

Technical Review

To:	Alexandra Smith	Date:	29/4/2025
Authority:	Environment Southland	Ref:	24116_2E
Consent:	APP-20242608 _Waikaka Gold Mines Ltd		
From	Role in Audit	Internal Reviewer	
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1 Project Summary

Waikaka Gold Mines LTD proposes to establish a gold mine near the Waikaka Stream in Southland and has applied for resource consents to Environment Southland (ES) and the Gore District Council. ES have engaged e3Scientific to complete an ecological audit of the freshwater ecology aspects of the consent application which resulted in a request for further information (RFI). This audit reviews the RFI response completed by Ross Dungey (April 2025) provided to e3Scientific on 08/04/2025. This audit considers the specific questions outlined in Section 2.

The initial freshwater ecological report outlined the ecological characteristics present but did not assign any ecological values of High, Moderate or Low based on a demonstrated methodology such as the EIANZ (2018) Guidelines, this is still the case. Without an assessment evaluating the ecological value and effects of the various activities following an established industry standard protocol it is difficult to effectively assess the potential effects of the activity and therefore a precautionary approach should be taken.

The responses to each question are considered in Section 2 and the overall findings and summary is provided in Section 3.

2 Audit Questions

2.1 Freshwater Ecology

Q1. *What is proposed for the network of open drains/ditches? It is important to understand this as these appear to be important habitat for the "Threatened - Nationally Vulnerable" Gollum galaxias (page 25 of AEE). In particular, but not limited to:*

- i. Will diversions reduce the length, width, gradient, and natural character of ditches present? If yes, what length, width, gradient, and natural character will the resulting channels be?*
- ii. What mitigation or offsetting is proposed to ensure no net loss of these species and associated habitat occurs? Will fish salvage in the ditches be undertaken, and where will fish be released? Is increased predation of Gollum Galaxias fry anticipated, why, and how would this be avoided?*

Q1. Response summary

Fish salvage will be undertaken and there will be uniform ditch channel habitat to release Gollum galaxias to, eels will be released elsewhere. Fish salvage and replacement of the ditches is considered sufficient mitigation for the 'very low value habit'.

Q1. Audit Assessment

It is good that Gollum galaxias "ditch" habitat will be replaced and that their fish predators are not immediately present. In my opinion the replacement of mature ditches that have a variety of habitat with uniform U-shaped channels is likely to reduce the quality of the habitat available for the "Threatened – Nationally Vulnerable" Gollum galaxias. The presence of threatened fish in the ditches results in the habitat not being "very low value habitat" as stated in the response. The Rehabilitation plan will need to include details of what ditches will be established, where, how and what habitat improvements are proposed to help maintain Gollum galaxias populations along with a proposed monitoring plan. A specific Gollum Galaxias Management Plan that clearly outlines where ditches will occur, how and what habitat improvements will be implemented and what monitoring will be undertaken to demonstrate the success of these actions would be a more appropriate approach.

Q2. *Are freshwater mussels (*Echyridella menziesii*) (Declining) present in the reaches to be diverted? Confirm whether it is proposed to collect and release*

freshwater mussels and koura (*Paranephrops zealandicus*) (Declining) (Grainger, et al., 2018).

Q2. Response summary

"No freshwater mussels were located during the aquatic surveys."

Q2. Audit Assessment

This response appears appropriate. However, the Rehabilitation Plan should include a requirement to translocate any *Echyridella menziesii* or *Paranephrops zealandicus* found during the river diversion operations.

Q3. *Freshwater species upstream and likelihood of need to migrate through this reach is not mentioned in the ecology report. Please provide a fish passage and migration timing assessment and description.*

Q3. Response summary

The response accurately assesses the migration times of the species covered (trout and eels). The response outlines there will be continuous flow via a channel at all times to maintain fish passage. Outlining fish passage is required in autumn, winter and spring.

Q3. Audit Assessment

The response overlooks the migration timing of the At-risk Declining longfin eel juvenile upstream migration in summer. Therefore, the assessment that summer is the best time of year ecologically requires further comment to understand how impacts on this species will be avoided. The response also does not outline how sediment and velocity will be managed to ensure the diversion channels do not create a sediment pulse that can have adverse effects on fish or create a velocity barrier. This is important to consider if the diversion will overlap with an At-risk native fish migration phase.

Q4. *What time of year are diversions proposed to occur? This is relevant to the migration timings of the fish potentially present and the spawning timings of fish known to be present.*

Q4. Response summary

The best time of year ecologically and operationally is summer.

Q4. Audit Assessment

This response is appropriate. Although as above it appears to not consider longfin eel juveniles.

Q5. *Provide details on restoration and habitat creation methods proposed in the diversion channels and the reinstated channel sections, so that the appropriateness of the proposal can be assessed. This may include, but not be limited to:*

- i. *An assessment of the current number and size of pool, run, riffles within the Waikaka Stream, Shepherds Creek, and unnamed ditch reaches to be diverted. Confirm how many will be established in the temporary diversion channels and the restored channels, method, and reasoning.*
- ii. *An assessment of the current number of undercut banks in the Waikaka Stream, Shepherds Creek and unnamed ditch reaches to be diverted. Confirm how many will be established in the temporary diversion channels and the restored channels, method, and reasoning.*

Q5. Response summary

The Waikaka Stream is predominantly pool and run habitat, with 66% undercut banks.

Shepherds Creek has roughly equal proportions of pool/run/riffles.

Ditches are uniform channels, replacement ditches will be constructed the same size with the occasional pool added, no undercut banks are planned for these to maintain this habitat to exclude trout and maintain Gollum galaxias populations.

The response outlines the approach for the restored Waikaka Stream channel and suggests any habitat creation in the temporary (approx. 1 year) diversion channels is not necessary).

Q5. Audit Assessment

The response outlines the approach for the restored/rehabilitated Waikaka Stream channel. The response suggests no habitat creation in the temporary diversion channels is necessary due to their short duration in place. However, as there are 3 separate diversions proposed, the duration of reduced habitat quality and extent would therefore equate to approximately 6 years. In addition to that, the restored channels are expected to take several further years to attain similar ecological habitat value to the existing channel. In my opinion, habitat enhancements should be added to the temporary channels to provide suitable habitat, offset the temporary loss of stream extent and to trial habitat features (boulder clusters and large woody debris) proposed for the rehabilitated Waikaka Stream channel.

The response is vague regarding Shepherds Creek using words "if" and "can" rather than "shall". Will the rehabilitated Shepherds Creek be designed to have similar sinuosity as the existing creek?

Q6. *Riparian shading - Describe management actions, mitigations, or offsetting proposed for removal and delay in growth of effective riparian shading and associated warmer water temperatures in the temporary diversion channels and the restored channels.*

Q6. Response summary

Water temperatures are high in the Waikaka Stream over summer. A shorter diversion length is proposed to minimise water temperatures with shade plantings only proposed for the restored/rehabilitated channel after the diversion completion.

Q6. Audit Assessment

The response does not outline management actions other than ensuring diversion channels are short in length. Comment is made that riparian shading would be difficult. No consideration is made of potentially using shade cloth over the stream or planting one bank to provide shade where possible. The lack of shade in the diversion channels and potential for elevated summer water temperatures is therefore still an adverse effect on an At-risk species that does not appear to have been adequately addressed, in my opinion.

Q7. *Diversion length - Will the temporary loss of stream length and associated habitat be addressed by offsetting or other actions? Please describe.*

Q7. Response summary

The shorter diversion length is the mitigation against increased stream temperatures.

Q7. Audit Assessment

This response outlines that the shorter length will help alleviate potential water temperature issues. The response however does not adequately address the loss of habitat extent for At-risk Declining longfin eels over the 6-year period that diversions will be in place.

Q8. *Wetlands appear to be present on the true left of the Waikaka River, no wetland delineation or assessment in relation to wetland effects has been made. Please provide delineation and ecological assessment of the wetland areas on the site, and planning assessment.*

Q8. Response summary

The response covers the 8 ponds previously discussed and assesses them against RMA and ES plans.

Q8. Audit Assessment

The response is largely acceptable with regard to the 8 ponds. The ponds have been adequately covered ecologically. The exception is the potential wetland located near the riparian zone of the Waikaka Stream at NZTM E1290826 N4903804. This (and any others) should be assessed following the Wetland delineation protocols (2022) by a suitably qualified person.

Q9. *The application proposes that a "better" standard in the rehabilitated channel be achieved. Describe how this will be achieved and measured.*

Q9. Response summary

Cobble riffles and LWD will be used to create habitat along with riparian plantings for shade. Comparison of fish population and habitat statistics in the rehabilitated channels will be made with the pre-existing channels.

Q9. Audit Assessment

"Various stream rehabilitation methods" are proposed. However, no ecological values or effects assessment following EIANZ guidelines has been made. Therefore, details on how many "cobble riffles", "LWD", "rock riprap", "strategic planting" and pools will be established in the rehabilitated channel was requested to adequately assess if the proposed actions are sufficient to mitigate adverse environmental effects. Further details on the number, location and design of habitat features in the rehabilitated channel is still required to have confidence in the potential long-term effects of the activity.

Q10. *Temporary effects - Please describe the temporary effects of the works on freshwater ecology. This should include, but not be limited to: time of temporary effect; level of effects; measures to be used to avoid, remedy, mitigate, or offset; and reasons for measures proposed to be used.*

Q10. Response summary

There will be a temporary loss of habitat but the rehabilitated stream will "provide more and better habitat".

Q10. Audit Assessment

The duration of each temporary diversion is not confirmed and consecutive diversions are proposed. Again, no detail on the number or location of habitat structures is provided, without that information "more and better habitat" remains unsubstantiated.

Q11. *Please provide a draft Erosion and Sediment Control Plan (ESCP). This helps to understand whether erosion and sediment risks can be managed through consent*

conditions.

Q11. Response summary

No response in R Dungey report, but the Town Planning group response includes a response that the applicant plans to provide an ESCP prior to the commencement of work near surface water bodies. Proposed conditions 46-49 and 69-70 relate to ESC.

Q11. Audit Assessment

It may be more applicable to provide the ESCP at a later stage but an indication of the type of measures planned to be put in place would be useful as the proposed instream works are extensive. However, the National Works in waterways guideline (National works in waterways guideline | Ministry for the Environment) is a useful tool. The response is acceptable.

Q12. Baseline water chemistry in surface water at the site, including suspended sediment, heavy metals, aluminium, and associated toxicity modifying factors (pH, hardness, dissolved organic carbon). This baseline data will help to refine the parameters that would be testing during the life of the consent.

Q12. Response summary

No response in R Dungey report, but response in the Environmental Associates response 27 January 2025 points to previous information provided in an earlier Environmental Associates report (March 2024).

Q12. Audit Assessment

The response is adequate with regard to mine processing water. An assessment of the predicted sediment inputs from the man-made diversion channels and re diversion of water back into recreated/rehabilitated streams is required to ensure a baseline is understood and ensure sediment mobilisation from created channels do not adversely alter the ecological properties of the stream. This still does not appear to be addressed.

3 Freshwater Ecology Audit Findings

Overall, the response supplied by R Dungey (April, 2025) addressed the majority of the questions well in the RFI response. However, certain aspects require further clarification:

- A) Can you please provide comment on how impacts to juvenile longfin eel migration will be avoided with the proposed stream diversions planned to be undertaken during summer (i.e. migration periods)?
- B) Will the rehabilitated Shepherds Creek be designed to have similar sinuosity

as the existing creek? If not, please provide rationale as to how similar ecological values will be provided.

- C) Further information on how shade will be provided to the diversion channels is required.
- D) It appears from the site walkover I undertook on the 31/10/2024 that a potential wetland is located near the Waikaka Stream at NZTM E1290826 N4903804. Can you please provide information as to what assessment (if any) has been undertaken to confirm or discount wetlands at this site (and others nearby). This location should be assessed following the Wetland delineation protocols (2022) by a suitably qualified person.
- E) If this site (NZTM E1290826 N4903804) or any others nearby are deemed to be a wetland, what management actions are proposed for the loss of this wetland?
- F) Further details on the number, location and design of habitat features in the rehabilitated channels is required to establish the potential long-term effects of the activity.
- G) Please undertake an ecological value and impact assessment regarding the activity following an industry standard protocol such as EIANZ (Roper-Lindsay et al., 2018).

Suggested additional requirements for any potential consent;

- A) The Rehabilitation plan will need to include details what ditches will be established, where, how and what habitat improvements/protections are proposed to help maintain Gollum galaxias populations along with a proposed monitoring plan.
- B) The Rehabilitation Plan should include a requirement to translocate any *Echydella menziesii* or *Paranephrops zealandicus* found during the river diversion and fish salvage operations.
- C) Habitat enhancements shall be added to the temporary channels to provide suitable habitat, offset the temporary loss of extent and to trial habitat features (woody debris and boulder clusters) proposed for the rehabilitated Waikaka Stream channel.