of groundwater flux from m³/day to L/s, which was initially identified by Dr Leanne Morgan (11). While HGG subsequently acknowledged and corrected this quantitative error, they note that the revised calculation does not materially alter the broader conceptual interpretation presented in the memorandum.

I concur that the narrowing of the valley at the Bedrock Gap may indicate a reduction in alluvial thickness and potentially shallower groundwater conditions. However, the available hydrogeological information does not conclusively demonstrate the presence of an upward vertical hydraulic gradient from the underlying bedrock aquifer to the alluvial aquifer. Confirmation of this interpretation would require additional groundwater level and hydraulic head data from nested monitoring installations across the Bedrock Gap area. Furthermore, KSL (8) acknowledged that unrecovered seepage may bypass SC01 and emphasised the importance of groundwater monitoring within the alluvium, colluvium, and weathered schist at the natural narrowing of the gorge. KSL (8) considered that monitoring at this location would minimise the potential for seepage to bypass the proposed monitoring point.

In conclusion while I agree that at the Bedrock Gap and or immediately upstream of it may represent a logical location for the contingency seepage interception due to the constricted valley geometry, additional hydrogeological investigations and detailed seepage modelling would be required to confirm the effectiveness and practicality of such a system.

Regards



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