

APP- RM23.819

Summary of evidence by Mark Hamer 9/5/2024

1. I am a Senior Freshwater Ecologist at e3Scientific Limited. I have been in this role since January 2023. My education consists of a BSc and MSc in Ecology from Massey University.

2. I have worked as a freshwater ecologist undertaking stream, river and lake ecological assessments in the Waikato for the last 18 years and Central Otago over the last 16 months. During this time, I have completed numerous ecological investigations helping develop new monitoring methods and procedures. I also undertook regional council state of the environment monitoring and reporting using stream periphyton, macrophytes, macroinvertebrates and freshwater fish as indicators of aquatic health.

3. I have authored or co-authored over 20 scientific publications and technical reports with topics ranging from functional indicator use to demonstrating new fish passage options at culverts.

4. I confirm that I have read the Expert Witness Code of Conduct set out in the Environment Court's Practice Note 2023. I have complied with the Code of Conduct in preparing this evidence and agree to comply with it while giving oral evidence before the Hearings Panel. This evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

5. The stream habitat of the Tima Burn is considered generally of low quality.

6. There are two "At Risk – Declining" fish present (longfin eel and inanga). In my review I suggested these were "threatened" fish. I acknowledge that my wording was incorrect, in that they have a threat classification but are not 'threatened' and agree with Dr Allibone (points 47-49) that they are "At-Risk" rather than threatened. Nevertheless, Tables 4 and 7 of the EclA Guidelines (Roper-Lindsay, et al., 2018) outline that the presence of "Threatened, At Risk or uncommon species" are attributes to be assessed when considering the Rarity/Distinctiveness matter.

7. I also note that the "Threatened - Nationally Vulnerable" lamprey have been recorded at locations within the Tima Burn, 320 m upstream of Teviot Rd in Department of Conservation fish surveys in 2000, 2014 and 2016 (Figure 1). Lamprey are a migratory fish and adults would need to migrate upstream through this section of stream to access upstream sites (and juveniles would migrate downstream through this section). While lamprey were not found in the survey undertaken by Dr Allibone (likely due to a lack of suitable backwaters with fine sediment streambed) they have been found to be present on 3 occasions in the last 25 years indicating they do use this waterway as habitat. I would therefore assess the ecological value of the fish present in this section of the Tima Burn as "High".



Figure 1: Map of Tima Burn with sites surveys in the ecological assessment and historical lamprey records.

8. The proposed condition 5 (Section 42A Report Appendix 1b) to augment the flow of the Tima Burn with 21 L/s of flow will provide benefit to the ecology of the stream present particularly if the augmentation can be of cool (the same as ambient stream temperature or lower), clean (no sediment or mining related contaminants) and well oxygenated (>8 mg/L) water.

9. Dissolved Oxygen – I agree with the ecological processes outlined in point 55 of Dr Allibone's evidence (Allibone, 2024). Dissolved Oxygen levels greater than 8 mg/L provides sufficient level of oxygen to aquatic life present. Ensuring the water augmentation discharge has dissolved oxygen levels greater than 8 mg/L is appropriate ecologically. I consider it sufficient to ensure the augmentation water is monitored to ensure > 8 mg/L dissolved oxygen rather than monitoring downstream of the flow augmentation input.

10. In summary, it is my opinion the Tima Burn stream habitat is of low quality. The fish community present is indicative of "high" quality in terms of rarity values. Water augmentation to maintain or enhance the stream flow is appropriate and beneficial to the ecology of the stream provided the water is of good quality.

References

- Allibone, R. M. (2024, April 29). Evidence of Richard Mark Allibone on behalf Hawkeswood Mining Limited (Freshwater Ecology).
- Roper-Lindsay, J., Fuller, S. A., Hoosen, S., Sanders, M. D., & Ussher, G. T. (2018). *Ecological impact assessment, EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 2nd edition*. Melbourne: EIANZ.

Appendix A. Further information

Proposed Condition 5.

5.	<p>During any period of groundwater abstraction for mine dewatering purposes and where any water table level decline as a result of mine dewatering exceeds 0.2 m adjacent to the reach of the Tima Burn from Teviot Road Bridge to the confluence with the Clutha River:</p> <ul style="list-style-type: none">a) The consent holder shall provide environmental flow augmentation to the Tima Burn to maintain either:<ul style="list-style-type: none">i. A minimum of 21 L/s of stream flow throughout the reach from Teviot Road Bridge to the confluence with the Clutha River, orii. The assessed natural flow in the Tima Burn at/downstream of Teviot Road Bridge to the confluence with the Clutha River corresponding to an upstream catchment natural MALF of 21 L/s (i.e. inclusive of any natural stream leakage).b) The non-consumptive flow augmentation to the Tima Burn shall be abstracted from groundwater sources and form part of the dewatering allocation to this resource consent.c) Any non-consumptive flow augmentation from groundwater sources to the Tima Burn shall be fresh (clean) water to fresh water, and be undertaken within the requirements of the relevant permitted activity in the Regional Plan: Water for Otago.d) Any flow augmentation to the Tima Burn shall be reasonably oxygenated by aerating the water using a diffuser and/or riffles or similar approach, and shall not cause scour or bank erosion.
----	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Regional Plan: Water for Otago 12.B.1.10

RULES: WATER TAKE, USE AND MANAGEMENT

- 12.B.1.10 The discharge of any contaminant, excluding settled sediment, present in water impounded by a dam that is not permitted by Rule 13.2.1.3, to water in a lake or river, is a *permitted* activity, providing:
- (a) The purpose of the dam is not for the storage of contaminants; and
 - (b) The dam operator has not caused the contaminant to be discharged into the dam from which it is discharged; and
 - (c) The discharge, after reasonable mixing does not give rise to all or any of the following effects:
 - (i) The production of any conspicuous oil or grease films, scum or foams, or floatable or suspended materials; or
 - (ii) Any conspicuous change in colour or visual clarity; or
 - (iii) Any emission of objectionable odour; or
 - (iv) The rendering of fresh water unsuitable for consumption by farm animals; or
 - (v) Any significant adverse effect on aquatic life; and
 - (d) The discharge ceases when an enforcement officer of the Otago Regional Council requires the discharge to cease to provide for clean-up operations and prevent adverse effects on the environment.