

Comments on the Fast-Track Approval Act 2024 – Matakanui Gold Limited – Substantive Application for the Bendigo-Ophir Gold Project

Purpose

Our property¹ is mentioned in Matakanui Gold Limited - Substantive Application for the Bendigo-Ophir Gold Project (BOGP) - Lodged Document I.04. "Records of Title - Properties Adjacent to the BOGP Consent Area"².

We appreciate the Panel giving us this opportunity to comment.

Context and concerns

We have a bore/well that draws water from Lindis Ribbon Alluvial Aquifer (see **Appendix One** for details). We have used this well as a source of drinking water and for domestic use for the past 40 years. This is our only source of drinking water. The long-term quality of this aquifer is of fundamental importance to our family and for the continued enjoyment of our land. Water, in this dry Central Otago landscape, is the true gold, it is life sustaining. Inter-generational security of clean drinkable water is essential. Any contamination of this aquifer would have immediate and far-reaching consequences. It would directly endanger not only our household, but also the many guests, campers, swimmers, and other residents who rely on this for water now and into the far future.

There are flaws in the project's water management approach. These flaws represent an unacceptable risk to not only our water source but also the wider community and environment.

Among our concerns, which we expand on further below, are:

- the Lindis Ribbon Alluvial Aquifer (LRA) and Ardgour Aquifer (AA) have not been meaningfully acknowledged and any potential risks to them have not been adequately addressed;
- there is an inadequate understanding of groundwater-surface water interactions in regards to these aquifers and Shepherds Creek;
- the LRA needs to be treated as both groundwater and surface water - water quality guidelines for any contaminants entering the aquifer must conform to the most stringent (i.e. best) compliance level applicable to either classification;

¹ OTA2/827 -Section 31 Block III Tarras Survey District (Registered Owner James Clarke Hanan).

² List of lodged Documents – https://www.fasttrack.govt.nz/_data/assets/pdf_file/0025/15559/A.04-List-of-Lodged-Documents.pdf

- there is insufficient modelling of the extent of the anticipated contaminated groundwater plume;
- there is poor surface water and groundwater monitoring plans for these aquifers - the monitoring systems that are suggested are inadequate;
- there are serious surface water problems - modelling of flooding shows potential for direct toxic surface run-off water entering the Lindis River with catastrophic results to both groundwater and surface water;
- no emergency plans for remediation are evident in the documentation;
- contaminated surface water risks are exacerbated by inadequate sludge, silt and sediment storage, as well as poor treatment and disposal management;
- climate vulnerability has not been adequately examined;
- modelling on mitigation or remediation needs to be based on Plan 5A water volume constraints; and
- there is an over-reliance on untested mitigation and "adaptive management".

Summary and request

On the basis of the concerns that we outline above and detail below, we consider that the application from Matakanui Gold Limited is incomplete and poses an unacceptable risk to the long-term security of the Lindis Ribbon Alluvial and Ardgour aquifers and the lower Lindis River. It is not possible for the Panel to impose suitable conditions or modifications without this information.

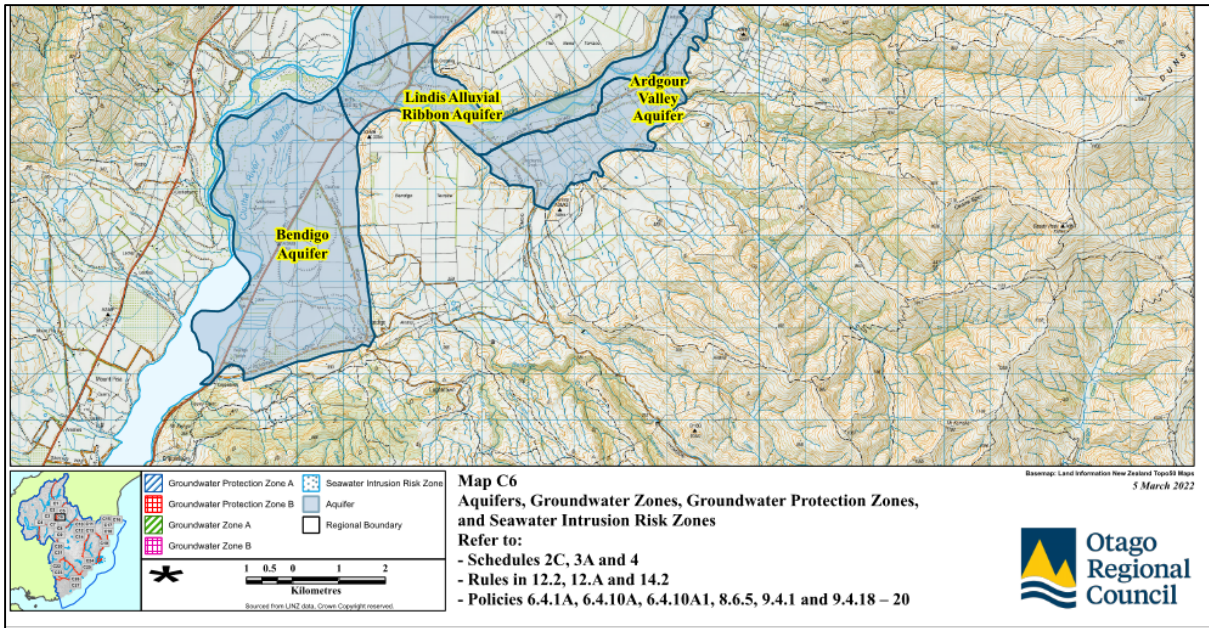
We therefore request the Panel to exercise its powers under the Act and **decline the application**.

If the Panel proceeds to consider the application in its current form, we request that the Panel hold a hearing, as set out in section 57 of the Act, and we request the opportunity to be heard.

Detailed Concerns and Evidence

1. Omission of critical aquifers

The project's Water Management Plan (G.01) conspicuously fails to meaningfully address the Lindis Ribbon Alluvial Aquifer (LRA) and the Ardgour Aquifer (AA). There is little to no commentary or analysis. While the Bendigo Aquifer is frequently mentioned (seventeen times), the other two major aquifers are inadequately accessed (the AA is mentioned twice, the LRA not at all)



Otago Regional Council – Regional Plan for Water - Map C Series

This creates a fundamental gap in the assessment of environmental effects. Groundwater in this region is a connected system. Contamination or hydrological changes in the Shepherds Creek area will inevitably migrate and impact the LRA and AA aquifer systems over time. An informed decision is not possible without a more rigorous understanding of potential effects on all receiving environments below the Shepherds Creek mine activities.

2. Inadequate understanding of groundwater-surface water interactions

The applicant's hydrogeological report admits a critical knowledge gap. "...detailed information on groundwater-surface water interactions is currently not available..."

Groundwater-Surface Water Interactions

Groundwater-surface water interactions can be complex in both space and time, varying along creek reaches and seasonally. At the BOGP, groundwater is conceptualised to typically discharge and feed creeks, springs, and channels. However, detailed information on groundwater-surface water interactions is not currently available to characterise interaction beyond this higher level conceptualisation.

B.43 Hydro Geochem Group - Flow Augmentation Strategy

Accepting contamination risks without understanding how groundwater from the Shepherds Creek area feeds the Lindis River, and ultimately the Clutha/Mata-Au utilising 'conceptualisation' is inadequate. This violates the precautionary principle central to the RMA, the Regional Plan - Water for Otago as well as the National Policy Statement for Freshwater Management (NPS-FM).

The small snippets of information that can be gleaned are cause for great concern, such as “Shepherds Creek alluvium has high permeability and porosity”. This suggests that contamination will be quickly absorbed into the groundwater.

Bendigo and Shepherds creeks alluvium have higher permeability and porosity. Low flows in Bendigo and Shepherds creeks result in a loss of surface water flow when the creek water soaks into the alluvium. Higher- and flood- flows in the creeks allow visible creek flow to extend further downstream, with subsurface flow continuing underground (Rekker, 2025a).

Source: G.01 – Water Management Plan

And it is well documented that Shepherds Creek disappears into the Ardgour Aquifer demonstrating profound connectedness; the AA then seeps into the LRA, the Lindis River and beyond.

As part of the unique intermontane physiography of the Bendigo area, Shepherds Creek does not extend as a perennial water course to its main stem, the Lindis River. Instead, Shepherds Creek in normal flow is lost to soakage through its bed a full three (3) kilometres short of the Lindis confluence, thereby replenishing the Ardgour Alluvial Aquifer, which in turn seeps into the Lindis River. Similarly, Bendigo Creek which includes Rise

Source: B.03 Groundwater Existing Environment and Effects

Even where there is some analysis available the consultancy Kōmanawa Solutions Limited (KSL) recommends that “a more detailed model be developed.” The current model does not provide a cumulative, holistic view of the interactions between each model.

- Each model (Rise and Shine, Come in Time, and SREX) was conducted independently and therefore the results do not provide a holistic view of the system. This approach was undertaken to allow parameter differences between each model to be optimised independently and to reduce the computational burden and instability issues of a single large model. We believe that this approach is reasonable given the limited data available, the relatively low conductivity of the hard rock aquifer (as compared to alluvial systems), and the relative independence of the modelled impacts. All impacts should be assumed to be additive, if detailed interactions between the various model pits are needed, we would recommend a more detailed model be developed.

B.05 Groundwater Modelling Analysis for Mining Bendigo Ophir Gold Deposit

In the very few areas where the aquifers are mentioned, the lack of knowledge about them is acknowledged. The applicant itself states “...groundwater movement through the alluvial gravels along the bed of Shepherds Creek remain unexplored.” Disconcertingly no further investigation is suggested.

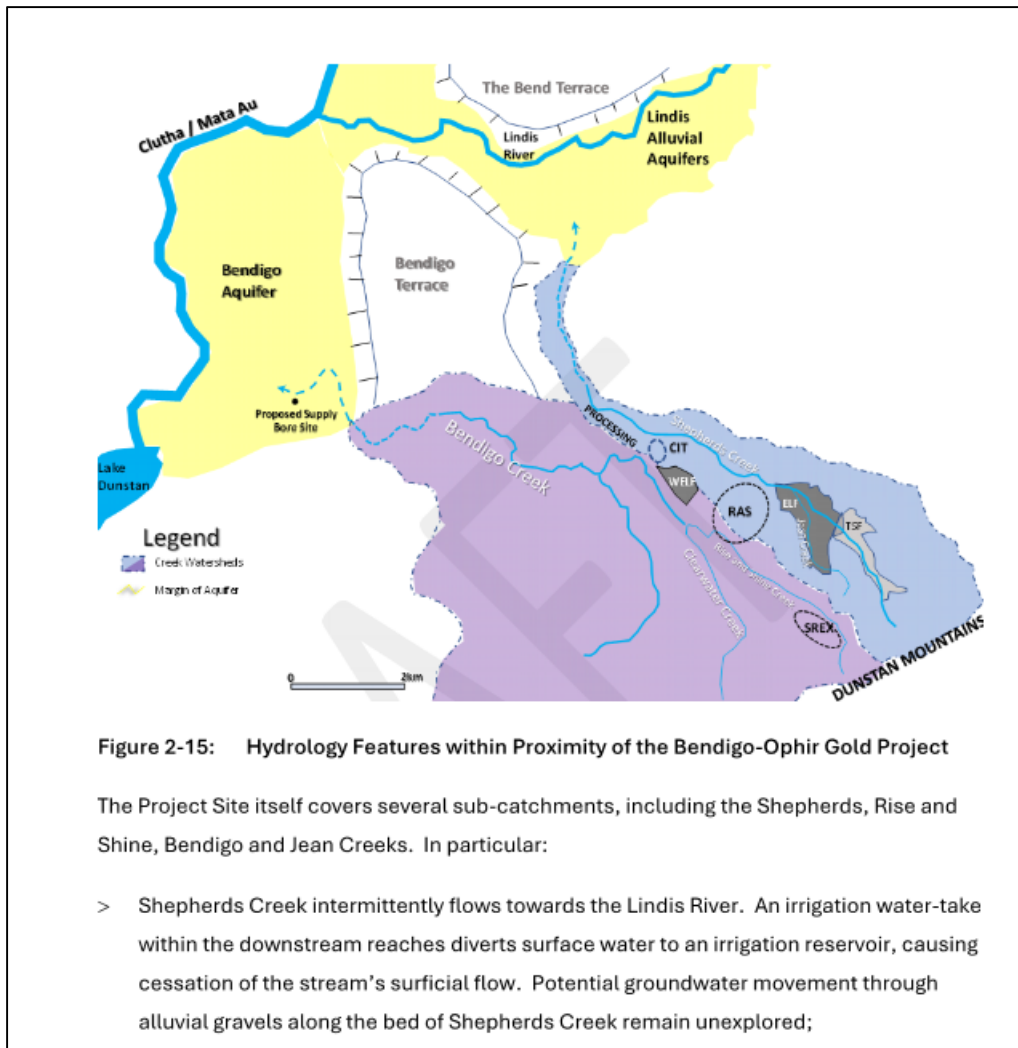


Figure 2-15: Hydrology Features within Proximity of the Bendigo-Ophir Gold Project

The Project Site itself covers several sub-catchments, including the Shepherds, Rise and Shine, Bendigo and Jean Creeks. In particular:

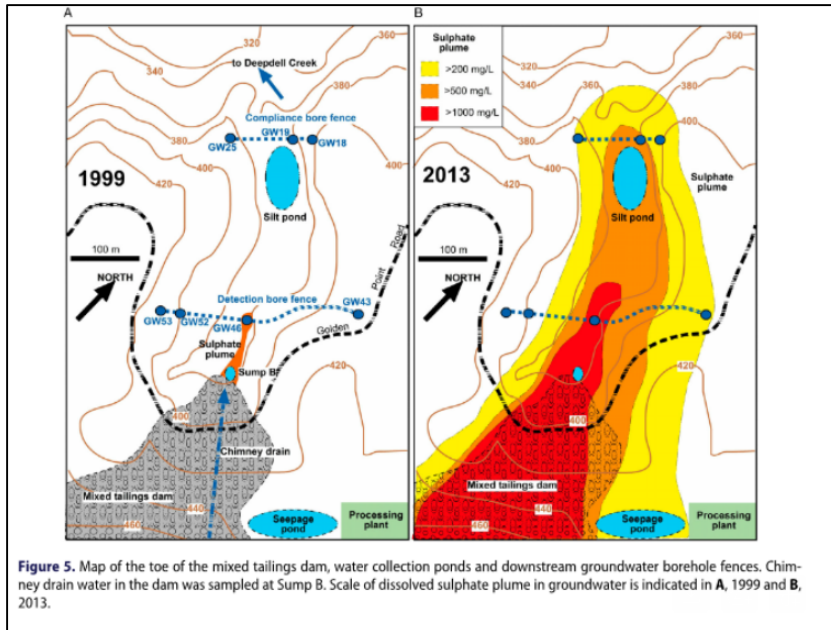
- > Shepherds Creek intermittently flows towards the Lindis River. An irrigation water-take within the downstream reaches diverts surface water to an irrigation reservoir, causing cessation of the stream’s surficial flow. Potential groundwater movement through alluvial gravels along the bed of Shepherds Creek remain unexplored;

A.09 Existing Environment

3. There is no effective modelling of groundwater plume extent prediction

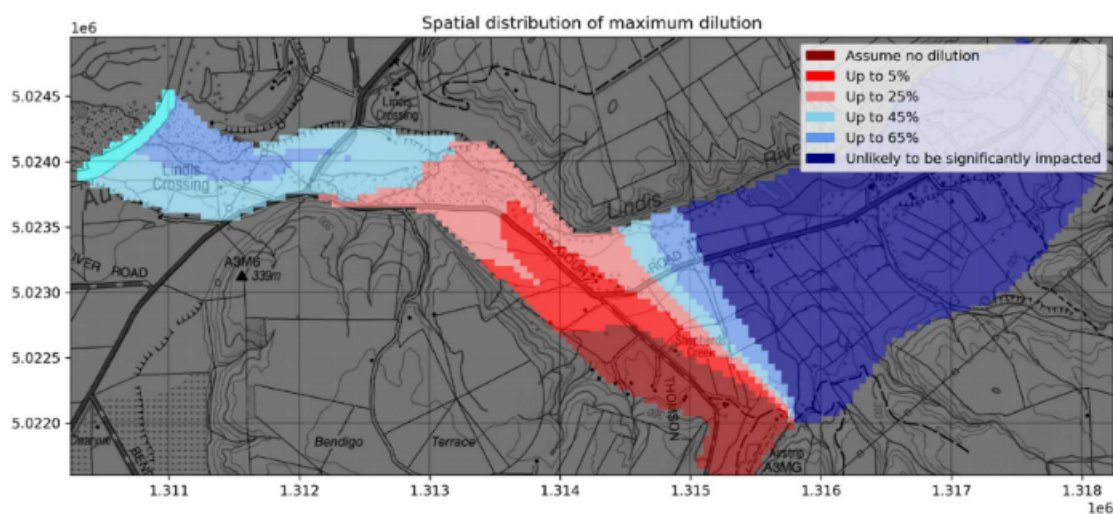
Based on Pope and Craw's study on the nearby Macraes Gold mine³ we have a high level of surety of the impacts that are very likely to occur to the groundwater in the BOGP.

³ https://www.cmer.nz/publications/2017/Craw_and_Pope_2017_NZJGG_Arsenic_macraes.pdf



The applicant has provided some guidance using a **generic** model of the movement of water in the LRA and AA. The example of sulphur is used in the discussion, where the proposed discharge limit of 500 milligrams per litre would dilute to 275 mg/l at the Clutha/Mata-au confluence. This dilution effect of 45% is shown in the 'friendly' light blue colour in the image below - referred as Figure 29. As an aside in this particular example, the water we extract from our well would sit above the water quality guideline of 250 mg/l mentioned in the report.

sulphate is 250 milligrams per litre (Taumata Arowai, 2022). These indications from generic groundwater transport modelling result in the requirement to monitor groundwater composition throughout the baseline, operations and post-closure periods for the possibility that the drinking water standard or water quality target concentration would be approached.



Instead of a generic model, what is required is (in scientific parlance) a **proven** scientific model. This is a model that has been tested and validated through empirical data from the site (such as pump tests or tracer studies) to accurately reflect the transmission rates of the LRA and AA, rather than relying on theoretical assumptions. This will create a more accurate assessment so that the transmission and dilution rates of the actual aquifers can be more fully understood.

As mentioned previously, KSL also suggests that a more detailed model be developed and notes a significant areas of uncertainty.

Significant areas of uncertainty remained. The model report discussed the limitations to the accuracy of model predictions, primarily equivalence between alternative parameter realisations. The more important areas of uncertainty were summarised as follow:

- A general lack of observed snap-shot or time series aquifer water level observations to calibrate, optimise or validate the model,
- A lack of measured aquifer parameters such as observed above in this section,
- Deficiencies in the understanding of current and future water management relevant to aquifer dynamics in the area, and
- A general lack of drill logs or geophysical characterisation of aquifer geometry and any vertical stratification.

B.03 BOGP - Groundwater existing Environment and Effects Assessment

Further, in KSL's updated report K.01, they once again note that the model they use is highly uncertain and they helpfully provide a range of techniques to reduce this uncertainty.

4.4 Options to Reduce Uncertainty

The current model results cannot preclude minimal dilution of contaminants in the aquifer, however the model is highly uncertain. Further investigation could be undertaken to reduce this uncertainty. It is beyond the scope of this report to provide detailed proposals for further investigation, however we suggest the following as potential options to reduce uncertainty:

1. Piezometric survey
2. Pumping tests
3. Injection tests
4. Push-pull tests
5. Water Chemistry Survey
6. Numerical experiments

We provide a brief discussion of each of these options in the sections below.

K.01 Post Closure Impacts on the Ardgour Aquifer

Once a proven scientific model has been developed the Panel will then be able to more accurately determine the role groundwater movement has on toxic plumes and water quality.

4. Should any contamination of The Lindis Ribbon Aquifer occur then water quality guidelines need to be treated as both surface water and groundwater as per the Otago Regional Council’s Regional Plan for Water

The LRA should also be considered as primary surface allocation. This was determined during Plan Change 5A which established an integrated management regime for surface water and hydrologically connected groundwater resources within the Lindis catchment to help restore a significantly degraded river system.

3.2.2. Information to assist decision making

3.2.2.1 Water Plan provisions

Aquifers with a strong hydrological connection to adjoining surface water bodies are listed in Schedule 2C of the Water Plan and are managed as surface water (Policy 6.4.1A). Groundwater takes from Schedule 2C aquifers are subject to a minimum flow and surface water allocation regime.

Groundwater takes in the portion of the Lindis Alluvial Ribbon Aquifer that are located upstream from the SH8 Bridge are currently managed as surface water takes through the inclusion of this aquifer in Schedule 2C.

ORC’s Plan Change 5A

2C Schedule of aquifers where groundwater takes are to be considered as primary allocation, and subject to minimum flows of specified catchments in accordance with Policy 6.4.1A

Aquifer Name	Map Reference	Catchment to which primary or supplementary allocation limits apply, and minimum flows may apply*
Cardrona Alluvial Ribbon Aquifer	C2 & C3	Cardrona catchment upstream of the Mount Barker recorder site**
Kakanui-Kauru Alluvium Aquifer	C17 & C18	Kakanui catchment*
Lindis Alluvial Ribbon Aquifer	C5 & C6	Lindis catchment**
Lowburn Alluvial Ribbon Aquifer	C7	Lowburn Stream**
Pomahaka Alluvial Ribbon Aquifer	C22 & C23	Pomahaka catchment**
Shag Alluvium Aquifer	C19	Shag catchment*

* as given in Schedules 2A and 2B.

** as provided for by Policies 6.4.2, 6.4.3 and 6.4.9.

Regional Plan for Water: Schedule 2C

Water permits are issued in direct relationship to the aquifer that they extract the groundwater from and are treated as primary allocation.

Consent No. RM17.301.14

WATER PERMIT

Pursuant to Section 104C of the Resource Management Act 1991, the Otago Regional Council grants consent to:

Name: [REDACTED]

Address: [REDACTED]

To take and use water from the Lindis Alluvial Ribbon Aquifer as primary allocation for the purpose of irrigation and storage

Environment Court, 14 July 2020.

Should any contamination of the LRA occur and given that the LRA is also to be treated as surface water, then water compliance guidelines for the LRA should be held at the highest quality standard of either the surface water or groundwater compliance limits.

We note that in report B.07 - Water Quality Compliance Limits, water compliance limits are separated and there can be substantial difference between surface and groundwater limits – see images below.

For example nitrate levels for surface water compliance levels are lower than that for groundwater levels. In this instance water quality guidelines for the aquifer should be held at surface water standards.

Summary of recommended water quality compliance limits for BOGP surface water

PARAMETER (units are mg/L unless stated otherwise)	SURFACE WATER Recommended compliance limit(s)
pH (unitless)	6.5-9.0
Turbidity (NTU)	5 (over a 5-year rolling period, 80% of samples, when flows are at or below median flow, are to meet the limit)
Ammoniacal-nitrogen (NH ₃ -N)	≤0.24 (annual median) <0.4 (annual 95 th %) See Appendix A for adjustments
Nitrate-nitrogen (NO ₃ -N)	<2.4 (annual median) <3.5 (annual 95 th %)
Cyanide (CN ⁻)	0.011 (un-ionised HCN, measured as [CN], ANZG 2018) See Appendix A for adjustments
Sulphate (SO ₄ ²⁻)	A. If hardness is <100 mg/L (CaCO ₃), the sulphate compliance limit = 500 mg/L. B. If chloride is <5 mg/L, the sulphate compliance limit = 500 mg/L C. If the hardness is 100–500 mg/L AND if chloride is 5–<25 mg/L, the sulphate compliance limit is (in mg/L): [-57.478 + 5.79*(hardness mg/L CaCO ₃) + 54.163*(chloride mg/L)] * 0.65 D. If hardness is between 100 and 500 mg/L AND if chloride is between ≥25 and ≤500 mg/L, the sulphate limit is (in mg/L): [1276.7+5.508*(hardness mg/L CaCO ₃) +1.457*(chloride mg/L)] * 0.65 A minimum of 12 samples must be collected over any rolling 12-month period. For compliance limits in A to D, no more than 20% of samples collected over a rolling 12-month period may exceed the relevant compliance limit. E. An acute compliance limit = 1,000 mg/L averaged over 4 days and not to be exceeded more than once in a one-year period, OR in more than 10% of samples over a one-year period.
Aluminium (Al) (dissolved)	≤0.08
Antimony (Sb) (total)	0.074 (chronic) 0.250 (acute)

PARAMETER (units are mg/L unless stated otherwise)	SURFACE WATER Recommended compliance limit(s)
	See below
Arsenic (As(V)) (dissolved)	≤0.042
Cadmium (Cd) (dissolved)	≤0.0004 See below for adjustment algorithm
Chromium (Cr) (dissolved)	≤0.0033 (CrIII) ≤0.006 (CrVI) See below for adjustment algorithm
Cobalt (Co) (dissolved)	0.001 (chronic) 0.11 (acute, not to exceed) See below for adjustment algorithm
Copper (Cu) (dissolved)	≤0.0018
Molybdenum (dissolved)	≤0.034
Zinc (Zn) (dissolved)	0.015 See below for adjustment algorithm
Cd (dissolved)	HMTV = TV (H/30) ^{0.89} , where hardness-modified trigger value (HMTV) = (µg/L), trigger value (TV) (µg/L) at a hardness of 30 mg/L as CaCO ₃ ; H, measured hardness (mg/L as CaCO ₃) of a fresh surface water.
Cr (dissolved)	HMTV = TV (H/30) ^{0.82} , where hardness-modified trigger value (HMTV) = (µg/L), trigger value (TV) (µg/L) at a hardness of 30 mg/L as CaCO ₃ ; H, measured hardness (mg/L as CaCO ₃) of a fresh surface water.
Co (dissolved)	Cobalt (µg/L) = exp{(0.414[ln(hardness CaCO ₃ mg/L)] - 1.887)}
Sb (total)	(chronic) the average of 5 (monthly) samples over a 5-month period (acute) not to be exceeded at any time
Zn (dissolved)	HMTV = TV (H/30) ^{0.85} , where hardness-modified trigger value (HMTV) = (µg/L), trigger value (TV) (µg/L) at a hardness of 30 mg/L as CaCO ₃ ; H, measured hardness (mg/L as CaCO ₃) of a fresh surface water.

Summary of recommended water quality compliance limits for BOGP ground water	
PARAMETER (units are mg/L unless stated otherwise)	GROUNDWATER Recommended compliance limit(s)
Nitrate-nitrogen (NO₃-N)	11.3 (MAV)*
Cyanide (CN⁻)	0.6 (MAV)
Sulphate (SO₄²⁻)	≤250 (taste threshold)
Aluminium (Al)	1 (MAV)
Antimony (Sb)	0.02 (MAV)
Arsenic (As(V))	0.01 (MAV)
Cadmium (Cd)	0.004 (MAV)
Chromium (Cr)	≤0.05(MAV)
Cobalt (Co)	<1 (livestock drinking water)
Copper (Cu)	≤0.5
Iron (Fe)	≤0.3
Lead (Pb)	0.01 (MAV)
Manganese (Mn)	0.4 (MAV)
Molybdenum (Mo)	<0.01
Strontium (Sr)	4
Uranium (U)	0.03 (MAV)
Zinc (Zn)	≤1.5
* MAV = Maximum acceptable value – From NZ drinking water standards	

B.07 Water Quality Compliance Limits

5. Current surface monitoring systems are inadequate.

Surface water quality monitoring at the Shepherds Creek, Rise & Shine and Clearwater Creek sites are projected to be done monthly. This is not of sufficient regularity. Should an event occur, it may be up to a month before any environmental damage is detected and any remedial work started. Monitoring sites should also be

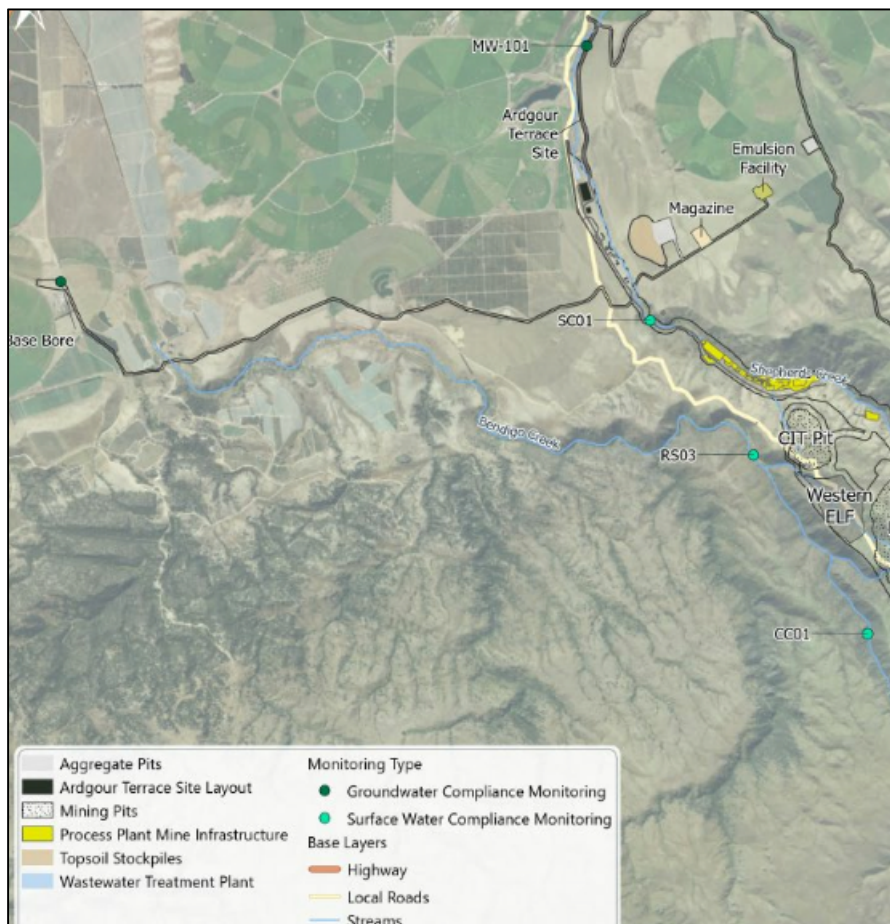
required at various points along the Lindis River to ensure the water system is safe for recreation and for animal and human consumption.

6. There is no dedicated Groundwater Monitoring Plan for the aquifers

Groundwater monitoring is currently projected to be located at two locations, one at the Bendigo aquifer, and the other at Shepherds Creek. The Shepherds Creek site sits outside the AA as defined by the Otago Regional Council (ORC) (see earlier image, page 3, Regional Plan for Water - Map C Series). There is no monitoring occurring in either the AA or LRA aquifers. These aquifers need monitoring for both quality and level. Monitoring systems should be transparent and accessible to the public.

This needs to include precise geographic coordinates, the number, and depths of the monitoring wells relative to the two aquifers.

Current groundwater monitoring locations can be seen in the image below. Neither are located in or near the LRA nor AA.



B.07 Water Quality Compliance Limits

7. There are serious surface water problems, with inadequate sludge, silt and sediment storage, and treatment and disposal analysis

No plan for sludge disposal has been presented.

9.6. Sludge Disposal

Sludge, a by-product of active and passive water treatment will be created. Further studies need to be completed to determine the quantity and quality of water treatment residues (sludge) and identify appropriate disposal locations. The sludge should be disposed offsite at a suitable facility or studies should be undertaken to confirm suitable onsite management options.

G.01 Water Management Plan

Silt ponds are designed around a one in ten-year event. This poses an unacceptable risk profile for our environment.

4.4.2. Silt Ponds

The purpose of a silt pond is to capture coarse sediment and debris from stormwater runoff, thereby slowing the water flow and allowing sediment to settle out. This in turn enables improved water quality prior to discharging off site, without the need for active treatment (i.e., directing through a water treatment plant etc.). The following silt ponds are present at BOGP, designed to detain peak flows and sediment retention from 1 in 10 year storm events (MWM, 2025b):

- **Shepherds Silt Pond:** captures stormwater from Shepherds ELF before being discharged into the receiving environment via Shepherds Creek Clean Water Diversion Channel. It will be located immediately downstream of the Shepherds Seepage Collection Sump, providing a contingency option if the seepage sump becomes full.

G.01 Water Management Plan

A silt pond breach could extend to the Clutha/Mata-Au.

The Shepherds Silt Pond is located in a gully at the toe of the proposed Shepherds ELF. The Shepherds Silt Pond is designed using a downstream-constructed embankment. Figure 1 presents the potential path of the breach flood. A breach of the silt pond embankment dam could result in discharges of the silt pond stored water into the Shepherds Creek, and over the flood plain further downstream, across Thomson Gorge Road and Ardgour Road. A breach would join the Lindis River and eventually the Clutha River which is approximately 11 km downstream of the Shepherds Silt Pond.

B.23 EGL Shepherds Silt Pond Technical Report

Sediment Ponds are also modelled on a one in ten-year rainfall event. This is inadequate, especially in an uncertain climate change affected environment.

4.4.1. Sediment Retention Ponds

Surface water runoff from the Shepherds Service Corridor area will be captured in a sediment retention pond(s) sized for a 10 year ARI event (with emergency spillway for 100 year ARI flow at a minimum).

G.01 Water Management Plan

8. Modelling of flooding shows potential for direct surface run-off water entering the Lindis River with catastrophic results. The applicant should ensure that detailed remediation processes are in place should such an event occur

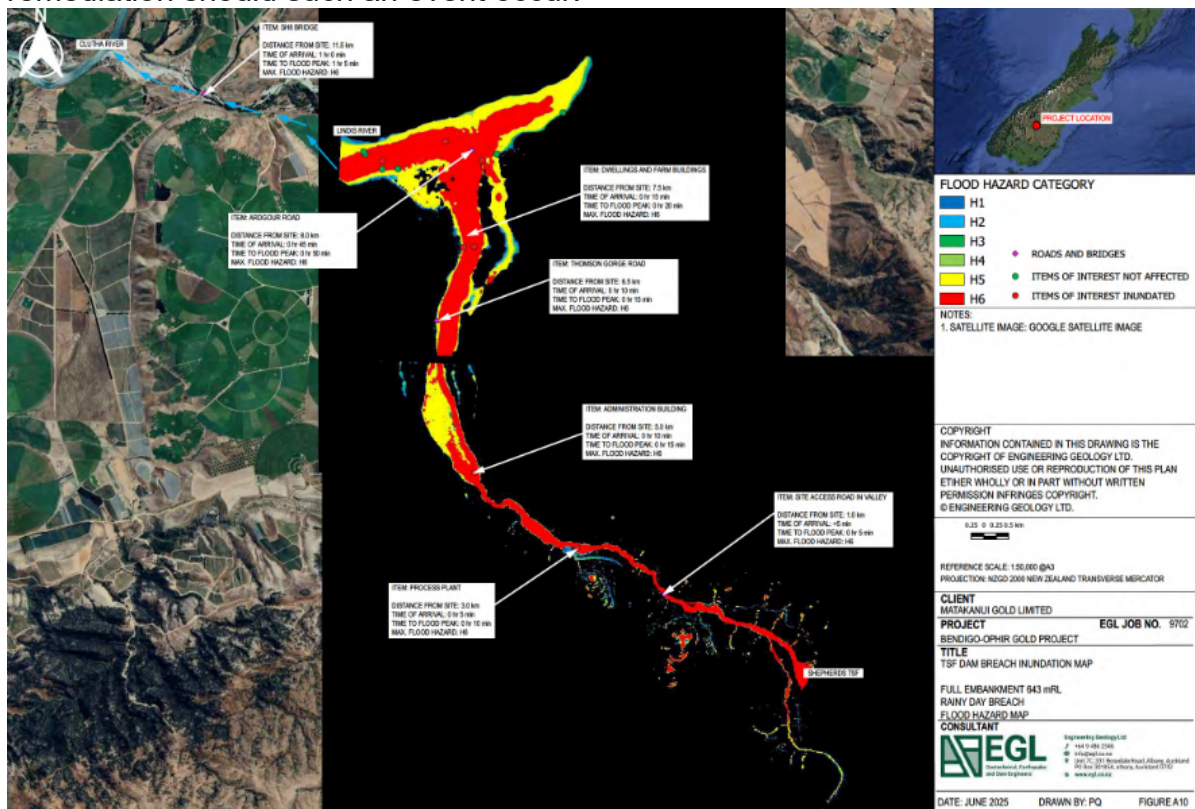
The EGL report has put it as clearly as they can - in a major flooding event the environmental damage will be **major to catastrophic**.

Natural Environment

- Tailings and sediment entrainment result in widespread environmental impact, particularly along Shepherds Creek and farmland adjacent to the Lindis River.
- Given the potential presence of hazardous constituents in the tailings and the depositional footprint, the environmental damage is assessed as Major to Catastrophic, depending on the scenario.

B.21 Engineering Geology Limited– Shepherds Tailing Storage Facility

The images they have modelled show the extent of damaged area. The impact is substantial and dramatic. There is no report detailing plans and approaches for remediation should such an event occur.



B.21 Engineering Geology Limited– Shepherds Tailing Storage Facility

9. There is an inherent contradiction in the "fully contained" design

The application claims the Tailings Storage Facility and Engineered Landforms (ELFs) will be "fully contained, no release" facilities.

During operations, the TSF will be a fully contained, no release facility with no dedicated spillway, with all supernatant (decant) water managed onsite and contained within the

G01 Water Management Plan

Yet, the application simultaneously dedicates extensive sections to managing seepage in its section on water management risk management. The images below (MIW03, MIW04, and MIW05) represent an admission that the facility is not, and cannot be, fully contained.

Risk no.	Risk Description	Cause	Consequence	Risk Rating	Control (mitigation measures)	Residual Risk Rating
MIW03	ELF and TSF seepage rates (flow) higher than expected.	<ul style="list-style-type: none"> ELF construction approach unsuitable. ELF cover system not performing to design criteria. 	<ul style="list-style-type: none"> Non-compliance for water quality. Potential impacts to the receiving streams (at SC01 and RS03) and the Bendigo Aquifer. 	High	<ul style="list-style-type: none"> All materials placed within the ELF undertaken in alignment with BOGP ELF Design Criteria (MGL, 2025c). Robust construction QA/QC required to ensure ELF Design criteria are achieved (MGL, 2025c). Cover system trials completed in the first few years of the BOGP operational phase (e.g., lysimeters) to confirm net percolation into the ELFs and TSF. Development of a detailed water balance modelling by mine stage. Active treatment phase (WTP) to be run for longer (contingency). Performance monitoring. Development of adaptive management processes (see Section 10.6). 	Low
MIW04	ELF and TSF seepage quality poorer than expected.	<ul style="list-style-type: none"> ELF construction approach unsuitable. 	<ul style="list-style-type: none"> Non-compliance for water quality. Potential impacts to the receiving streams (at SC01 and RS03) 	High	<ul style="list-style-type: none"> Validate water quality source terms and update All materials placed within the ELF undertaken in alignment with BOGP ELF Design Criteria (MGL, 2025c). 	Low
MIW05	Shepherds Seepage Collection Sump (4,500m ³) spills	Gravity feed pipeline to Processing Plant fails or Processing Plant is not operating and cannot receive water	<ul style="list-style-type: none"> TSF and Shepherds ELF seepage water will build up in the sump and this could spill to the Shepherds Silt Pond (30,000 m³) and then discharge to Shepherds Creek 	High	<ul style="list-style-type: none"> Flow monitoring at the Processing Plant – influent to identify if water transfer is not working. Shepherds Seepage Collection Sump has 48 hours capacity based on estimated flows of 25 L/s. Ability to turn seepage valves off from the TSF and ELF to stop flow to the sump. Water can be pumped to the TSF if required. Development of adaptive management processes (see Section 10.6). 	Low

G01 Water Management Plan

This calls into question the veracity of some of the language being employed by the applicant.

10. Climate vulnerability has not been adequately examined

A separate report should be conducted detailing potential climate change effects on all aspects of the operation and closure of the mine.

The mine will be operating in what is likely to be significantly changed climatic conditions. Any potential impacts from a changing climatic environment need to be fully understood across all parts of the timeline.

For example, changes in the climatic environment (set out in the image below) need to be acknowledged and considered.

Key messages

- Extreme, rare rainfall events are likely to increase in intensity in Otago because a warmer atmosphere can hold more moisture.
- Rainfall depth increases are projected at both future periods (2040 and 2090) under all four climate change scenarios; greatest increases are projected by 2090 under RCP8.5 (up to 35% higher for a 1:100 year 1-hour duration rainfall event).
- Short duration rainfall events have the largest relative increases.
- Extreme rainfall projections for any New Zealand location can be viewed at <https://hirds.niwa.co.nz/>
- Increases in extreme rainfall events may cause more flooding (see Section 6).

NIWA - Climate Change Report Otago.

We note that under Section 13 of the Fast-track Approvals Act 2024 the applicant must furnish:

(v) a description of whether and how the project would be affected by climate change and natural hazards:

We cannot find a report detailing long-term climatic effects on the project as a whole.

At the individual report level there is generally little to no discussion on the future climate. This raises concerns that hydrology and flood risk assessments, as well as water management infrastructure (TSF, silt ponds) rely mainly on historical data and do not sufficiently integrate the projected increases in extreme climatic events in the Otago region. This increases the risk of over-topping, erosion, and catastrophic release of contaminated water during a future extreme weather event. Significant margins in design need to be incorporated for changing climatic conditions.

The application also fails to provide a comprehensive greenhouse gas emissions assessment encompassing such things as extraction, processing and transport. This omission contradicts the purpose and principles of the fast-track process, which must support climate change mitigation. This project will create significant emissions, but the applicant has not accounted for them. This may require a separate report or as a fulsome addition to any climate impact documentation.

(vii) will support climate change mitigation, including the reduction or removal of greenhouse gas emissions:

Section 22 (2) Fast-track Approvals Act 2024.

11. Seismic vulnerability has not been adequately examined

The site-specific seismic hazard study (B.20.) is very technical and appears to end with a bland hope - “The TSF will be designed to be robust and safe from all potential earthquake sources...” without actually evaluating the TSF’s suitability.

6.0 CONCLUSION

A SSSHA has been completed for the proposed TSF at the BOGP. PGA and SA values are provided along with mean magnitudes for design. The results are suitable for other structures, with due consideration for the specific basis of design being applied and compliance with the Building Act (Ref. 9), Regulations and Codes (Ref. 10). The SSSHA includes many earthquake sources. The TSF will be designed to be robust and safe from all potential earthquake sources contributing to the seismic hazard.

If any of the toxic water containment infrastructure fails then cyanide and heavy metal-laden slurry will spill into Shepherds Creek then down into the LRA and AA aquifers and on to the Lindis and Clutha/Mata-au Rivers.

Attached as **Appendix Two** is a case study detailing the impact of a series of small earthquake tremors on Newmont’s Cadia mine in Orange, NSW, Australia. These tremors caused liquefaction in the base of the mine and resulted in the failure of the TSF dam wall. A large toxic plume then occurred; this impacted both the shallow alluvial and the deeper rock aquifers. Multiple groundwater bores used for livestock watering and irrigation were contaminated, making them unusable. Groundwater was also discharged into local creeks leading to elevated sulphate levels in the surface water. It is important to note that this was from a relatively small breach in a low earthquake region.



Source: [ABC Australia](#) showing dam wall failure

While the BOGP’s TSF foundations may be different to the Cadia the consequences are directly relevant to this application. A relatively minor seismic event compromised a tailings facility, resulting in a multi-year, multi-kilometre groundwater plume that destroyed private water supplies.

12. Plan Change 5A conditions may impact remediation capabilities should an environmental breach occur

In the Lindis River catchment, water is already fully allocated. There are also precise conditions that must be upheld during low flow conditions.

For clarity we have created the table below to detail the conditions in which the river flows are managed when flows are low.

Conditions	Ardgour Recorder	If condition not met
June to September	>1600 l/s	Permit holder must not extract water
October to May	>550 l/s	Permit holder must not extract water
October to May	>700 l/s	If longer than 14 days flushing flow required
October to May	>900 l/s	If longer than 21 days flushing flow required
	Clutha/Mata Au confluence	
Annual	>100 l/s	Ensuring continuous surface flow at all times

This impact on river flows may mean any dilution of contaminated groundwater is constrained by the limited water available. Equally water movement in the aquifer during these low volume times may impact the rate of movement within the aquifer. We have not seen any modelling that has involved this constraint.

13. Over-reliance on untested mitigation and "adaptive management"

Risk registers contained in the application reveal a disturbing pattern: multiple "High" and "Moderate" risks are downgraded to "Low" risk based purely on proposed mitigation that is unproven, not yet designed, or reliant on future modelling or monitoring that is also not yet designed nor have benchmarks been determined.

For example, in the Water Management Plan's risk register all but one of the nine risks identified have the phrase "development of adaptive management processes." There are future promises of developing modelling and the vague coverall "Development of adaptive management process to manage potential effects." See image MIW01 below.

In MIW02 descriptions such as "Development of adaptive management process" and "Develop passive treatment systems" are woefully inadequate. These processes and treatment systems need to be developed before the mine is approved to ensure that they are adequate to mitigate the risk.

Risk no.	Risk Description	Cause	Consequence	Risk Rating	Control (mitigation measures)	Residual Risk Rating
MIW01	Uncontrolled discharge of MIW surface waters during the Operational Phase leading to non-compliance.	Elevated PCOC in surface runoff.	<ul style="list-style-type: none"> Immediate non-compliance for surface water quality compliance limits. Potential long-term impacts to the Bendigo Aquifer (groundwater). 	High	<ul style="list-style-type: none"> Development of a detailed water balance modelling by mine stage. Detailed groundwater modelling as part of detailed design for the TSF/ELFs. Development of adaptive management processes to manage potential effects (see Section 10.6). Use bore water rather than pit water for dust suppression beyond the pit shell. Pit water may be suitable for use within the pit shell, see Section 6.5 for control specifics. Increase water storage capacity. Install evaporation systems to reduce water budget. Install the active water treatment plant to treat MIW during the Operational Phase to reduce water budget. Performance monitoring. 	Low
MIW02	Uncontrolled discharge of MIW seepage waters during the operational and closure phases leading to non-compliance.	Loss of MIW seepage water from the water management system	<ul style="list-style-type: none"> Non-compliance for water quality (surface and groundwaters). Potential impacts to the receiving streams (at SC01 and RS03) and the Bendigo Aquifer. 	Moderate	<ul style="list-style-type: none"> Development of a detailed water balance modelling by mine stage to understand Net Percolation rates. Detailed groundwater modelling as part of detailed design for the TSF/ELFs to understand effects on seepage rates. Robust construction QA/QC required to ensure ELF Design Criteria are achieved (MGL, 2025a). Construction QA/QC for seepage control systems (underdrains, toe bunds, sumps, etc) 	Low
					<ul style="list-style-type: none"> Record keeping of 'as built' designs (Building (Dam Safety) Regulations 2022) Install the active water treatment plant to treat MIW seepage during the Operational Phase of the project. Develop passive treatment systems for sub-surface seepage (e.g., permeable reactive barrier technologies) Performance monitoring. Development of adaptive management processes (see Section 10.6). 	

G.01. Water Management Plan

Approval cannot be granted based on the promise that problems will be solved after they occur.

What BOGP should be doing is 'proactive management', identifying all significant risks and putting in place practices from day one that mitigates these risks to an acceptable standard. The applicant must be able to prove, with a high degree of certainty, that their proposed systems will work. 'We will figure it out on the fly' is not a suitable response.

10.6. High Level Adaptive Management Processes

Adaptive management processes will be developed and refined throughout the operational phase; a tool which links potential environmental issues / triggers to predefined actions to rectify the trigger or help to bring the trigger back on track, ensuring a consistent and effective response.

A review of developed adaptive management processes will regularly occur, particularly following an adaptive management response being initiated, thereby ensuring the adaptive management tool remains relevant and suitable for the scenario encountered.

Adaptive management processes, which will be developed throughout the course of the BOGP operations, may include a response to the following:

- Uncontrolled discharge of MIW surface and seepage waters.
- ELF and TSF seepage rates higher than expected.
- ELF and TSF seepage quality poorer than expected.
- Turbidity levels of retention and silt ponds not reducing.
- Collection sumps, retention pond or silt pond spills.
- Active water treatment plant cannot achieve water quality limits.
- Passive water treatment system cannot achieve water quality limits.
- Pit sump water used for dust suppression.
- Creek flow augmentation rate either too high or too low.

G.01. Water Management Plan

To express it colloquially and misusing a Rumsfeld quote. For known unknowns we need to have developed suitable responses beforehand. Above, in table 10.6, is a list of known unknowns, the adoption of adaptive management for these is a cop-out. The applicant must provide fixed, engineered controls at the outset, not promises to 'figure it out' after the damage is done. Infrastructure needs to be built to ensure these events don't occur and detailed action and remediation plans need to be in place in the event something unforeseen does go wrong.

We appreciate there are some unknown unknowns, for these we should look to employ adaptive management techniques.

Areas of Potential Legal Breach

The Bendigo-Ophir mine application has specific failures that breach key provisions of the RMA and the NPS-FM.

These breaches mean the application is incomplete and poses an unacceptable risk. We therefore urge the Panel to exercise its powers to request further information and decline the application in its current form.

The application fails to assess all affected environments (RMA, Section 104)

The application's Water Management Plan fails to meaningfully assess the effects on the LRA and the AA and the impact on the lower Lindis River's surface water.

Under Section 104(1)(a) of the RMA, a consent authority must have regard to "any actual and potential effects on the environment of allowing the activity." An incomplete assessment of effects on all aquifers and the lower Lindis River means the Council cannot make an informed decision as required by law.

104 Consideration of applications

- (1) When considering an application for a resource consent and any submissions received, the consent authority must, subject to [Part 2](#) and [section 77M](#), have regard to—
- (a) any actual and potential effects on the environment of allowing the activity; and

Source: Resource Management Act 1991

The applicant fails to understand the groundwater-surface water connections (NPS-FM)

As mentioned previously the applicant's own hydrogeological report (B.43) admits a critical knowledge gap" regarding groundwater-surface water interactions between the site and the Lindis River.

Groundwater is conceptualised to typically discharge and feed creeks and springs. Interactions with surface water are likely to be complex in both space and time, varying along creek reaches and seasonally. However, detailed information on groundwater-surface water interactions is not currently available to characterise interactions beyond a higher-level conceptualisation.

B.43 Flow Augmentation Strategy

The NPS-FM requires councils to recognise the interconnectedness of the whole environment. It is vital that we understand the mine to aquifer to river connections and the impact contamination might have on them, now and in the future. As an already degraded river the council is tasked with improving this lower Lindis ecosystem, it is hard to see how the proposed BOGP will help in this regard.

Granting consent without this knowledge violates the precautionary principle and is inconsistent with integrated freshwater management.

Policy 5: Freshwater is managed (including through a National Objectives Framework) to ensure that the health and well-being of degraded water bodies and freshwater ecosystems is improved, and the health and well-being of all other water bodies and freshwater ecosystems is maintained and (if communities choose) improved.

National Policy Statement for Freshwater Management 2020

3.5 Integrated management

- (1) Adopting an integrated approach, ki uta ki tai, as required by Te Mana o te Wai, requires that local authorities must:
- (a) recognise the interconnectedness of the whole environment, from the mountains and lakes, down the rivers to hāpua (lagoons), wāhapū (estuaries) and to the sea; and
 - (b) recognise interactions between freshwater, land, water bodies, ecosystems, and receiving environments; and
 - (c) manage freshwater, and land use and development, in catchments in an integrated and sustainable way to avoid, remedy, or mitigate adverse effects, including cumulative effects, on the health and well-being of water bodies, freshwater ecosystems, and receiving environments; and
 - (d) encourage the co-ordination and sequencing of regional or urban growth.

National Policy Statement for Freshwater Management 2020

There is risk of unlawful discharge and a lack of contaminant and containment modelling (RMA, Section 15)

The application provides only generic contaminant plume modelling showing how far or fast contaminant seepage from the Tailings Storage Facility (TSF) would travel towards and into the LRA and AA aquifers and then on to the Lindis River nor how long this material would take to leave these systems should they become polluted.

Section 15(1) of the RMA prohibits the discharge of contaminants into water unless expressly allowed by a rule or resource consent. The application seeks discharge consent but fails to demonstrate how it will prevent unlawful discharges over the long term. Without proven plume modelling, the proposed "safeguards" are unverified.

Discharges

15 Discharge of contaminants into environment

- (1) No person may discharge any—
- (a) contaminant or water into water; or
 - (b) contaminant onto or into land in circumstances which may result in that contaminant (or any other contaminant emanating as a result of natural processes from that contaminant) entering water; or
 - (c) contaminant from any industrial or trade premises into air; or
 - (d) contaminant from any industrial or trade premises onto or into land—
- unless the discharge is expressly allowed by a national environmental standard or other regulations, a wastewater environmental performance standard, a stormwater environmental performance standard, an infrastructure design solution, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.

Source: Resource Management Act 1991

Inadequate assessment of climate & flood risks (RMA, Section 104)

The design for critical infrastructure (silt ponds, sediment ponds) is based on a 1-in-10-year rainfall event. Additionally, there is no plan at all for sludge. The applicant's own flood modelling shows a major event would cause "major to catastrophic" damage, with toxic runoff reaching the Lindis River.

Under Section 104 of the RMA, the Council must not grant consent if the activity will have more than a minor adverse effect on the environment. Failing to plan for credible climate change affected extreme events increases the probability that such effects will occur.

A design that has not addressed foreseeable extreme weather events is likely to fail to avoid adverse effects.

Over-reliance on "Adaptive Management" to reduce or mitigate high risks (RMA, Section 17)

The applicant's Risk Register downgrades "High" and "Moderate" inherent risks (e.g., uncontrolled seepage, treatment plant failure) to "Low" based on future, untested "adaptive management" processes.

Section 17 of the RMA imposes a duty on every person to avoid, remedy, or mitigate adverse effects. "Adaptive management" is not a mitigation measure; it is a promise to possibly find a solution after the effects occur. This does not satisfy the legal duty under Section 17.

Consent cannot be granted based on the hope that future actions will solve high-risk problems. The applicant must demonstrate proven, upfront mitigation.

Adverse effects

17 Duty to avoid, remedy, or mitigate adverse effects

- (1) Every person has a duty to avoid, remedy, or mitigate any adverse effect on the environment arising from an activity carried on by or on behalf of the person, whether or not the activity is carried on in accordance with—
 - (a) any of sections 10, 10A, 10B, and 20A; or
 - (b) a national environmental standard, a rule, a resource consent, or a designation.

| Source: Resource Management Act 1991

Conclusion & Request

For the reasons outlined above, the application in its current form is incomplete. It is currently not possible for the Panel to determine if the adverse impacts caused by the BOGP are out of proportion to regional or national benefits, as per section 85 of the Act. The current risks to the Lindis River and its connected aquifers are unacceptable without better information.

We request that the Panel use its powers under the Act and decline the application.

Should the Panel not decline the application, we ask that the applicant pause the application and that the Panel request that the applicant provide the information detailed below so that the Panel can understand the long-term consequences more accurately, specifically:

1. a detailed hydrological report, **with a proven scientific model**, examining the groundwater connections between Shepherds Creek and the AA and LRA aquifers, (see 'options to reduce uncertainty' section 4.4, document K.01);
2. a report on toxic plume predictions **using this proven model**;
3. a detailed report or reports examining climate impacts over the life of the project, including the carbon footprint of the BOGP, as required in Sections 13 and 22 of the FTA;
4. a re-determination of water quality metrics to be used for both the LRA and AA given that groundwater is surface water as per the Regional Plan for Water: Schedule 2C;
5. increased surface and groundwater monitoring and a monitoring plan for the Lindis river, LRA and AA aquifers;
6. remediation plans should the aquifers become polluted, these should include Plan 5A water dynamics; and
7. a reduction in adaptive management approaches substituting these for concrete management plans, section 10.6 of document G.01 – Water Management Plan – has a good starting list.

If the Panel is still of mind to approve the application, we request that the first four points raised above be addressed through robust and enforceable conditions. In

particular the use of a proven scientific model on hydrological behaviour and toxic plume movement, as well as clear climate and water quality metrics.

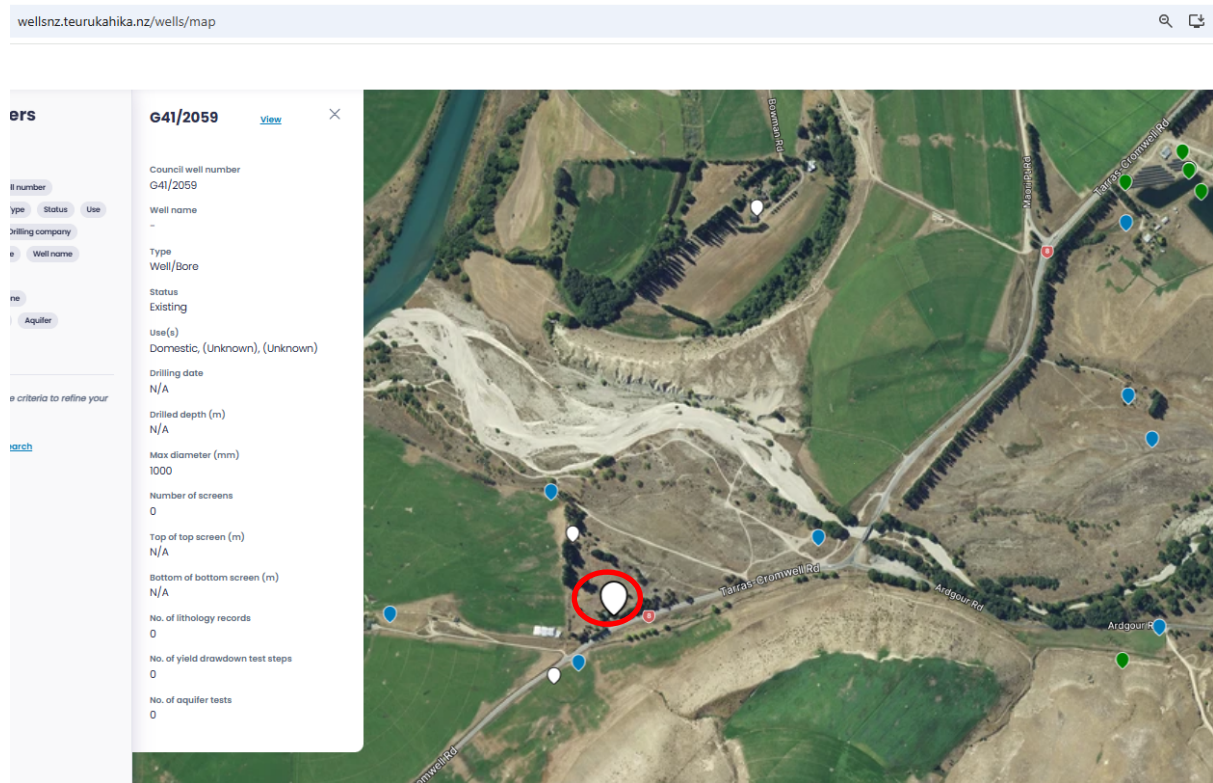
Suitable conditions and management plans for the final three points also need to be put in place to mitigate the concerns detailed above. These must be developed and submitted to the concerned bodies, for example the ORC and CODC.

These conditions and management plans must be provided and certified by the regulatory authority **before commencement** of the BOGP.

If the Panel proceeds to consider the application in its current form, we request that the Panel hold a hearing, as set out in section 57 of the Act, and we request the opportunity to be heard.

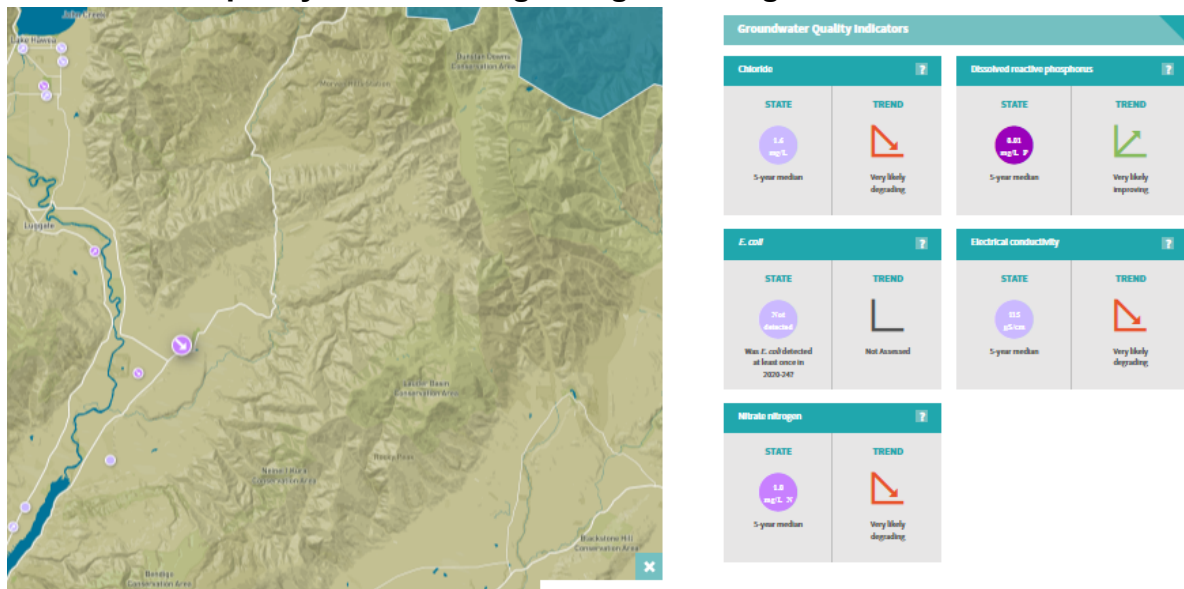
Appendix One

Location of our well G41/2059, circled in red.



Source: Wellsnz

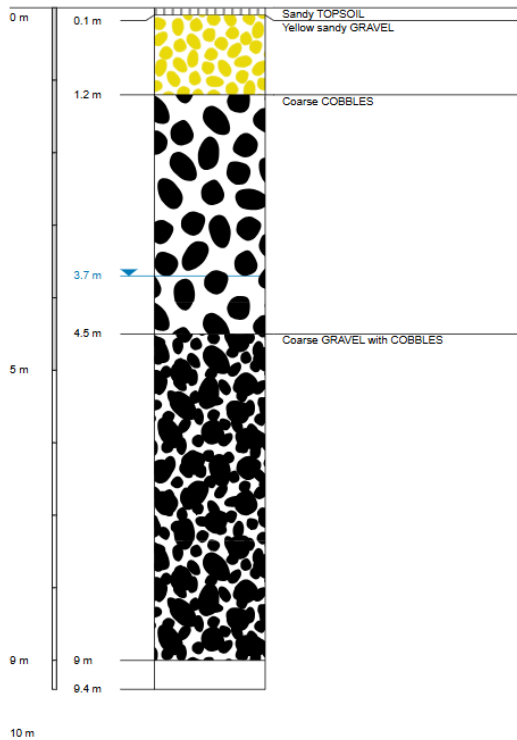
Groundwater quality has been degrading at testing location G40/0175



Source: Lawa

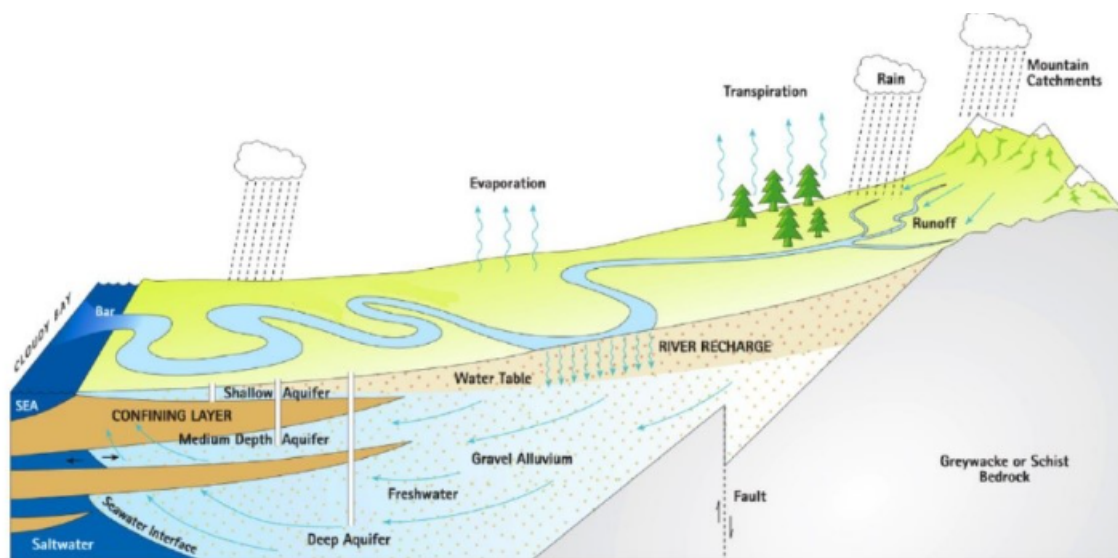
Cross section of Lindis Bridge well G41/1444

Council well number : G41/1444
 Well name : Piezo 2 (Lindis Bridge)
 Drilling company : McNeill Drilling
 Drilling date : 13/02/2009
 Drilling method : Air Rotary
 Locality :
 Total depth drilled : 9.4m
 NZTM : 1311977 : 5023817



Source: WellsNZ

Depiction of a groundwater ecosystem



Schematic representation of the water (hydrological) cycle (Adapted from the Groundwater Forum)

Source: ORC

Appendix Two

Case Study: The 2018 Cadia Mine Tailings Dam Failure and Groundwater Impact - compiled with the assistance of AI

1. Introduction & Background

Location: Cadia Valley, near Orange, New South Wales, Australia.

Operator: Cadia Valley Operations (CVO), a subsidiary of Newmont Corporation (formerly Newcrest Mining).

Mining Type: Large-scale underground and open-pit gold-copper mining.

Key Infrastructure: Multiple tailings storage facilities (TSFs), including the **Cadia East Tailings Dam** (a centerline construction dam).

The Incident: On March 9, 2018, a section of the northern embankment of the Cadia East Tailings Dam experienced a significant "down-valley" slope failure. This was not a catastrophic, instantaneous breach but a progressive structural failure within the dam wall itself. A second, smaller movement occurred on March 14, 2018. Crucially, there was no release of tailings slurry into the external environment. The failure was contained within the dam's footprint, but it represented a major geotechnical failure of a critical safety structure.

2. Causes of the Failure

The subsequent investigations, including a formal Inquiry by the NSW Resources Regulator (2020), identified a complex interplay of factors:

- **Foundation Weakness:** The dam was constructed on weathered and altered rock (sheared rhyodacite). This foundation material was weaker than anticipated in the original design, containing clay-rich seams that reduced shear strength.
- **Design and Construction Flaws:** The centerline raise construction method, combined with the use of unsaturated, un-compacted **cycloned tailings sands** as the primary building material, created a vulnerable structure. The sands were prone to saturation and strength loss.
- **Inadequate Drainage:** Internal drainage systems within the dam wall were insufficient to manage pore water pressure effectively. This allowed water to build up within the structure, further weakening it.
- **Seismic Trigger:** The region experienced minor seismic activity in the months preceding the failure. While not a major earthquake, it is believed these small tremors contributed to the accumulation of strain and the eventual liquefaction potential of the saturated sands.
- **Systemic Governance Failures:** The Regulator's Inquiry found failures in risk assessment, design review, and adherence to the "International Council on Mining and Metals (ICMM) Tailings Governance Framework." There was an over-reliance on the original design without adequate review of changing conditions.

3. Impact on Groundwater

Despite no surface spill, the incident had profound and ongoing impacts on groundwater, representing one of its most significant environmental legacies.

a) Mechanism of Contamination:

The failure disrupted the integrity of the dam's base and underlying geology. Tailings slurry, held

behind the dam wall, comes into direct contact with the ground. Under normal conditions, a liner system (natural or engineered) minimizes seepage. The failure compromised this, leading to:

- **Enhanced Seepage:** Increased migration of tailings pore water (laden with contaminants) into the subsurface.
- **Direct Pathway Creation:** Cracking or subsidence potentially created new pathways for contaminant transport into shallow aquifers.

b) Key Groundwater Contaminants:

- **Sulphate:** The primary and most widespread contaminant. Generated from the oxidation of sulphide minerals (e.g., pyrite) in the tailings. Sulphate levels downstream of the TSFs skyrocketed, exceeding aesthetic and health guideline values by large multiples.
- **Metals:** Elevated concentrations of nickel, arsenic, aluminium, and zinc were detected in monitoring bores.
- **Acidification:** While the tailings system was net-neutralizing, localized acid generation was possible, mobilizing heavier metals.

c) Documented Groundwater Impact:

- **Plume Migration:** A distinct sulphate plume was mapped migrating several kilometers down-gradient (north and north-east) from the TSFs.
- **Impact on Aquifers:** Contamination affected both shallow alluvial aquifers and deeper fractured rock aquifers, complicating remediation.
- **Loss of Beneficial Use:** Multiple private groundwater bores used for livestock watering and irrigation were contaminated, rendering them unusable. This directly impacted local farmers.
- **Surface Water Interaction:** Groundwater discharge into local creeks (e.g., Cadiangullong Creek) led to elevated sulphate levels in surface water, illustrating the interconnectivity of the water systems.

4. Response and Remediation Measures

- **Immediate:** Emergency stabilization of the dam wall, massive pumping and treatment of water from within the dam to lower the reservoir level.
- **Groundwater Management:**
 - **Expanded Monitoring Network:** Installation of dozens of new groundwater monitoring bores to track the plume.
 - **Hydraulic Containment:** Installation of interception wells and pumping systems to extract contaminated groundwater, creating a "hydraulic barrier" to slow plume migration.
 - **Water Treatment:** Construction and operation of a dedicated sulphate removal plant (using reverse osmosis and other methods) to treat extracted groundwater.
 - **Alternative Water Supply:** Providing potable water tanks and constructing pipelines to supply affected landowners with clean water.
- **Regulatory:** The NSW Regulator issued multiple legally enforceable directives. The incident became a catalyst for major reform in tailings regulation across Australia, leading to a public register and stricter compliance requirements.

5. Long-Term Consequences and Lessons

- **Environmental:** Long-term (decades-scale) commitment to groundwater monitoring and treatment is required. Complete containment or clean-up of the deep groundwater plume is extremely challenging and may not be fully achievable.

- **Social:** Erosion of trust with the local community and landowners, leading to litigation and ongoing disputes over water rights and property impacts.
- **Economic:** Costs exceeding hundreds of millions of AUD for remediation, water treatment, alternative water supplies, and legal settlements.
- **Industry-Wide Lessons:**
 1. **Foundation is Critical:** Comprehensive understanding of subsurface geology at TSF sites is non-negotiable.
 2. **Conservative Design:** The risks of using tailings sands as construction material in high-risk dams were highlighted.
 3. **Governance & Oversight:** Reinforced the need for rigorous, independent engineering review and transparent risk management, as per global best practices (ICMM, Global Industry Standard on Tailings Management).
 4. **Groundwater is a Primary Risk:** Tailings facility risk assessments must prioritize groundwater impact scenarios, even in the absence of a surface breach.

6. Conclusion

The Cadia tailings dam failure is a landmark case study in **high-consequence geotechnical failure without a catastrophic breach**. It demonstrates that structural instability alone can trigger severe and long-lasting environmental damage, particularly to groundwater resources. The incident shifted regulatory and industry focus towards the inherent risks in tailings dam design, construction methods, and the paramount importance of protecting groundwater systems from mining operations. It stands as a costly warning that the integrity of a tailings dam is inextricably linked to the health of the surrounding hydrogeological environment.