

**Before an Expert Panel
Bendigo-Ophir Gold Project**

FTAA-2507-1089

Under the

Fast Track Approvals Act 2024

In the matter of

an application for approvals to establish,
operate, and remediate an open pit and
underground gold mine at Bendigo and
Ardgour Stations

By

Matakanui Gold Limited

Applicant

**SUPPLEMENTARY STATEMENT OF EVIDENCE OF DR LEANNE MORGAN
GROUNDWATER HYDROLOGY
RESPONSE TO RFI 11
7 September 2026**

*The views of the academic expressed in this report may not necessarily represent the views
of the University of Canterbury*

Environmental Defence Society Inc
PO Box 91736 Victoria Street West Auckland 1142
Shay Schlaepfer, COO
Email: [REDACTED]

Counsel Acting

Rob Enright

Email: [REDACTED]

Jen Vella

Email: [REDACTED]

Introduction

1. My name is Dr Leanne Kaye Morgan.
2. My qualifications and experience are set out in my evidence in chief dated 10 April 2026 (EiC) and are not repeated here.
3. This is a supplementary statement of evidence responding to information in reports responding to Request for Information 11 (RFI 11), issued by the Environmental Protection Authority (EPA) on 25 June 2026 under section 67 of the Fast-track Approvals Act 2024.

Code of conduct

4. I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023, and referred to in the Fast-track Approvals Act 2024: Panel Conveners' Practice and Procedure Guidance dated 22 July 2025, and that I have complied with it in preparing this statement. The data, information, facts, and assumptions I have considered in forming my opinions are set out in this evidence. Unless I state otherwise, this evidence is within my sphere of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Materials considered

5. In preparing this evidence, in addition to the material listed in my EiC, I have reviewed:
 - RFI 11, letter from the EPA to Matakanui Gold Limited dated 25 June 2026.
 - RFI 11 Question 2a Water Hydrological Report (HGG, Document Number J-H-NZ0238-010-R-Rev0). Dated 17 August 2026. Prepared by Hydro Geochem Group for Matakanui Gold Ltd.
 - RFI 11 Question 2b, c Updated Groundwater Modelling for Bendigo Ophir Gold Deposit. Report: Z20111.m3 prepared by Komanawa Solutions Ltd for Matakanui Gold Ltd.
 - RFI 11 Question 3a, b, c, Operational Phase Site Wide Water and Load Balance Model Document Number J-NZ0488-015-R-Rev0. Dated 17 August 2026. Prepared by Mine Waste Management Limited for Matakanui Gold Ltd.

- Response to RFI 11 Question 5 – Document number J-H-NZ0238-006-L-Rev0. Dated 17 August 2026. Prepared by Hydro Geochem Group for Matakanui Gold Ltd.
- RFI 11 Question 6. Rekker, J. (2026). Report on Compliant Aquifer Test at BOGP Water Supply Bore Field. (Z24002BOG-4). Prepared for Matakanui Gold Ltd by Kōmanawa Solutions Ltd, Christchurch. Dated 17 August 2026.
- D.01 CODC Land Use Consent and Conditions, 28 August 2026 (Clean).
- D.02 Otago Regional Council Consents and Conditions, 28 August 2026 (Clean).
- D.03 Schedule One, Common Conditions to the CODC and ORC Consents, 28 August 2026 (Clean).
- D.04 Schedule Two, General Conditions for ORC Consents, 28 August 2026 (Clean).
- EMM Consulting, Water Resources Impact Assessment Summary, dated August 2026 (E260840 | RP1 | v2).
- Matakanui Gold Limited Response to RFI 4 Geology, Geotech and Engineering. Dated 3 June. Available [here](#).
- Bendigo-Ophir Gold Project Groundwater Joint Witness Statement, dated 14 and 15 May 2026
- Bendigo-Ophir Gold Project Geochemistry / Water Quality / Water Management / Freshwater Ecology Joint Witness Statement dated 8-9 June 2026
- Bendigo-Ophir Gold Project Reconvened Geochemistry / Water Quality / Water Management / Freshwater Ecology Joint Witness Statement dated 10 June 2026
- BOGP MWSF Seepage Risk Assessment. Document JHNZ0238-003-M-Rev0. Dated 5 March 2026. Prepared by Hydro Geochem Group for Matakanui Gold Ltd.
- Bendigo-Ophir Gold Project: Mine Waste Storage Facility Seepage Assessment, Document J-H-NZ0243-001-R-Rev0. Dated 17 April 2026 ([Response to RFI 2](#)). Prepared by Hydro Geochem Group for Matakanui Gold Ltd.
- Matakanui Gold Limited Joint Expert Response to Minute 29 Groundwater 22 June 2026 ([Response to Minute 29](#))
- B.06C Mine Waste Management Limited Mine Impacted Water Overview Report, Appendix I, Source Term Definition Report, J-NZ0475-001-R-Rev2, dated 5 August 2025.

- B.22 Engineering Geology Limited Site Geotechnical Factual Report Part 3, dated 8 August 2025, prepared for MGL.
6. I also participated in expert conferencing, including the Groundwater Joint Witness Statement (14 and 15 May 2026) and the Geochemistry, Water Quality, Water Management and Freshwater Ecology Joint Witness Statements (8 and 9 June 2026), including the reconvened conferencing session (10 June 2026). I also gave oral evidence at the concurrent hearing on water matters held in Wellington on 15 June 2026.

Executive Summary

7. **The scale of this Project is large.** It involves a direct disturbance footprint of 480 hectares, including more than 200 hectares of mine waste storage facilities. The waste includes arsenic-bearing rock and other contaminants that may leach into groundwater. The mine waste facilities use an underdrainage system to capture seepage and do not have an impermeable liner beneath them. It is acknowledged by the Applicant that a portion of the seepage will not be captured. The receiving environment for the uncaptured seepage includes the Bendigo and Ardgour Aquifers, which are used for drinking water and agriculture, as well as the Lindis River and Clutha Mata-au. There is also a proposed continuous groundwater take of 97 L/s, or roughly 8.4 ML/day.
8. **Groundwater contamination is difficult to detect, contain and reverse.** For a project of this scale, it is therefore important that the likely adverse effects are sufficiently understood before a decision is made, so that it can be determined whether those effects can be avoided, remedied or mitigated.
9. **Reliable assessment of groundwater effects requires adequate site characterisation and reliable modelling.** The site needs to be sufficiently characterised to establish baseline groundwater quality, groundwater flow paths and aquifer properties. That information is necessary to develop a model capable of predicting the effects of mining and assessing whether those effects can be effectively managed.
10. **RFI 11 has generated a substantial volume of new material relating to groundwater,** work that in my opinion should have formed part of the substantive application. The Applicant characterises the effects addressed in this evidence as low risk, less than minor, and largely confirmed rather than altered by the RFI 11 responses. In my opinion, the material does not support that. Across everything I have reviewed, RFI 11 has not resolved the concerns I raised in my evidence in chief. In many respects it confirms they were well founded.
11. **The site is still not well enough understood.** The field investigation carried out for RFI 11 added some data to a very limited dataset, but the work was confined almost entirely to the Shepherds Creek valley and falls well short of a completed characterisation programme. Water quality was sampled only once at each new well, far short of what recognised guidelines recommend, and no water quality data has been collected from the Ardgour Aquifer at all, a gap the experts, including the Applicant's, agreed exists. The rock beneath the site was found to be more permeable than previously assumed, which makes it more likely that contaminated seepage will travel further and deeper rather than staying shallow where it can be collected. Groundwater flow in the valley also appears to be more complicated than expected, which means the monitoring locations now proposed may not be in the right places.

12. **The groundwater modelling cannot reliably tell us what the effects will be.** Under the Australian Groundwater Modelling Guidelines, I consider the model to be Class 1, the lowest of three confidence levels. In my opinion, a decision of this scale requires a substantially higher level of confidence. It has not been independently peer reviewed. The modelling estimates up to 10% of seepage would escape capture at the waste facilities modelled. Escaped seepage enters the surrounding groundwater rather than being collected and treated. In my opinion that figure understates the likely loss, and no separate scenario has been run for what would happen if the drainage systems beneath the mine waste degrade.
13. **Several material problems were found with the modelling.** Near two of the waste facilities, the model was calibrated, that is, tuned to match field measurements, to show groundwater flowing upward, when the measured data shows it flowing downward. Several structural assumptions affecting how flow is divided between the shallow and deep systems have not been tested against reasonable alternatives, which matters because that division determines whether seepage stays where it can be collected. The new field data collected for RFI 11 was not used, and the model does not cover the Bendigo Aquifer's contaminant sources at all.
14. **The groundwater modelling has not established how much contaminated seepage there would be, where it would go, or whether it would be detected and managed.** Until it does, the effects on the Ardgour and Bendigo Aquifers cannot be reliably assessed.
15. **The water and load balance modelling has changed significantly, and still relies on optimistic assumptions.** The Project was previously expected to have a water deficit, meaning no surplus requiring management. It is now expected to have surplus water from early in the project, and the model now predicts contaminant limits will be exceeded, for nitrogen in 2038 and antimony in 2037. Several of the groundwater inputs are still not conservative, despite experts raising this in conferencing, including the volume of groundwater expected to be pumped out of the pits during dewatering. It is a positive step that the model now includes escaped seepage, but the 5% figure adopted is lower than the Applicant's groundwater modelling estimated.
16. **Only the operational phase of the water and load balance modelling was updated.** The closure and post-closure phases remain unchanged, including an assumption that no seepage escapes, even though the Applicant's own modelling acknowledges the drains may be damaged or blocked, and contaminant concentrations are expected to rise over that period. The risk of aquifer contamination continues for decades post mining but this has not been adequately assessed.
17. **A proper compliant pumping test has now been done for the Bendigo Aquifer groundwater take, but effects on neighbouring bore owners are still unknown.** The

revised results point to more water table drawdown. A cumulative drawdown assessment, accounting for other consented takes in the area, is required to determine whether other bore users will be affected, and experts agreed in conferencing it is needed, but it has still not been carried out.

18. **The conditions circulated on 28 August 2026 make some improvements, but significant gaps remain.** A new process has been added to protect bore owners near the Bendigo Aquifer take, but the one-kilometre notification radius was not worked out using the method Otago Regional Council prescribes. Using that method gives a larger area. The process is also reactive, it only starts once a bore owner finds they can't access their full water allocation and reports it. Similar gaps apply to seepage. A new seepage capture system has been added, but only at one of at least four facilities that generate seepage, and even where the system exists, the path contaminated water will take underground has not been reliably worked out. The compliance monitoring locations may also be compromised, and there are too few of them.
19. **Adaptive management is poorly suited to groundwater effects here.** While adaptive management is a legitimate method in some circumstances, it assumes effects will be detected early enough to intervene before harm becomes permanent. That assumption does not hold here. Contamination may take years to reach a monitoring bore, the pathway it would take has not been established, and detection cannot be assured. Also, the source will keep producing long after mine closure, and there is no baseline against which any change could be attributed to mining, rather than natural variation. In these circumstances, adaptive management cannot provide the level of protection required. The precautionary principle instead requires the Applicant to demonstrate the full range of possible effects, including the worst case, before a decision is made. That has not occurred. Nothing in the response to RFI 11, or in the proposed conditions, resolves these deficiencies.
20. **Taken together, the material provided in response to RFI 11 does not establish that the Project's effects on groundwater are low risk or minor.** The Applicant's own summary¹ concludes otherwise, but that conclusion rests on the reports addressed below, none of which, in my opinion, adequately answers the question it was responding to. On the material presently available, it is not possible to know whether problems arising from the Project could be effectively controlled, and the conditions as drafted do not provide that certainty.

¹ Response to RFI 11 Question 5, Document number J-H-NZ0238-006-L-Rev0, as addressed in my evidence on RFI 11 Question 5 below.

RFI 11 Q2a

Please note that in this section ‘the Report’ refers to the document: RFI 11 Question 2a Water Hydrological Report (HGG, Document Number J-H-NZ0238-010-R-Rev0). Dated 17 August 2026. Prepared by Hydro Geochem Group for Matakanui Gold Ltd.

RFI 11 Q2a requested:

Please provide additional information to better understand the hydrogeological characterisation of the site and wider receiving environment in terms of groundwater and contaminant movement from the site and the ultimate effects on the surface and groundwater receiving environment. This requires additional baseline data collection and modelling, including but not necessarily limited to:

a. General hydrogeological field data.

Summary

21. The field investigation detailed in the response to RFI 11 Q2a has added some data to a previously limited dataset. However, the new data is confined almost entirely to the Shepherds Creek valley, and has not measured most of the parameters identified as required within the Groundwater JWS. The snapshot groundwater quality survey, comprising a single reading at each well, falls significantly short of Guideline² recommendations for establishing a baseline, which call for at least quarterly sampling over two years, with a higher minimum recommended for high-risk activities such as mine sites. Groundwater quality data has still not been collected from the Ardgour Aquifer, despite an agreed need for baseline information in that receiving environment, including from an Applicant expert.³
22. Hydraulic conductivity measured in the weathered and fresh bedrock was considerably higher than previous estimates, and hydraulic head gradients differ from location to location in ways the assumed topographic flow regime does not clearly explain. Together, these findings undermine, rather than support, the Report's conclusion that low bedrock permeability will keep seepage shallow and readily collected.
23. Overall, the Report does not achieve the characterisation of the site and wider receiving environment that RFI 11 Question 2a sought. As a result, while this work adds to what has already been collected, the material needed to reliably develop a properly calibrated contaminant transport model and assess effects has not yet been provided.

² EPA South Australia (2024) Guideline 3 – Establishing baseline groundwater quality, Guidelines for groundwater quality monitoring of regulated activities series, Environment Protection Authority, Adelaide.

³ Bendigo-Ophir Gold Project Groundwater Joint Witness Statement, dated 14 and 15 May 2026, paragraphs 96 (AB, DA, LM and JR agreeing) and 97 (AB, DA and LM agreeing).

Assessment

24. Between 13 July and 13 August 2026, MGL undertook field work comprising installation of 10 new monitoring wells and 5 vibrating wire piezometer strings. Slug tests were carried out on the new monitoring wells to measure hydraulic conductivity. Groundwater quality was sampled at 14 monitoring wells (the 10 new wells plus 4 existing wells). Most of the new work was carried out in the Shepherds Creek valley.
25. Adequate hydrogeological characterisation is needed before consent, so that the effects of mining on groundwater can be reliably assessed. This includes establishing baseline groundwater levels and quality, including how they vary seasonally, since without this it is difficult to distinguish a change caused by mining from natural variability. The baseline, once missed, cannot be recovered. Characterisation also includes properly assessing the aquifer's hydrogeological properties, hydraulic conductivity, storage, anisotropy and porosity, since these control the magnitude and movement of contaminant seepage. Both the baseline and these properties are needed as inputs to the modelling that determines what adverse impacts will occur and whether they can be monitored for and managed.
26. The location of the 10 new monitoring wells (GW02A/B/C, GW03A/B/C, GW06A/B/C, GW19) and 5 vibrating wire piezometers (GW04, GW05, GW13, GW14, GW23) is shown in Figure 1 below. Note that existing monitoring wells (GW01, GW10, GW22, and MDD500) are also shown on this figure as they were sampled for groundwater quality.

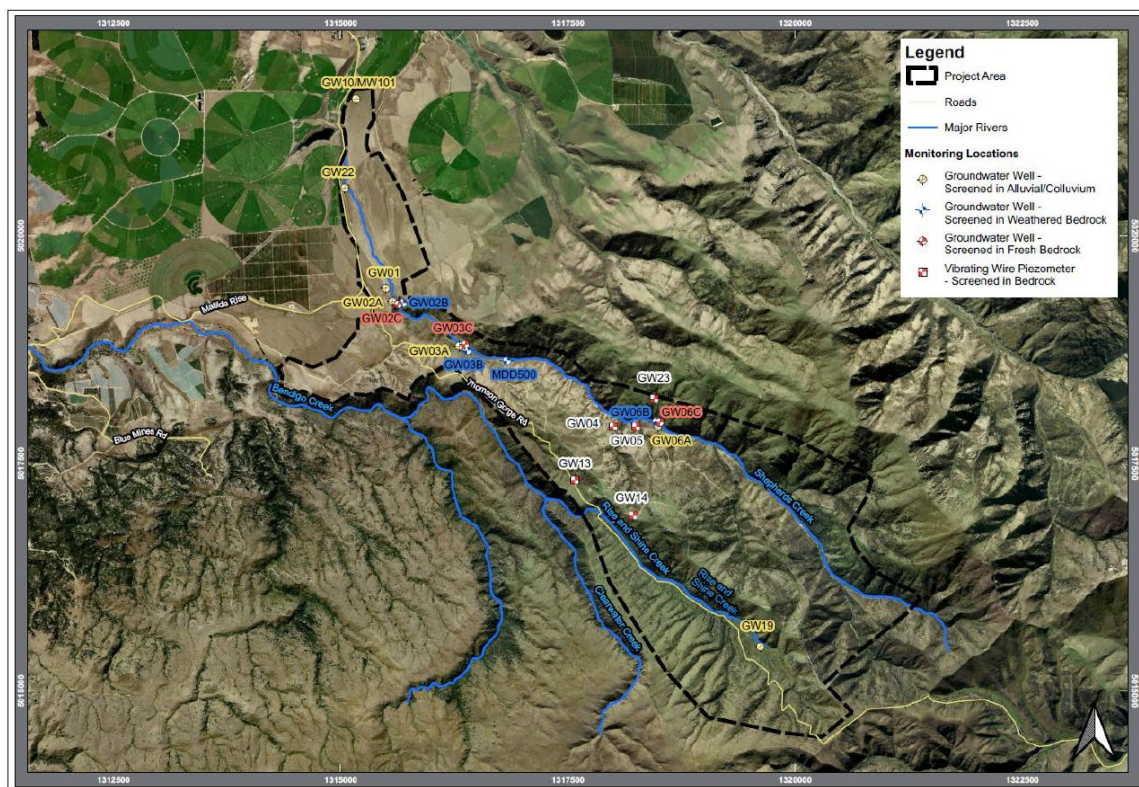


Figure 1. Site investigation overview (Figure 1 in the Report)

27. The 10 new monitoring wells are all located in the Shepherds Creek Valley bottom, apart from GW19, which is in the upper Rise and Shine Creek valley bottom. Monitoring wells GW02A/B/C, GW03A/B/C and GW06A/B/C are nested wells that are each screened across the alluvium/colluvium, weathered bedrock (schist) and fresh bedrock. These are in areas described as the Shepherds Creek Valley Alluvium, Shepherds Creek Valley Fill, Shepherds ELF i.e., at locations of proposed infrastructure. GW19 is in the upper Rise and Shine Valley bottom in the SRX ELF area and is only screened in the alluvium/colluvium. These monitoring wells are all relatively shallow with a maximum depth of 17 m.
28. The five vibrating wire piezometer strings, GW04, GW05, GW13, GW14, and GW23, are all located on the valley sides of the Shepherds Creek valley, with GW04 and GW05 closer to the valley bottom than GW13, GW14, and GW23. Each string has three sensors positioned at different depths, with placement depths across the five strings ranging from around 30 m to 200 m along the borehole, all within the TZ3 or TZ4 textural zones of the schist.
29. **The geological logging shows substantial thickness variability over short lateral distances.** In the valley bottom, alluvium/colluvium ranges from 5 to 6 m at GW03 and GW06 to 15 to 16 m at GW02, while weathered bedrock is relatively thin throughout, at 1 to 3 m. On the valley sides, weathered bedrock is considerably thicker, ranging from 19 to 37 m at GW04 and GW05, closer to the valley bottom, and thinning to 4 to 9 m further up-slope at GW13, GW14, and GW23.
30. Slug tests were carried out on the new monitoring wells to estimate hydraulic conductivity (K), which is the ability of a material to transmit water (sometimes also referred to as permeability or conductivity in the applicants' reports).
31. **The results indicate a considerable range of K across each hydrostratigraphic unit:**

Alluvium/colluvium ($n = 4$): 1×10^{-6} to 5×10^{-4} m/s
Weathered bedrock ($n = 4$): 6×10^{-5} to 3×10^{-4} m/s
Fresh bedrock ($n = 3$): 4×10^{-8} to 1×10^{-5} m/s
32. The range of K for the fresh bedrock is particularly notable, spanning close to three orders of magnitude between the lowest and highest recorded values.
33. **This variability is most likely structural.** The Report records frequent small-scale shear and fault zones at all drilling locations across the site and specifically identifies the Thomson Gorge Fault at the bedrock surface at GW03, where highest fresh bedrock K was found. Given this, the K variability observed is most likely structural. However, a characterisation based on two or three point-scale tests per unit does not capture that structure.

34. The groundwater level data broadly show that at GW02 there is a small downward gradient, at GW03 there is a large upward gradient (1.3 m higher in the fresh bedrock than in the alluvium), and at GW06 there is no vertical gradient. GW02's downward gradient is linked to the bedrock dropping away toward the Lindis River, where the Report notes seepage collection becomes more challenging as depth to the water table increases. Previous field work⁴ showed upward gradients in the valley bottom at three locations and downward gradients on the valley flanks at two locations.
35. Hydraulic heads measured at all five new vibrating wire piezometer strings indicate downward vertical gradients, consistent with downward gradients previously recorded on the valley flanks at two locations⁵. This sits uneasily, however, with data previously presented by the applicant showing an overall upward hydraulic gradient in the basement schist within the Rise and Shine pit area⁶. A conceptual model reconciling this discrepancy has not been provided and is needed.
36. The Report's Findings Summary draws conclusions that go beyond what the data supports. The individual factual observations, hydraulic conductivity ranges, water quality exceedances, and the new vertical gradient results, are generally consistent with the data presented. However, the broader conclusions drawn from this data are not, for the reasons set out below. As such, the central argument of the Findings Summary, that seepage will remain shallow and readily collected across the site, is not adequately resolved from the data presented.
- **Results are not consistent with the topographically driven flow system the Report's conclusions assume.** Under such a system, valley-bottom locations typically act as discharge zones, where converging flow from the valley sides produces an upward gradient and upward groundwater flow. Of the three new locations, only GW03 shows a clear upward gradient, and this is attributed to the Thomson Gorge Fault acting as a barrier, a structural mechanism, not a topographic one. GW02 shows a downward gradient rather than the expected upward one.
 - **New hydraulic conductivity data undermines the low-K premise the Report's conclusions depend on.** The Report's overall conclusion rests on the schist being low-K, stating that "such low K bedrock will act to keep seepage migration pathways shallow, facilitating high levels of seepage collection." The geometric mean of the four new weathered bedrock results is about 20 times the previous geometric

⁴ B.22 Engineering Geology Limited Site Geotechnical Factual Report Part 3, Dated 8 August 2025, Prepared for Matakanui Gold Limited.

⁵ B.22 Engineering Geology Limited Site Geotechnical Factual Report Part 3.

⁶ B.03 Rekker, J. H., & Dumont, M. (2025). Bendigo – Ophir Gold Mine Project – Groundwater Existing Environment & Effects Assessment. Kōmanawa Solutions Client Report No. Z24002BOG-1.

mean⁷. For fresh bedrock, one of the three new results, from GW02C, is about 6 times above the maximum previously measured, while the other two sit within or below it. From this it is likely that the schist in the vicinity of the Shepherds Creek Valley bottom may have considerably higher permeability, at least locally, than previously assumed. This was not acknowledged in the Report and undermines the low-permeability assumption the seepage containment design depends on.

37. **The monitoring period is too short to characterise how groundwater responds to changing conditions.** The new monitoring wells have only a single manual reading, and each vibrating wire piezometer has data from a monitoring period of between 1 and 6 days, capturing no seasonal or interannual variation. In my opinion, at least two years of data is needed, since a single reading or a few days of data cannot show how heads respond across wet and dry periods, and flow directions cannot be confirmed with confidence from the data presented on this basis.
38. **There is not enough groundwater quality data to establish a baseline.** The EPA South Australia Guideline⁸ recommends a minimum of quarterly sampling for at least two years to establish a baseline data set, providing at least eight data points per monitoring well, and notes that long-term monitoring beyond two years is required to adequately describe seasonal trends. For high-risk activities such as mine sites, or those located near sensitive receptors such as groundwater users, the guideline recommends a higher minimum sample size of seventeen per monitoring well. Applying either standard, the single groundwater quality reading taken at the 14 monitoring wells falls well short of what is needed to establish a robust baseline. By contrast, surface water quality monitoring at the two compliance points has been ongoing since September 2022, providing 56 samples at SC01 and 53 at RS03 by March 2026⁹, exceeding the Guideline's baseline standard. Without an adequate groundwater baseline, it will not be possible to reliably distinguish a change in groundwater quality caused by the BOGP from natural variability.
39. **The new investigation does not extend to areas the Panel identified, and experts agreed required further work.** Except for GW19, the new field work and groundwater quality sampling are confined to the Shepherds Creek valley. RFI 11 specifically directed that updated assessments address the potential adverse impacts on the Ardgor and Bendigo aquifer.¹⁰ Experts agreed in the Groundwater JWS that no baseline water quality

⁷ Bendigo-Ophir Gold Project: Mine Waste Storage Facility Seepage Assessment, Document J-H-NZ0243-001-R-Rev0, dated 17 April 2026 (Response to RFI 2). Prepared by Hydro Geochem Group for Matakanui Gold Ltd.

⁸ EPA South Australia (2024) Guideline 3 – Establishing baseline groundwater quality, Guidelines for groundwater quality monitoring of regulated activities series, Environment Protection Authority, Adelaide.

⁹ Bendigo-Ophir Gold Project Geochemistry, Water Quality, Water Management, Freshwater Ecology Joint Witness Statement, dated 8 and 9 June 2026, paragraph 19.

¹⁰ RFI 11, letter from the EPA to Matakanui Gold Limited, dated 25 June 2026, paragraph 5.

information existed for the Ardgour Aquifer and that is baseline was required.¹¹ Further investigation was separately agreed to be required in the Shepherds Valley Alluvium, the Ardgour Aquifer, and the Bendigo alluvium upgradient of the Bendigo Aquifer.¹² Of these, only the Shepherds Valley Alluvium has since received new investigation.¹³ The Ardgour Aquifer and Bendigo alluvium remain unaddressed.

40. **Agreed knowledge gaps have not been addressed.** The Groundwater JWS¹⁴ identified critical knowledge gaps needing to be filled before further modelling could produce a robust conceptual model, hydraulic conductivity data, anisotropy, storage values, flux estimates, veneer aquifer properties, and a potentiometric surface. The Report addresses only hydraulic conductivity and does so in the limited way set out above. Anisotropy, storage values, and flux estimates are not addressed at all. Veneer aquifer properties are addressed only to the extent captured by the slug testing and the single water-level and water-quality measurements discussed above. In my opinion, porosity, distinct from but related to the storage values above, should also have been characterised, since it is required (together with hydraulic conductivity) to estimate the velocity of groundwater and contaminant movement, and hence the travel time of a contaminant between a source and a proposed monitoring location or receptor, directly relevant to the characterisation RFI 11 Question 2(a) requested.
41. **No potentiometric surface or cross-section is provided.** A potentiometric surface, showing groundwater levels in plan view for each unit, would require sufficient groundwater-level data to establish head contours and hydraulic gradients across the site (considering seasonality), rather than a small number of point measurements. This is particularly important given the differing vertical gradients already observed at different locations and depths. A cross-section, showing the hydrostratigraphic units and groundwater levels across the site, and especially through the Shepherds Creek valley, is also needed, given the thickness and structural variability already identified between GW02, GW03 and GW06. Without either, it is difficult to establish whether contaminant seepage can be reliably monitored or captured in the Shepherds Creek valley floor.
42. **Two things follow from the findings set out above.** First, while the Report adds some new data for the Shepherds Creek valley, it does not establish a reliable present-day understanding of how groundwater moves through the site and wider receiving

¹¹ Bendigo-Ophir Gold Project Groundwater Joint Witness Statement, dated 14 and 15 May 2026, paragraphs 96 (AB, DA, LM and JR agreeing) and 97 (AB, DA and LM agreeing).

¹² Bendigo-Ophir Gold Project Reconvened Geochemistry, Water Quality, Water Management, Freshwater Ecology Joint Witness Statement, dated 10 June 2026, paragraph 68 (LM and AB agreeing).

¹³ The groundwater quality sample taken at MW-101 is in the Shepherds Creek Alluvium, not the Ardgour Aquifer. BOGP MWSF Seepage Risk Assessment, Document J-H-NZ0238-003-M-Rev0, dated 5 March 2026. Prepared by Hydro Geochem Group for Matakanaui Gold Ltd. Figure 3.

¹⁴ Bendigo-Ophir Gold Project Groundwater Joint Witness Statement, dated 14 and 15 May 2026, paragraph 34 (LM, AB and DA agreeing)

environment, for the reasons already given. Second, mining will change that picture. Modelling is needed to tell us how much contaminant seepage there will be, and where it will move, both during and after mining, and hence whether that seepage can be effectively monitored and intercepted. This additional field work has not provided the data agreed as necessary to build that model with confidence, and most of what was collected was not carried through into the modelling that followed, which is discussed further below. Accordingly, the remaining issue is not simply a lack of additional data. It is that the conceptual model controlling the predicted movement and capture of seepage has not been developed and demonstrated. The hydrogeological characterisation and impact assessment required by RFI 11 Q2a therefore remain unresolved. Without this the Panel does not have the information it needs to reliably evaluate adverse impacts to groundwater from the project, especially from contaminated seepage. The conditions at the site appear more complex than originally thought and it may not be possible to capture seepage at the levels needed to ensure significant adverse impacts to the receiving environments can be avoided.

RFI 11 Question 2b, c and 4

Please note that in this section ‘the Report’ refers to the document: Dumont et al., (2026). *Updated Groundwater Modelling for Bendigo Ophir Gold Deposit*. Report: Z20111.m3 prepared by Komanawa Solutions Ltd for Matakanui Gold Ltd. Dated 14 August 2026.

RFI 11 requested (as relevant):

Please provide additional information to better understand the hydrogeological characterisation of the site and wider receiving environment in terms of groundwater and contaminant movement from the site and the ultimate effects on the surface and groundwater receiving environment. This requires additional baseline data collection and modelling, including but not necessarily limited to:

b. Three-dimensional groundwater contamination modelling.

c. Quantification and demonstration of uncaptured seepage, including details of the seepage scenarios through the site and wider receiving environment.

We expect all models to be appropriately calibrated against existing conditions with consideration of:

- A range of potential geological scenarios that may realistically be foreseen; and*
- Variable environmental conditions which demonstrate the range of effects possible.*

Summary

43. The Report presents two coupled numerical groundwater models, a deep model of the regional schist system and a smaller seepage model of the near-surface system around the mine waste and engineered landforms in Shepherds Creek. The deep model was calibrated and the seepage model was not calibrated, despite the Panel’s expectation, stated in RFI 11, that “all models” would be “appropriately calibrated against existing conditions”. Calibration is the process of testing a model's parameters against real-world field measurements, adjusting them until the model's simulated results match what has actually been observed at the site. A model that has not been calibrated has not been checked against reality.
44. Applying the criteria in the Australian Groundwater Modelling Guidelines¹⁵, the coupled model has a Class 1 confidence classification, against the higher Class 3 standard that is,

¹⁵ Barnett B et al. (2012) Australian Groundwater Modelling Guidelines, Waterlines Report Series No. 82, National Water Commission, Canberra.

in my opinion, appropriate to a decision of this scale. The model has also not been subject to the external peer review a model of this complexity and consequence warrants.

45. The reported magnitude of lost seepage cannot be relied upon as a conservative upper bound. One important reason is a problem with the calibration data. I have found that some of the data used for calibration does not match the measured data. Near the Shepherds ELF and Shepherds Creek Valley Fill, the model has been calibrated to upward groundwater flow when the measured data shows the opposite, downward flow. The remaining calibration dataset has not been checked against its original sources for accuracy, and it should be. Other reasons include the way the underlying stochastic suite was constructed, and the use of a single blended figure that obscures what seepage loss would be if drainage degraded.
46. New data collected in response to RFI 11 Question 2a, including significantly higher new measurements of schist permeability, has not been used. No conceptual model has been presented, and several structural assumptions that influence the partitioning of flow between the shallow and deep systems have not been tested against reasonable alternatives.
47. The model's domain does not include the Bendigo Aquifer's contaminant sources at all.
48. The modelling has not demonstrated, to the level of confidence I consider is required for a determination to be made that lost contaminated seepage will be small, will remain within the assumed containment pathway, or will be reliably detected if it escapes that pathway.

Assessment

The two models

49. The Report describes two coupled numerical groundwater models. The deep model represents the wider regional schist groundwater system, using a 100 m grid extending through 34 vertical layers. It was optimised (calibrated) against observed groundwater heads and stream flows, under current, pre-mining conditions.
50. The seepage model represents the shallow groundwater system over a smaller domain, immediately around the tailings storage facility (TSF), Shepherds Creek Engineered Landform (SHELF), and Shepherds Creek Valley Fill (SHFILL), at finer spatial detail than the deep model. Unlike the deep model, it was not calibrated. The Report states there was insufficient data to do so. Instead, many parameter combinations were run forward, drawing on the deep model's calibrated results together with a wide range of assumed values for the hydrogeological properties of the shallow groundwater system and

engineered structures, to explore the range of possible seepage outcomes during mining and closure.

51. While predictive uncertainty has clearly been considered in the modelling approach, my concern is whether the way it has been incorporated, filtered and reported provides sufficient confidence that the resulting upper limits on lost seepage are appropriately conservative and mean what the Report says they mean. This is detailed further below.

Peer review

52. **This is a complex model which should have been subject to external peer review** before being presented to the Panel, given the scale of the project and the significance of the decision it is intended to inform. The Australian Groundwater Modelling Guidelines¹⁶ identify peer review by experienced hydrogeologists and modellers as an established part of the review process for groundwater models of this kind, recommending that review occur at each reporting milestone, beginning at the planning stage, so that key conceptual and modelling decisions can be addressed before construction and calibration. The New Zealand Groundwater Model Audit Guidelines¹⁷ similarly contemplate a reviewer working through the same steps as the modeller, with sufficient information to independently reproduce the model's results if necessary. I have not seen evidence that this process occurred here. In the absence of it, a substantial burden falls on those commenting on the Report within the limited time available.
53. The comments here represent a first-pass assessment and identify matters that warrant the Panel's attention regardless of the lack of external peer review. However, given the short time available, they should not be treated as a substitute for the full external peer review that a model of this complexity and consequence warrants. I carry out groundwater model peer reviews as a researcher and consultant, so am familiar with the extent of work ordinarily involved.

Confidence classification

54. The Australian Groundwater Modelling Guidelines¹⁸ contain standards for groundwater model confidence-level classification, with indicators to assess the classification of a particular model. The model confidence-level classification provides a useful framework for assessing whether a model has the level of confidence appropriate to the use being made of it. A Class 1 model might be used for "estimating impacts of low-risk developments", whereas a Class 3 model is associated with "evaluation and management of potentially high-risk impacts" and "assessment of complex, large-scale solute transport

¹⁶ Barnett B et al. (2012), Chapter 9.

¹⁷ Pattle Delamore Partners Ltd (2002). Groundwater Model Audit Guidelines. Prepared for the Ministry for the Environment, October 2002.

¹⁸ Barnett B et al. (2012), Section 2.5.

processes"¹⁹. In my opinion, the level of assessment required to respond adequately to RFI 11 Question 2b and 2c sits closer to the latter description than the former.

55. **The deep model has a low (Class 1) confidence-level classification.** The data used for the model's highest confidence calibration target contains an error. The Guidelines identify "calibration illustrates unacceptable levels of error especially in key areas" as a Class 1 indicator²⁰, which the discrepancy (detailed below under Calibration) meets. Other relevant indicators include no conventional calibration statistic, such as scaled root-mean-square error or mass-balance closure being reported.
56. **The seepage model has a low (Class 1) confidence-level classification.** It is uncalibrated²¹, with the Report stating there was minimal data to support calibration²².
57. **The modelling used to generate the relevant predictions does not meet the confidence classification required for the project.** The deep and seepage models are directly coupled, and the headline seepage-loss figures are produced by the coupled system. Since both components have a Class 1 confidence-level classification, for the reasons set out above, and a coupled system cannot be more reliable than its least reliable component, the coupled model is also Class 1.
58. The reasons for this classification, and the other matters bearing on whether the modelling can be relied on, are set out below.

Conceptualisation

59. **There is a lack of a conceptual model.** The conceptual description of the system continues to be lacking, especially of surface water/groundwater interactions. A conceptual diagram of the seepage model was presented, but this is not a conceptual model of the surrounding groundwater system, shallow or deep. The Report's "Deep Groundwater Conceptualisation" section describes the model's numerical layer structure, but does not set out expected flow directions, recharge and discharge relationships, or how the geology is understood to control groundwater movement, in the way a conceptual model normally would. A conceptual model that considers the existing and new data collected in response to RFI11 Q2a should have been presented, and details of how the model setup relates to it described, as is standard practice for a modelling project²³. Information related to groundwater flow direction from vibrating wire piezometers and nested wells, for example, could be used here to draw and justify what is expected in terms of groundwater flow direction in different geological units and

¹⁹ Barnett B et al. (2012), Table 2-1.

²⁰ Barnett B et al. (2012), Table 2-1

²¹ Barnett B et al. (2012), Table 2-1

²² Report, section 4.3, p.7; section 5, p.9.

²³ Barnett B et al. (2012), Table 9-2, review checklist items 2.8 (clear description and graphical representation of the conceptual model) and 2.4.4 (watertable maps/piezometric surfaces).

locations. This step would provide confidence in the ability of the model to broadly replicate groundwater processes and flow patterns under present day conditions.

Data

60. **Most of the data collected as part of the RFI11 Q2a response has not been used.** New site investigation data was collected in the Shepherds Creek valley as part of that response, but only data from two of the vibrating wire piezometers, GW04 and GW05, was used as calibration targets (although with errors, as detailed below). A model intended to satisfy RFI 11's requirement for additional baseline data collection and modelling should incorporate the baseline data collected for that purpose.
61. **The new hydraulic conductivity estimates from the Question 2a investigation are also not used.** These new site-specific values would have been particularly useful for the alluvium and colluvium unit, for which no site-specific estimates previously existed. The modelling instead uses a generic textbook range from Freeze and Cherry (1979) for this unit, and its schist conductivity parameters draw only on the earlier seepage assessment²⁴ without incorporating the new measurements. The geometric mean of the new weathered bedrock results is about 20 times the previous geometric mean, and one of the three new fresh bedrock results, from GW02C, is about 6 times the previous maximum. These new estimates should have been incorporated in the modelling, particularly because the low hydraulic conductivity of the schist bedrock is a premise on which several of the Report's conclusions depend.
62. **The Report's basis for dismissing high weathered schist conductivity as an artefact no longer holds.** The Report states that no field data from Shepherds Creek show weathered schist conductivity as high as 10^{-4} m/s and suggests model parameter values reaching that range are compensating for structural errors rather than reflecting real aquifer properties²⁵. The new GW03B result, 3×10^{-4} m/s, is field evidence from Shepherds Creek at this magnitude.

Model setup

63. **The Report has not demonstrated that its shallow/deep partitioning is robust to reasonable alternative structural assumptions.** This matters because the Report's collection and monitoring systems are designed around the premise that seepage stays shallow and moves toward the valley floor, where it can be captured. Seepage that instead moves to depth would escape both systems entirely, since neither is designed to

²⁴ Bendigo-Ophir Gold Project: Mine Waste Storage Facility Seepage Assessment, Document J-H-NZ0243-001-R-Rev0, dated 17 April 2026 (Response to RFI 2). Prepared by Hydro Geochem Group for Matakanaui Gold Ltd.

²⁵ Report, Appendix F.3.2, p.178.

detect flow in that direction. Several structural choices in the deep model plausibly affect this partitioning and should have been tested against reasonable alternatives.

- **Vertical anisotropy may not suit a fractured system.** Vertical hydraulic conductivity is set so it can never exceed horizontal conductivity in any layer, including the Thomson Gorge Fault zone²⁶. This is usually justified in layered sedimentary systems but requires more justification in fractured rock. Vertical gradients calculated from the vibrating wire piezometer data exceed 1 m of head change per m of depth at several locations (MDD394, MDD362, MDD493), reaching over 4 m per m at MDD491. Steep gradients like this are consistent with low vertical conductivity, but also mean any discrete pathway that does exist would carry substantial flux, a combination the model's treatment of vertical conductivity may not adequately represent.
- **Unit thickness is held uniform despite evidence that it matters.** Both models represent the alluvium and weathered schist as a uniform thickness²⁷. The Report identifies this assumption as contributing to head discrepancies, but thickness was not varied in generating the seepage-loss percentiles.
- **The confined solution overestimates shallow-system flow.** The model uses a fully confined solution, so the full cell thickness is always used to calculate transmissivity. The Report acknowledges this produces higher-than-realistic flow rates in valley-side QALCL and possibly weathered schist, but provides no analysis supporting its conclusion that this is "unlikely to significantly affect the results."²⁸ These are the same units the Report defines as the shallow groundwater system.
- **The drain representation structurally favours the shallow system.** Surface water is represented using a drain boundary condition applied to every active cell in the top layer. A drain only discharges, never recharges, so an exit to the shallow system is structurally available everywhere, unlike the deep system's more limited pathways out. A drain also cannot represent a losing reach; the Report excluded RS01 from calibration for this reason, since lower flows there may reflect water lost to the alluvial fill of Rise and Shine Creek²⁹. The Report attributes the model's overprediction of streamflow at SC01, by more than twice the observed value, to this drain representation³⁰.

²⁶ Report, Appendix A.4 parameter tables; Appendix C.4, p.120.

²⁷ Report, Appendix C.2, p.111; Appendix A.2, p.26.

²⁸ Report, Appendix D.3, p.138.

²⁹ Report, Appendix A.5, p.4.

³⁰ Report, Figure B.7.

- **Calibration excludes the observations most likely to reveal fast pathways.** Nearly all dry and artesian observations were left out of the deep model's calibration³¹. Artesian observations may indicate a strong vertical pressure differential, a signal a model assuming low vertical connectivity would struggle to reproduce, and one consistent with a fracture or fault pathway.
- **The offshore boundary may relocate, rather than remove, shallow flow.** The top two layers of the OFFSHORE area are inactive, so the boundary can act only as a sink.³² This prevents shallow flow from leaving through those layers and may redirect it elsewhere in the model, potentially contributing to the model's overprediction of flow at SC01.

Calibration

64. **There is a significant error in data used to calibrate the deep model.** The model uses two vibrating wire piezometer strings, GW04 and GW05, as calibration targets³³. However, the hydraulic head values used in the calibration differ substantially from the raw data reported in the RFI 11 Q2a hydrological investigation³⁴.
65. The discrepancy is particularly significant because the two datasets indicate opposite vertical hydraulic gradients. The measured data show hydraulic head decreasing with depth, indicating downward groundwater flow, whereas the calibration data show hydraulic head increasing with depth³⁵, indicating upward flow. In other words, the model has been calibrated to an upward flow gradient when the field measurements indicate a downward flow gradient.
66. The difference between the two datasets is substantial, ranging from approximately 20 to 134 m across the five sensors shown in Table 1. A discrepancy of this magnitude is not readily explained by a simple transcription error, such as the one identified by the Report for a sixth GW04 sensor, S20393, excluded from Table 1 for this reason³⁶. It therefore warrants further investigation, particularly because the Report describes the vibrating wire records as providing "a high confidence observation of the mean groundwater levels and mean groundwater head gradients" and treats them as its highest-confidence calibration target³⁷.

³¹ Report, Appendix A.5, pp.43-44.

³² Report, p. 26.

³³ Report, Figure A.20.

³⁴ RFI 11 Question 2a Water Hydrological Report, Tables 3, 6.

³⁵ Report, Figure A.20.

³⁶ Report, Appendix A.5.

³⁷ Report, Appendix A.5.

Table 1. Measured and calibration hydraulic head values for GW04 and GW05 vibrating wire piezometer sensors

	Sensor ID	Measured data ³⁸		Calibration data ³⁹		Elevation error	Head error
		Elevation (m RL)	Head (m RL)	Elevation (m RL)	Head (m RL)		
GW04	S20457	497.1	504.7	495	575	-2.1	70.3
	S20458	478.1	489.9	475	595	-3.1	105.1
GW05	S20061	534.5	529.7	530	550	-4.5	20.3
	S2230879	500.4	496.2	480	580	-20.4	83.8
	S2628896	474.1	471.2	455	605	-19.1	133.8

67. GW04 and GW05 are also in an important location, situated in the same part of the Shepherds Creek valley as the Shepherds ELF and Shepherds Creek Valley Fill infrastructure described above.⁴⁰
68. I identified this discrepancy by checking the GW04 and GW05 records against the RFI 11 Question 2a response. I have not had time to check the remaining calibration dataset against its source data.
69. **The deep model overpredicts heads in the valley bottom, where the seepage model is located.** The deep model calibration uses a stochastic calibration approach and draws on a larger observation set than earlier groundwater modelling for this site. Although the Report describes the overall calibration fit as reasonable, it systematically overpredicts valley-bottom heads and underpredicts ridgeline heads.
70. **This bias likely understates seepage-loss.** The seepage model is vertically coupled to the deep model, with its base connected to the top of the deep model across the valley bottom.⁴¹ Overpredicted deep-model heads reduce the modelled head difference driving flow from the shallow to deep system, tending to suppress predicted seepage to depth and therefore to the deep model's drains, offshore boundary, RAS pit and underground workings.
71. **The model's fit to observed streamflow is very poor,** overpredicting flow at SC01 by more than twice the observed value⁴². Representation of surface water and groundwater interaction is a specific weakness in the model.

³⁸ RFI 11 Question 2a Water Hydrological Report, Tables 3, 6.

³⁹ Report, Figure A.20. Approximate values as read off figure.

⁴⁰ RFI 11 Question 2a Water Hydrological Report, Figure 1.

⁴¹ Report, section 4.3, p.8.

⁴² Report, p. 110, Figure B.7.

Results

72. The coupled model partitions seepage from each source, the TSF, SHELF, and SHFILL, into six categories. Two represent capture: the process drains and the SiltPond. Four represent seepage that has escaped capture: the shallow surface and weathered drains, the deep model's regional surface drains, the "offshore" boundary (a numerical simplification allowing seepage to exit the model domain), and the RAS pit and underground workings. "Lost seepage" is a defined term covering only three of these four escaped categories, excluding seepage reaching the RAS pit and underground workings, even though that seepage has equally escaped the collection system. These figures are calculated across a stochastic suite of model realisations rather than a single run.
73. **The reported percentile figures for lost seepage should be interpreted with caution.** The Report gives 95th percentile upper limits of less than 9% lost seepage for the SHELF and less than 10% for the SHFILL, and under 8% for the TSF⁴³. A 95th percentile would ordinarily imply a 5% chance of the value being exceeded. That meaning only holds if the sample used to calculate it reflects the real likelihood of each outcome, so that outcomes common in reality are common in the sample, and outcomes rare in reality are rare in the sample. The sample used here does not appear to meet that condition.
74. Four steps in how the underlying parameter sets were selected and the stochastic suite constructed each move it away from a likelihood-based representation. In plain terms, the sample was guided toward extremes, filtered for plausibility, filtered again, and reweighted toward spread rather than fit, each pulling further away from something a percentile can meaningfully describe. The mechanisms are set out in the Report and not included here for brevity⁴⁴.
75. **In the raw stochastic suite, before any filtering, lost seepage was around 30% for the TSF, 55% for the SHELF, and 72% for the SHFILL**⁴⁵. The reported headline results are 4 to 8% for the TSF, under 9% for the SHELF, and under 10% for the SHFILL. That is not a modest refinement, the headline figures are several times lower than the raw results⁴⁶.
76. The Report acknowledges this problem for the raw suite, describing its own figures as a "biased 95th percentile" and stating the percentiles "should be interpreted with caution"⁴⁷. That caveat is not carried forward. The filtered figures presented in the Key Outcomes are given without it.

⁴³ Report, Key Outcomes, p.iii.

⁴⁴ Report, Appendix E, pp.138–139; Appendix B.4, p.61.

⁴⁵ Report, Appendix F.1 (Figs F.2 – F.4), F.3.1–F.3.3.

⁴⁶ Report, Key Outcomes.

⁴⁷ Report, Appendix F.1, p.140.

77. **The reported seepage figures depend on drainage that is assumed to keep working.** The Report states that adequate underdrainage of the SHFILL is essential to manage lost seepage from all three sources, and that without it the model predicts high heads and potential upward seepage⁴⁸. The Report acknowledges that drains "may suffer damage and/or blockage during their operational life," and drain conductance was sampled across a wide range, down to values approaching zero⁴⁹. However, the headline figures are a single blended number across all realisations, so the Panel cannot see what seepage loss would be if drainage degraded, despite the Report describing adequate drainage as essential. In my opinion, lost seepage should be reported separately for functioning and degraded drainage, so degradation can be assessed as its own scenario rather than absorbed into an average
78. **The potential for loss of hydrodynamic containment was not adequately tested.** A central assumption of the water management approach is that groundwater beneath the Shepherds Creek catchment, where much of the mine waste storage is occurring, flows toward Shepherds Creek, where it can be monitored and intercepted. Whether this remains true under mining and post-mining conditions has not been demonstrated. I raised this concern in my Evidence⁵⁰ and it was also agreed by all experts in groundwater conferencing that further modelling was needed to confirm seepage containment⁵¹. While the risk has been classified as "unlikely"⁵² by the applicant, that was a qualitative assessment relying on the schist bedrock having low hydraulic conductivity and modelling is needed to answer this question.
79. The Report does not adequately use the model to test whether containment is maintained. Every head figure in the Report is drawn from the pre-mining model. The dewatering scenario appears only once elsewhere, in a sensitivity chart showing it has a small effect on total predicted seepage⁵³. However, it also shows that dewatering increases the sensitivity of seepage reaching the RAS pit and underground workings, and the offshore boundary, for all three sources, and of SHFILL seepage reaching the deep model's surface drains specifically, both pathways further from Shepherds Creek than the shallow drainage system. This does not show containment is lost, but it does show seepage shifting away from Shepherds Creek as dewatering increases.

⁴⁸ Report, Key Outcomes, p.iii.

⁴⁹ Report, Appendix C.3, p.113.

⁵⁰ L Morgan EIC, 10 April 2026, paragraphs 94 to 107.

⁵¹ Bendigo-Ophir Gold Project Groundwater Joint Witness Statement, dated 14 and 15 May 2026, paragraph 28 (AB, DA, LM, RB and JR agreeing).

⁵² Matakaniui Gold Limited Response to RFI 4 Geology, Geotech and Engineering, dated 3 June 2026.

⁵³ Report, section 8.3, Figure 8.5, p.21.

Scope

80. RFI 11 sought to understand contaminant movement and the ultimate effects on the wider receiving environment. The model's domain covers the pathway to the Ardour Aquifer, the Shepherds Creek Valley. Nothing comparable exists for the Bendigo Aquifer. Lower Bendigo Creek and the Bendigo Creek alluvium, its pathway, and the Western and SREX Engineered Landforms, the nearest contaminant seepage sources to it, all sit outside the model domain.

Conclusion

81. Taken together, these findings bear on the questions central to RFI 11. The model's low confidence classification, the calibration error at its highest confidence target, the construction of the stochastic suite, and the reporting of a single blended figure that obscures what seepage loss would be if drainage degraded, mean the reported magnitude of lost seepage cannot be relied upon as a conservative upper bound. The absence of a conceptual model, the unused Q2a data, and the untested structural assumptions mean the pathway that seepage would follow, and whether it can be monitored and intercepted, has not been reliably established. In addition, the model's domain excludes the Bendigo Aquifer's contaminant sources entirely, a further gap in the assessment RFI 11 sought.
82. The modelling has not demonstrated with sufficient confidence (a) a conservative upper bound on the magnitude of contaminated seepage, (b) the pathways that such seepage may follow, or (c) whether seepage would be reliably detected and managed.

RFI 11 Question 3, 4

Please note that in this section 'the Report' refers to the document: RFI 11 Question 3a, b, c, Operational Phase Site Wide Water and Load Balance Model Document Number J-NZ0488-015-R-Rev0. Dated 17 August 2026. Prepared by Mine Waste Management Limited for Matakanui Gold Ltd.

RFI 11 Q3, 4 requested:

Please provide a contaminant load water balance model taking into account the above findings and the full array of potential climatic outcomes for the following phases:

- a. operation;*
- b. active water treatment closure period; and*
- c. passive water treatment closure.*

We expect all models to be appropriately calibrated against existing conditions with consideration of:

- A range of potential geological scenarios that may realistically be foreseen; and*
- Variable environmental conditions which demonstrate the range of effects possible.*

Summary

83. The Report presents a new Operational Phase Water and Load Balance Model, updating the assessment with a GoldSim model that incorporates climatic variability more explicitly than the previous screening calculations. The Closure/Post-closure Phase remains unchanged, so Questions 3(b) and 3(c) are not addressed by this update.
84. Several of the values and assumptions adopted in the updated model do not reconcile with other modelling results relied on elsewhere in the application and are not conservative. The groundwater dewatering inflows have been reduced relative to those used in the previous Operational phase model, moving further from the recommended safety buffer rather than closer to it. The new lost seepage assumption is an improvement on the previous model's assumption of complete capture, but the adopted 5% value is below the upper-limit seepage losses produced by the groundwater modelling submitted for RFI Q2b,c. Net percolation for rehabilitated landforms sits below the applicant's own assessed range. The groundwater quality values used are from a well chosen for having

the most samples, rather than the well showing higher concentrations for several parameters.

85. The Operational phase water balance has reversed from deficit to surplus, a significant change from the previous assessment, without the Report identifying what has caused the change. The updated model has also identified exceedances the previous assessment did not, projecting nitrogen exceeding compliance limits at SC01 in 2038 and antimony in 2037.
86. The unchanged Closure and Post-closure phase models continue to assume 100% capture of seepage, despite the groundwater modelling acknowledging that drainage may be damaged or blocked during the operational life of the mine and despite closure seepage being substantially more concentrated for several contaminants. The long-term effects therefore remain dependent on an assumption of complete seepage capture that has not been demonstrated.
87. In my opinion, the Report does not adequately and completely respond to Question 3. Two of the three requested phases remain unanswered, and the operational phase update relies on several inputs that are not conservative. It has found new exceedances at SC01, so more conservative inputs would likely show greater adverse effects.

Assessment

88. The Report describes an Operational Phase Site Wide Water and Load Balance Model (WLBM), developed using GoldSim software and run at a daily timestep. It replaces the operational-phase component of the previous water balance assessment, which used spreadsheet-based screening calculations focussed on average annual conditions, with a model that simulates 200 realisations drawn from a synthetic climate record. Flows from each source, pit voids, engineered landforms, the tailings storage facility (TSF), haul roads, and the process plant, are assigned water quality source terms to generate coupled load and concentration projections at two compliance points, SC01 and RS03.
89. The Report states that this update covers the Operational Phase only, and that "the previous Closure/Post-closure Phase remains unchanged." Questions 3(b) and 3(c), covering the active and passive water treatment closure periods, are therefore not addressed by new modelling in this round of responses.
90. **The site's water balance has flipped from deficit to surplus.** The previous WLBM⁵⁴ found the site would run in water deficit up to Year 8 and surplus thereafter. The latest WLBM detailed in the Report has instead found that the site "will be in a water surplus

⁵⁴ B.06C Mine Waste Management Limited Mine Impacted Water Overview Report - Appendix N Water and Load Balance Model Report Document No. J-NZ0233-016-R-Rev1. Date 10 October 2025.

condition", with evaporation cannons required from Year 7 to manage it.⁵⁵ It is not clear from the Report what has caused this shift from deficit to surplus between the two versions of the model.

91. **Groundwater inflows recommended safety buffer has not been applied.** Groundwater modelling to estimate flows to pits associated with dewatering acknowledged uncertainty in the predictions and recommended a 2x safety factor be applied in the WLBM⁵⁶. This was not applied in the previous version of the WLBM⁵⁷ and again has not been applied here.
92. Not only was the recommended safety buffer not applied, groundwater inflow has reduced in the latest model version. For the RAS pit the reduction is from 5 L/s to 1.2 – 2.3 L/s. For the SRX pit the reduction is from 23 L/s to 2.3 L/s. The value for the CIT pit is unchanged. The Report does not explain why these reductions have been made.
93. **The new operational WLBM accounts for unrecovered seepage but the value used is below that estimated in the groundwater modelling.** The Report assumes a flat 5% seepage loss across all engineered landforms. The previous operational WLBM assumed zero seepage loss. However, the adopted value of 5% sits below the upper limits established in the groundwater modelling of less than 8% for the TSF, less than 9% for the SHELF, and less than 10% for the SHFILL.⁵⁸ A conservative approach would adopt these upper-limit figures for each facility rather than a single lower value applied uniformly across all three. The Report does not explain why 5% was selected and does not reference the groundwater modelling in adopting it.
94. **The closure and post-closure WLBM, which have not been updated, continue to assume zero uncaptured seepage.** The Water and Load Balance Model for the Closure and Post-Closure phase states that "seepage collection systems are assumed to collect and recover 100% of load associated with mine waste storage facilities."⁵⁹ This remains the assumption for the closure and post-closure phases, since the Report confirms "the previous Closure/Post-closure Phase remains unchanged."⁶⁰
95. The rehabilitated ELF net percolation figure, 20%, is unchanged from the previous WLBM and has not been revisited in this update. The Otago Regional Council's own technical

⁵⁵ Report, Executive Summary.

⁵⁶ B.05 Groundwater Modelling Analysis for Mining Bendigo-Ophir Gold Deposit, Komanawa Solutions Ltd, 2025.

⁵⁷ Bendigo-Ophir Gold Project Reconvened Geochemistry, Water Quality, Water Management, Freshwater Ecology Joint Witness Statement, dated 10 June 2026, paragraph 38.

⁵⁸ RFI 11 Question 2b, c Updated Groundwater Modelling for Bendigo Ophir Gold Deposit. Report: Z20111.m3 prepared by Komanawa Solutions Ltd for Matakaniui Gold Ltd. Key Outcomes.

⁵⁹ Water and Load Balance Model Report, J-NZ0233-016-R-Rev1, dated 10 October 2025, Appendix N to Mine Waste Management, Mine Impacted Water Overview Report, Section 5.4.3.1.

⁶⁰ Report, p.1.

reviewer raised this as a significant concern, noting that 20% "is at the lower end of the values predicted in the net percolation report," which itself gives a range of 30 to 50% for final landforms, and that this input "has the largest effect on contaminant mobilisation"⁶¹. This input, too, remains non-conservative and unaddressed by the new modelling.

96. The seepage is also more contaminated at closure than during operations. For the TSF, modelled sulfate rises from 495 mg/L to 1,269 mg/L, antimony from 0.099 to 0.734 mg/L, and ammoniacal nitrogen from 2.32 to 25.6 mg/L.⁶² So the closure model assumes complete capture of water that is several times more contaminated than the water the other two models predict will partly escape.
97. The groundwater modelling separately acknowledges that underdrains may suffer damage or blockage during their operational life.⁶³ In my opinion, an assumption of 100% seepage capture in perpetuity has not been demonstrated and is likely to mean that adverse impacts over the long term are not being adequately described.
98. **The chosen groundwater source term for pit dewatering inflows is not the most conservative of the wells sampled.** MDD015 was selected as the pit inflow source term on the basis that it has the greatest number of samples ($n=18$) of the three groundwater datasets reported.⁶⁴ However, MDD015 shows materially lower concentrations for some parameters than MDD302 ($n=12$), including arsenic (roughly half) and uranium (roughly a fifth). The Report does not explain why sample count, rather than a comparison of which well yields a more protective source term, was the basis for selection.
99. The Report projects nitrogen exceeding the SC01 compliance threshold from 2038 (Year 11) and antimony from 2037 (Year 10), describing these as "critical deviations." By contrast, the previous Operational Phase WLBW found that surface water quality at SC01 and RS03 would remain below compliance limits throughout⁶⁵.
100. **In my opinion, the Report does not adequately respond to Question 3.** Two of the three requested phases remain unanswered, and where the operational phase has been updated, several of the changes reduce rather than increase the model's conservatism

⁶¹ Bendigo-Ophir Gold Project Geochemistry, Water Quality, Water Management, Freshwater Ecology Joint Witness Statement, dated 8 and 9 June 2026, Item O; Badenhop, A. (2026). *Technical Review, Fast-Track Bendigo Ophir Mine*. e3 Scientific, prepared for Shay McDonald, Otago Regional Council. Ref: 25080A3.0, dated 20 March 2026.

⁶² Operational Phase Site Wide Water and Load Balance Model, J-NZ0488-015-R-Rev0, Table 14, p.28.

⁶³ RFI 11 Question 2b and 2c, Updated Groundwater Modelling for Bendigo Ophir Gold Deposit, Appendix C.3, p.113.

⁶⁴ B.06C Mine Waste Management Limited Mine Impacted Water Overview Report - Appendix I Source Term Definition Report, J-NZ0475-001-R-Rev2. Date 5 August 2025. Section 4.2.1.

⁶⁵ B.06C Mine Waste Management Limited Mine Impacted Water Overview Report - Appendix N Water and Load Balance Model Report Document No. J-NZ0233-016-R-Rev1. Date 10 October 2025. Section 4.5.

against other modelling relied on elsewhere in the application. Since the updated model has already identified exceedances, correcting these inputs would likely show a greater potential for adverse effects at SC01.

RFI 11 Question 5

Please note that in this section 'the Q5 letter' refers to the document: Response to RFI 11 Question 5 –Document number J-H-NZ0238-006-L-Rev0. Dated 17 August 2026. prepared jointly by Hydro Geochem Group Limited, Boffa Miskell Limited, Kōmanawa Solutions Limited, and Geocontam Risk Management for Matakanui Gold Limited.

RFI 11 requested:

The above information is to be reflected in updated expert assessments of the potential adverse impacts on the Ardgour and Bendigo aquifers and the associated surface water environments.

Summary

101. RFI 11 Question 5 requested an updated expert assessment of potential adverse impacts of the BOGP on the Ardgour and Bendigo Aquifers, based on the findings of RFI 11 Questions 1 to 4. The Q5 letter concludes that "the BOGP project presents a low risk to these water resources."⁶⁶ I do not agree with this conclusion. It is built on the Reports addressed in my evidence above on RFI 11 Questions 2a, 2b, c and 3, and I have concluded in that evidence that none of those Reports adequately answers the question it was responding to and does not provide a reliable basis for assessing adverse impacts. The reasons for my disagreement with specific claims in the Q5 letter are set out below.

Assessment

102. The Q5 letter's claim that the modelling's identification of the shallow groundwater and surface water system in Shepherds Creek as the dominant seepage risk pathway "is consistent with recent hydrogeological investigations"⁶⁷ is not fully supported. As set out in my evidence on RFI 11 Question 2a above, hydraulic conductivity measured in the weathered and fresh bedrock was considerably higher than previous estimates, and hydraulic head gradients differ from location to location in ways the assumed topographic flow regime does not clearly explain. Together, these findings undermine, rather than support, the low bedrock permeability premise the shallow seepage pathway conclusions depend on. Limited sampling of groundwater levels and quality also mean that a baseline dataset is still not available at the site or in the Ardgour Aquifer receiving environment.

103. Most of the new data collected in response to RFI 11 Question 2a was not incorporated into the modelling responding to RFI 11 Question 2b, c. As set out in my evidence there, near the Shepherds ELF and Shepherds Creek Valley Fill, the model has been calibrated to upward groundwater flow when the measured data shows the opposite, downward flow. This is one of the reasons the coupled model, applying the criteria in the Australian

⁶⁶ Q5 letter, Summary.

⁶⁷ Q5 letter, Item 2 assessment section.

Groundwater Modelling Guidelines, has a low (Class 1) confidence classification, against the higher Class 3 standard appropriate to a decision of this scale.

104. The Q5 letter's claim that the RAS Pit and underground workings act as "a net sink of water" and "will not be a potential source of seepage" is not well supported⁶⁸. The groundwater modelling acknowledges that once the pit and workings flood post-closure, they "could potentially become a source of mining impacted groundwater," and its basis for treating it as a sink instead comes from a preliminary screening exercise⁶⁹. Given the issues I have identified with that model, I am not convinced it can reliably verify the RAS pit and underground workings are a sink post-closure.

105. The Q5 letter's claim of "substantial confidence"⁷⁰ in seepage detection, and its associated seepage recovery percentages, also relies on modelling carried out in response to RFI 11 Question 2b, c. As set out in my evidence there, the modelling has not demonstrated, to the level of confidence I consider is required, that lost contaminated seepage will be small, will remain within the assumed containment pathway, or will be reliably detected if it escapes that pathway.

106. The Q5 letter proposes several design and monitoring measures to manage seepage risk. As set out in my evidence on RFI 11 Question 2b, c above, the modelling does not report what seepage loss would be if drainage degraded, and the monitoring network is not designed to detect seepage moving away from the Shepherds Creek valley floor, something that has not been shown with confidence will not occur. The Q5 letter's proposed measures do not address either gap.

107. The Q5 letter's conclusion of "negligible impact"⁷¹ on groundwater quality relies on the Water and Load Balance Model addressed in my evidence on RFI 11 Question 3 above. As set out there, the Operational phase water balance has reversed from deficit to surplus, a significant change from the previous assessment. The updated model has also identified exceedances the previous assessment did not, projecting nitrogen exceeding compliance limits at SC01 in 2038 and antimony in 2037. Several of the values and assumptions the model adopts do not reconcile with other modelling relied on elsewhere in the application and are not conservative, including in relation to dewatering, net percolation, and the groundwater quality source term. The Closure and Post-closure phase models, which were not updated, continue to assume 100% capture of seepage, despite the groundwater modelling acknowledging that drainage may be damaged or blocked during the operational life of the mine, and despite closure seepage being substantially more

⁶⁸ Q5 letter, Item 2 assessment section.

⁶⁹ Dumont et al., (2026). *Updated Groundwater Modelling for Bendigo Ophir Gold Deposit*. Report: Z20111.m3 prepared by Komanawa Solutions Ltd for Matakanaui Gold Ltd. Dated 14 August 2026, section 4.1.

⁷⁰ Q5 letter, Item 2 assessment section.

⁷¹ Q5 letter, Item 3 assessment section.

concentrated for several contaminants. These matters do not provide a sufficiently conservative basis for the Q5 letter's conclusion.

108. For these reasons, I do not agree with the Q5 letter's conclusion that the BOGP project presents a low risk to the Ardgour and Bendigo Aquifers. It is my opinion that there is an intergenerational risk of contaminated seepage from the BOGP reaching the Ardgour and Bendigo Aquifers, and that the assessment of this risk continues to have serious limitations, as set out in my evidence above.

RFI 11 Question 6

Please note that in this section 'the Report' refers to the document: Rekker, J. (2026). Report on Compliant Aquifer Test at BOGP Water Supply Bore Field. (Z24002BOG-4). Prepared for Matakanui Gold Ltd by Kōmanawa Solutions Ltd, Christchurch. Dated 17 August 2026.

RFI 11 requested:

In order to understand the potential effects on other users of the aquifers, please provide the results of a compliant bore pump test for the Bendigo aquifer.

Summary

109. Work detailed in the Report improves the technical quality of the aquifer test used to characterise the Bendigo Aquifer. A six-day constant rate test was undertaken at a mean rate of 97.1 L/s, short of the then-proposed 110 L/s abstraction rate, which the Otago Regional Council guideline requires the test to meet or exceed. However, the 28 August 2026 conditions have since reduced the proposed take to 97 L/s, so I have no outstanding concerns on this point.

110. The revised aquifer parameters indicate greater drawdown effects on neighbouring bores than previously assumed, both near the bore field and further afield. The Report also shows that the schist and till boundary is close enough to be intercepted, with an amplifying effect on drawdown near the margin.

111. RFI 11 Question 6 asked for a compliant pump test to understand the potential effects on other users of the aquifer. In my opinion, understanding those effects properly requires a cumulative drawdown assessment incorporating other consented takes on the Bendigo Aquifer, and this has still not been carried out. Without it, the Panel is unable to determine the potential effects of the proposed pumping on neighbouring water users.

Assessment

112. The Report describes a six-day constant rate aquifer test undertaken from 24 to 30 July 2026. It replaces the application's previous non-compliant aquifer test, which ran for 48 hours at 20.7 L/s⁷² with a longer test at a mean rate of 97.1 L/s. To achieve this rate, MGL combined the existing 400 mm test production bore (PB-1, up to 80 L/s) with a nearby 150 mm bore (PB-2, up to 18.7 L/s), the latter previously used as an observation bore (Obs-1) and repurposed as a second pumping source for this test. Water levels were

⁷² B.02 Rekker, J. H. (2025). Bendigo – Ophir Gold Mine Project – Bendigo Groundwater Take Effects Assessment. Kōmanawa Solutions Report No. Z24019SML-3. Prepared for Matakanui gold Limited.

monitored at two further observation bores (Obs-2 and Obs-3) plus the Otago Regional Council's regional monitoring bore, CB13/0159.

113. The improved test comes at the cost of reducing the number of usable observation points. Converting the nearest observation bore into a second pumping bore left only two observation bores for this test, rather than three. Of those two, only Obs-2 was used in deriving the aquifer parameters relied on in the Report's conclusions. The Report states that Obs-3 was excluded because its record was affected by suspected Bendigo Creek interflow, producing an irregular signal unsuitable for curve fitting⁷³. As a result, despite formally satisfying the ORC guideline's requirement for two observation bores, the substantive parameter derivation in this Report rests on a single observation bore's data, which is a limitation.
114. The test still fell short of the then-proposed abstraction rate. MGL sought and was granted a temporary consent permitting testing at up to 110 L/s. The test as conducted averaged 97.1 L/s over six days, beyond the ORC guideline's 72-hour minimum⁷⁴, with levels reported to have largely stabilised by the end of the test. The Report attributes the rate shortfall to the physical capacity of the available bores, noting that a brief trial at 102 L/s risked the pump drawing air. The test therefore characterises the aquifer's response at a rate below the proposed 110 L/s take, which the ORC guideline requires the test to meet or exceed. However, the 28 August 2026 conditions have since reduced the proposed take to 97 L/s.
115. The prior non-compliant aquifer test produced aquifer property values of $T = 4,500 \text{ m}^2/\text{day}$ and $Sy = 0.25$.⁷⁵ These were used in the drawdown assessment relied on elsewhere in the application⁷⁶.
116. This Report proposes revised values of aquifer parameters, $T = 4,100 \text{ m}^2/\text{day}$ and $Sy = 0.15$.⁷⁷ The Report states that the lower transmissivity and specific yield would be expected to increase the calculated drawdown near the bore field, and I agree with this. However, the Report also suggests this may reduce the overall radial extent of measurable drawdown.⁷⁸ As detailed under my evidence relating to Condition 9 below, I do not agree with this; the updated parameters in fact lead to an increased radius of influence relative to that calculated previously.

⁷³ Report, Section 4.2.1.

⁷⁴ Otago Regional Council, Aquifer Test Requirements guideline (undated web guidance, available via orc.govt.nz)

⁷⁵ B.02 Rekker, J. H. (2025). Bendigo – Ophir Gold Mine Project – Bendigo Groundwater Take Effects Assessment. Kōmanawa Solutions Report No. Z24019SML-3. Prepared for Matakānui Gold Limited.

⁷⁶ B.02 Rekker, J. H. (2025). Bendigo – Ophir Gold Mine Project – Bendigo Groundwater Take Effects Assessment. Kōmanawa Solutions Report No. Z24019SML-3. Prepared for Matakānui Gold Limited.

⁷⁷ Report, p. 34.

⁷⁸ Report, p. 34.

117. The radius of influence estimated from this test extends to the edge of the aquifer. The Report estimates a radius of influence of approximately 1,060 m at the tested rate, which it states reaches the till and schist rock margins of the Bendigo Aquifer. The interception of this boundary has an amplifying effect on drawdown near the aquifer margin. This figure is derived using a steady-state extrapolation of the six-day test, a different method to the one Otago Regional Council's own Schedule 5B prescribes for identifying potentially affected bores⁷⁹, which I address further in relation to Condition 9 below.
118. The existing drawdown assessment is based on the previous test parameters and considers the proposed MGL take alone⁸⁰. It calculated drawdown at each neighbouring bore using the Theis method with $T = 4,500 \text{ m}^2/\text{day}$ and $S_y = 0.25$, and compared the result against each bore's available freeboard. For the reasons set out above, those parameters and that assessment do not provide a reliable basis for assessing the drawdown effects of the proposed take.
119. More importantly, the existing assessment is not a cumulative drawdown assessment. It calculates the effect of the MGL take alone and does not add drawdown from other consented takes on the Bendigo Aquifer. It therefore does not answer the question of whether the proposed pumping, together with existing groundwater abstraction, could adversely affect neighbouring water users.
120. **A cumulative assessment incorporating other consented takes on the Bendigo Aquifer has not been carried out and is required.** I raised this gap in my EiC, noting that the drawdown assessment did not account for cumulative effects from other consented takes on the Bendigo Aquifer, which is standard practice when assessing drawdown impacts on neighbouring bores.⁸¹ The Groundwater Joint Witness Statement records the same gap, where experts "note that an ORC compliant pump test was not carried out and cumulative drawdown assessment was not carried out. Therefore, effects on neighbours are currently uncertain."⁸² This Report does not address that gap. Its conclusions and recommendations are confined to deriving aquifer parameters and proposing a further commissioning test. No cumulative drawdown assessment is presented.

⁷⁹ Regional Plan: Water for Otago, Otago Regional Council, updated to 2 April 2026, Schedule 5B, "Schedule of method for identifying groundwater takes potentially affected by bore interference," p.20-73.

⁸⁰ B.02 Rekker, J. H. (2025). Bendigo – Ophir Gold Mine Project – Bendigo Groundwater Take Effects Assessment. Kōmanawa Solutions Report No. Z24019SML-3. Prepared for Matakānui Gold Limited.

⁸¹ L Morgan EiC, 10 April 2026, paragraph 136.

⁸² Bendigo-Ophir Gold Project Groundwater Joint Witness Statement, 14–15 May 2026. Paragraph 85.

Updated Conditions

Summary

121. My key concern regarding the Bendigo Aquifer take is drawdown effects on neighbouring bores. The revised aquifer parameters point to a wider, not narrower, zone of drawdown, and no cumulative assessment has been done despite experts agreeing one is needed. The notification and remediation mechanism in Conditions 9 and 10 is problematic. The 1 km notification radius was not derived using ORC's own prescribed method, and the process is reactive rather than upfront, with real consequences for affected bore owners in the meantime.
122. The new Secondary Seepage Capture System is an improvement where it applies, but it is sited at only one of at least four seepage-generating facilities. More fundamentally, the pathway seepage will follow has not been reliably established by contaminant transport modelling, which limits confidence in any of these measures regardless of where they are sited.
123. The trigger for active water treatment is inadequate. It rests on an undefined "adaptive management" test that defers construction, and relies on GW02, a location with no adequate baseline, and a monitoring purpose (performance, not compliance or trigger) narrower than the role it has been given. No equivalent trigger exists for passive treatment.
124. Groundwater performance monitoring is now required to be set out in the WMP under the conditions, but the underlying monitoring network and details remain incomplete. Both proposed compliance monitoring locations may also be compromised, one by groundwater potentially moving upward from the basement and diluting mine-site contamination, the other by dilution from the Consent Holder's own pumping. In my opinion, the number of compliance monitoring sites is also likely inadequate, and additional locations are needed. No condition requires a groundwater quality baseline before mining begins.

Assessment

125. On 28 August 2026, Mitchell Daysh Ltd, on behalf of MGL, circulated an updated set of the resource consent conditions (D.01 to D.04), together with a post-workshop tracked changes version showing how they changed from the previous 22 June 2026 conditions.⁸³ I refer to the clean version below, and cite condition numbers accordingly.

⁸³ Mitchell Daysh Ltd, Memorandum to the BOGP Expert Panel, "BOGP Conditions," dated 28 August 2026.

126. The Water Management Plan ("WMP") is still the 22 June 2026 version.⁸⁴ Several conditions rely on it for technical detail, but where that's the case, I comment only on whether the condition itself is specific enough to secure the outcome, not on whether the WMP currently delivers it.

127. My comments on the conditions below are provided in the event that the Panel is minded to grant the approvals sought. They should not be taken as indicating that I consider the present information sufficient to determine the effects of the Project on groundwater, or that the further characterisation and modelling identified in this evidence can appropriately be deferred until after consent is granted.

Groundwater take from the Bendigo Aquifer

128. Condition 3 of the Bendigo Aquifer Water Take Permit (D.02) now sets the maximum instantaneous rate of take from the production bores at 97 L/s, reduced from 110 L/s, reflecting the rate used in the latest aquifer test. There is now no material difference between the tested rate and the proposed take, which resolves the earlier mismatch between test conditions and proposed abstraction. It does not, however, resolve the substantive concerns addressed below, which relate to the aquifer parameters derived from the test, not the rate itself.

129. My concern about drawdown effects on neighbouring bores remains, however, and has increased. The revised aquifer parameters associated with the compliant test, in particular the reduction in specific yield from 0.25 to 0.15, point to a larger water table drawdown and radius of influence. A cumulative drawdown assessment incorporating other consented takes has still not been undertaken despite experts agreeing during conferencing that this is needed to assess adverse impacts⁸⁵.

130. The term and lapse period of the take remain unchanged, at 35 years and 10 years respectively. As recorded in the Groundwater JWS, experts do not consider a 35-year term appropriate, since the specified need for the take should not exist for an extended period beyond mine operations.⁸⁶ Also, I understand that a consent greater than six years is not allowed under ORC rules for a new groundwater take. I would be concerned if this set a precedent for future groundwater takes to be assessed less protectively than ORC's own rules require.⁸⁷

⁸⁴ G.01 Water Management Plan, Rev 1, dated 22 June 2026.

⁸⁵ Bendigo-Ophir Gold Project Groundwater Joint Witness Statement, dated 14 and 15 May 2026, paragraph 85.

⁸⁶ Bendigo-Ophir Gold Project Groundwater Joint Witness Statement, dated 14 and 15 May 2026, paragraph 91.

⁸⁷ Bendigo-Ophir Gold Project Groundwater Joint Witness Statement, dated 14 and 15 May 2026, paragraph 90.

131. Conditions 9 and 10 of the Bendigo Aquifer Water Take Permit (D.02) introduce a new mechanism for affected bore owners. The Consent Holder must notify surrounding bore owners within 1 km of the Bendigo Aquifer bore. Where a registered bore owner reports they cannot access their full allocation, the Consent Holder must commission an independent hydrogeological assessment within 40 working days, and implement a remedial response if their take is found to be the cause. This establishes a defined process for affected bore owners where none previously existed. However, I consider this mechanism to be flawed.
132. Condition 9's 1 km notification radius is not explained in the condition, and was not derived using ORC's prescribed method for this purpose. Schedule 5B of the Regional Plan: Water sets out the method for identifying groundwater takes potentially affected by bore interference.⁸⁸ It uses the Theis equation, applied to an interference threshold of 0.2 m drawdown for unconfined aquifers such as the Bendigo Aquifer.
133. The applicant's previous groundwater take effects assessment applied this method, at the then-proposed rate of 110 L/s using a transmissivity of 4,500 m²/d and specific yield of 0.25, and calculated a radius of 2.34 km⁸⁹, more than double the buffer now in Condition 9.
134. Applying the same Schedule 5B methodology using the revised parameters from the new pump test, a transmissivity of 4,100 m²/d and specific yield of 0.15⁹⁰, and the now-proposed rate of 97 L/s, I calculate a radius of approximately 2.8 km at one year of continuous pumping. This calculation, like the applicant's own, does not include boundary condition effects, the till/schist barrier boundary identified in the Report, or the Clutha Mata-au and Bendigo Creek recharge boundaries, which the applicant's own evidence acknowledges were similarly excluded from the original assessment.⁹¹ Given the proximity of the barrier boundary, this figure is more likely to understate the radius of interference at this duration than overstate it.
135. Condition 9's radius should be set using the Schedule 5B methodology already applied by the applicant, over a duration that reasonably reflects the consent term, rather than the 1,060 m figure derived from the compliant test's short-term, unrelated steady-state extrapolation.

⁸⁸ Regional Plan: Water for Otago, Otago Regional Council, updated to 2 April 2026, Schedule 5B, "Schedule of method for identifying groundwater takes potentially affected by bore interference," p.20-73.

⁸⁹ B.02 Rekher, J. H. (2025). Bendigo – Ophir Gold Mine Project – Bendigo Groundwater Take Effects Assessment. Kōmanawa Solutions Report No. Z24019SML-3, section 5.3.1.2, Figure 20.

⁹⁰ RFI 11 Question 6, Water, Report No: Z24002BOG-4, Compliant Aquifer Test at BOGP Water Supply Bore Field, August 2026, Table 15.

⁹¹ Joint Expert Response to Minute 29 (Groundwater), paragraph 26.

136. In any case, this is a reactive process when what should occur is that a cumulative drawdown assessment is carried out prior to the consent being issued, as is standard practice.

137. Condition 10's protection for individual bore owners is a response mechanism rather than a substitute for that upfront cumulative assessment, and it will take considerable time to give effect to. A bore owner must first notice and report reduced access, before a 40-working-day independent assessment can begin, before any remedial response, whether lowering a pump, re-drilling a bore, or arranging an alternative supply, is investigated and implemented. In the meantime, the affected bore owner is without reliable water access, which could have serious consequences for productive agricultural operations dependent on that supply.

Seepage containment

138. Conditions 66 to 70 of D.04 require formation of the Shepherds Seepage Collection Sump and installation of a Secondary Seepage Capture System, comprising seepage interception wells, seepage interception drains, and cutoff walls or grout curtains, prior to the first discharge of tailings to the TSF. This is a specific, physical requirement, and where it applies, is an improvement.

139. However, the condition is located at a single point, the Shepherds Seepage Collection Sump, and that sump manages seepage from only two sources, the TSF and the Shepherds ELF.⁹²

140. As shown in Figure 2, the Shepherds Creek Valley Fill ("SHFILL") is a further facility sited downgradient of the Shepherds Seepage Collection Sump, between the Sump and the SC01 compliance point. Condition 70's secondary measures cannot intercept seepage generated by SHFILL, since that seepage enters the valley flow path downstream of the Sump. SHFILL was one of the three sources included in the groundwater model, and had the highest lost seepage results of the three, up to 10%.⁹³ The Report describes adequate SHFILL underdrainage as essential, while also acknowledging the drains may suffer damage or blockage over their operational life.⁹⁴ Figure 2 also shows a second, downstream contingency interception location near SC01, but I could not find it addressed in the current conditions. In my opinion, the conditions should identify how seepage from SHFILL that is not captured by its primary underdrainage will be intercepted and conveyed to treatment.

⁹² D.04 Schedule Two, General Conditions for ORC Consents, 28 August 2026 (Clean), Condition 66.

⁹³ Kōmanawa Solutions Ltd, Report No: Z20111.m3, Updated Groundwater Modelling for Bendigo Ophir Gold Deposit, dated 14 August 2026, prepared for Matakanaui Gold Ltd, Key Outcomes p.iii; Appendix F.1.

⁹⁴ Kōmanawa Solutions Ltd, Report No: Z20111.m3, Updated Groundwater Modelling for Bendigo Ophir Gold Deposit, dated 14 August 2026, prepared for Matakanaui Gold Ltd, Appendix C.3, p.113.

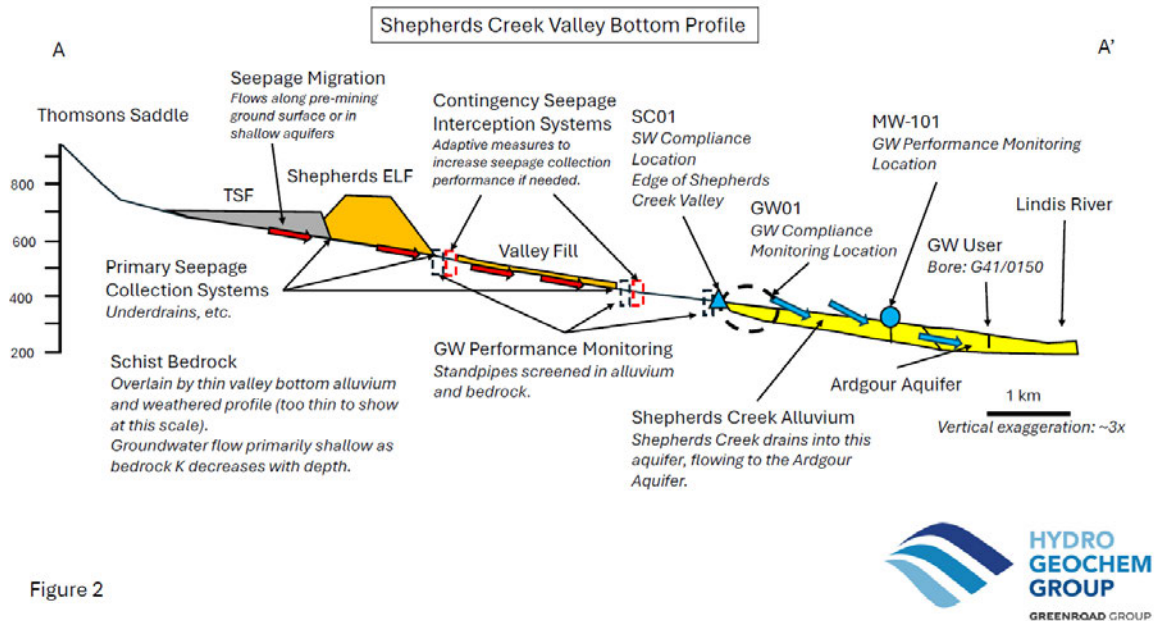


Figure 2

Figure 2 Shepherds Creek Valley Bottom Profile⁹⁵

141. Further, there are other mine waste storage facilities beyond the Shepherds Creek valley, the Western ELF, CIT Backfill and SRX ELF, which, like SHFILL, are not covered by a secondary seepage collection system.

142. More fundamentally, as set out in my evidence on RFI 11 Question 2b,c above, seepage contaminant pathways remain poorly understood. None of the measures addressed in this section can be assessed with confidence against the pathway seepage will follow, since that pathway itself has not been reliably established.

Water balance and treatment triggers

143. Condition 10 of the Discharge Permit (D.02) requires the Consent Holder to instigate construction of the Active Water Treatment Plant on the earliest of several triggers, including groundwater sulfate concentrations at GW02A, GW02B and GW02C exceeding 50% of the applicable compliance limit on three occasions in 12 months, provided the exceedance is attributable to the Project and “cannot be remedied through adaptive management processes”.

144. In my opinion, this trigger is not adequate. Neither what constitutes “adaptive management” for this purpose nor who determines whether adaptive management has failed is defined. The occurrence of three exceedances within 12 months does not, of itself, trigger construction; it is only one part of a two-part test, the second part of which is not objectively measurable. This creates the possibility that construction could be

⁹⁵ Memorandum to the Bendigo-Ophir Gold Project Expert Panel: Joint Response to Minute 29, dated 22 June 2026, Figure 2.

deferred on the basis that some form of adaptive management remains ongoing. The condition is further qualified by allowing the 12-month deadline for construction, once triggered, to be extended by agreement between the Consent Holder and Otago Regional Council.

145. I also have concerns about whether GW02 is a suitable location for a trigger of this kind. GW02 is located where the basement is dropping away toward the Lindis River, and groundwater flows at this location may not be representative of groundwater discharged from the mine site, which is what compliance monitoring at this location is intended to detect. Also, GW02 is downgradient of GW03, where upward groundwater flow from the basement schist (that intercepts Thomson Gorge Fault) may dilute contaminant concentrations. Further, Attachment 4 identifies GW02 only as a performance monitoring location. Condition 10 nonetheless relies on it for a function closer to a compliance role. In my opinion, further field work is needed to establish whether GW02 is a suitable location for a trigger of this kind.

146. I could not identify an equivalent trigger condition for commencement of the Passive Water Treatment System. Condition 14 of the Discharge Permit (D.02) requires water treatment studies for passive treatment to commence “at least 5 years before passive treatment is required”, but no condition defines when passive treatment is required. This is a gap that should be addressed, particularly given that passive treatment is intended to operate through the post-closure period, when the Consent Holder’s ability to respond adaptively will be more limited than during active mining.

Monitoring, baseline data, and the Water Management Plan

147. Condition 23 of D.04 requires the WMP to set out the groundwater performance monitoring the Consent Holder must implement, including monitoring purpose, location, frequency and parameters, reporting by a Suitably Qualified and Experienced Person, advice on trends, and identification of adaptive management responses triggered by monitoring data. This addresses several of the matters I considered should be included in consent conditions, as recorded in the Groundwater Joint Witness Statement. The condition does not specify timing of trigger responses, which experts have requested.⁹⁶

148. Condition 24 sets out the groundwater compliance monitoring locations. For the Ardour Aquifer, this has changed from MW-101 to GW01. This is likely because drilling at MW-101 found “considerably different hydrogeological conditions than anticipated,” with the

⁹⁶ Bendigo-Ophir Gold Project Groundwater Joint Witness Statement, dated 14 and 15 May 2026, paragraph 93; and paragraph 101 (AB and DA, in relation to the absence of triggers and clear timeframes for actions in the Water Management Plan).

applicant's own expert accepting it was therefore unclear whether MW-101 was an appropriate compliance monitoring location.⁹⁷

149. However, I am not certain that GW01 is a suitable compliance monitoring location for the same reasons as set out above for GW02.

150. Taken together, these findings mean that sampling at GW01 and GW02 may not reliably identify or quantify impacts from the mine site. The groundwater flow pathways and potential mixing identified above should therefore be resolved before the compliance monitoring locations are finalised. Additional compliance monitoring upgradient of GW03 may be required.

151. For the Bendigo Aquifer, monitoring remains at the Base Bore. I do not consider this suitable on its own, since it will be affected by the Consent Holder's own pumping, including dilution of contaminant concentrations if water from the Clutha Mata-au is drawn in toward the pumping well. A monitoring well closer to the Bendigo Aquifer alluvium is needed.

152. Taken together, only two compliance monitoring locations exist for the entire site, one for the Ardgour Aquifer and one for the Bendigo Aquifer, and I have concerns about the suitability of both. Also, in my opinion, more groundwater quality monitoring sites are needed across the receiving environment.

153. Condition 25 requires continuous monitoring of water level and electrical conductivity, a proxy for contaminants, at these monitoring wells as was recommended in the JWS.⁹⁸

154. Under Condition 26, the Consent Holder must, at a minimum, undertake groundwater performance monitoring at the locations set out in Attachment 4. This monitoring covers a range of purposes, including seepage bypass monitoring, contaminant pathway monitoring, drawdown and wetland monitoring, and monitoring for the influence of wastewater treatment discharges.

155. Groundwater quality monitoring generally needs to follow recognised sampling standards.⁹⁹ No condition requires adherence to such a standard.

156. I remain concerned that the seepage bypass network (8 locations) and contaminant pathway network (2 locations) are not sufficient to reliably detect contamination. These wells are usefully sited close to the source facilities. However, as set out in my evidence

⁹⁷ Bendigo-Ophir Gold Project Reconvened Geochemistry, Water Quality, Water Management, Freshwater Ecology Joint Witness Statement, dated 10 June 2026, paragraph 66.

⁹⁸ Bendigo-Ophir Gold Project Reconvened Geochemistry, Water Quality, Water Management, Freshwater Ecology Joint Witness Statement, dated 10 June 2026, paragraph 80. (AB and RB agreeing).

⁹⁹ National Environmental Monitoring Standards (2019). *Water Quality Part 1 – Sampling, Measuring, Processing and Archiving of Discrete Groundwater Quality Data*, Version 1.0.0, 31 March 2019.

on RFI 11 Question 2b,c above, the pathway seepage will follow has not been reliably established. Monitoring positioned on an assumed pathway will not detect seepage that departs from that assumed pathway, before it reaches the Ardgour or Bendigo Aquifers.

157. While a few of the performance monitoring wells were installed as part of the response to RFI 11 Question 2a, many have not yet been installed, and details are not available for the remainder, including depth. Nor is it yet specified what will be monitored at these locations or how frequently.

158. Under Condition 34, a summary of monitoring undertaken during the previous year, including compliance and performance monitoring, must be provided to ORC¹⁰⁰. It is good that performance monitoring data will be provided to ORC and that it can be made available to the public.

159. All of the matters addressed above assume that monitoring, wherever it is sited and however frequently it occurs, will be capable of showing whether the Project has caused a change. That assumption depends on an adequate baseline existing to compare against. However, none of the current conditions require a groundwater quality baseline to be established, across all relevant hydrostratigraphic units and receiving environments, before mining commences.

160. Guidelines for establishing baseline groundwater quality recommend, as a minimum, quarterly monitoring over at least two years, with a minimum of seventeen samples per well recommended for higher-risk activities such as mine sites.¹⁰¹ As set out in my evidence on RFI 11 Question 2a above, the groundwater quality dataset presently available falls well short of that standard, and especially in the Shepherds Creek Valley, with no data collected from the Ardgour Aquifer at all.

161. I recommend a condition requiring an adequate groundwater quality baseline, consistent with these guidelines, across all relevant hydrostratigraphic units and receiving environments, to be completed before mining commences.

Modelling

162. Conditions 29, 30 and 33 all rely on the WLBM without resolving two problems. The operational phase still has non-conservative inputs, as set out in my evidence on RFI 11 Question 3, 4 above, and the closure and post-closure phases have not been updated at all. In my opinion, these models need to be amended before a decision can be made, and this cannot appropriately be left to a post-consent condition.

¹⁰⁰ D.04 Schedule Two, General Conditions for ORC Consents, 28 August 2026 (Clean), Condition 34.

¹⁰¹ EPA South Australia (2024) Guideline 3 – Establishing baseline groundwater quality, Guidelines for groundwater quality monitoring of regulated activities series, Environment Protection Authority, Adelaide, p.15.

163. Condition 31 requires the Consent Holder to commission 3D contaminant transport modelling studies, prior to the final detailed design of Mine Waste Storage Facilities, to support the design of seepage collection elements and ensure downstream receptors are not adversely affected. As per my recommendations above and elsewhere¹⁰², all groundwater related modelling should be subject to external peer review. This is particularly important here, since the modelling will build on the same coupled groundwater model I found to be of low, Class 1 confidence, and any review should directly address the issues I identified as detailed in my evidence relating to the RFI 11 Q2b, c response.

164. I should be clear, however, that Condition 31 does not resolve my concerns about the current modelling or the Class 1 confidence assigned to the coupled groundwater model. It requires further modelling after consent is granted to support detailed design, but does not address the deficiencies in the modelling currently before the Panel. Those deficiencies therefore remain relevant to the Panel's assessment of the Project's effects.

¹⁰² L Morgan EIC, 10 April 2026, paragraph 72; Bendigo-Ophir Gold Project Groundwater Joint Witness Statement, dated 14 and 15 May 2026, paragraph 93.