



# Technical Review

<b>To:</b>	Danielle Ter Huurne	<b>Date:</b>	18/08/2023
<b>Authority:</b>	Otago Regional Council	<b>Ref:</b>	23009.6B
<b>Consent:</b>	RM23.474 Hawkeswood Mining Limited		
<b>From</b>	<b>Role in Audit</b>		
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This brief memo is to discuss whether the s92 response adequately answers the concerns outlined in my initial review:

## Points 1-4. Hydraulic Data and Assessments

The provided maps of depth to water, water elevations and saturated thickness improve the clarity of the assessment. Whilst the map of water elevations demonstrates considerable uncertainty due to coarse interpolated land surface elevations, the saturated thickness and depth to water table are based on actual measured points and are therefore helpful.

The uncertainty and limitations regarding the pumping tests and calculated aquifer parameters has been discussed, and it is acknowledged that the actual pumping rates of the test provide the best information (rather than the interpretations). However, while additional models or assessment may not provide further certainty, this does not mean that there will not be effects on both the Tima Burn and other groundwater users, therefore monitoring the effects and using adaptive management strategies is appropriate mitigation for the potential effects.

### Point 5: Tima Burn

Whilst the Tima Burn may at times be dry, this meets the description of an intermittent stream, rather than ephemeral<sup>i</sup>. There was no source provided for the ORC flow monitoring assessment, and there is still very limited understanding as to how often and for how long and over what reach the Tima Burn is dry. The discussion regarding the need to assess stream depletion within the ORC Regional Water Plan is unclear. Whilst Policy 6.4.1 A c) states that the take may be allocated as "(c) Groundwater and part surface water if the take is 100 metres or more from any connected **perennial** surface water body, and depletes that water body most affected by at least 5 litres per second as determined by Schedule 5A", the explanatory note in Schedule 5A for classifying other takes as groundwater only concludes that stream depletion is unlikely "Where the adjacent surface water body;

(b) Is ephemeral, or dry for extended periods, containing or conveying water only in episodes of high runoff; or

(c) Is separated from the underlying water table by an unsaturated zone, decoupling the interaction into a one-way loss of surface water from the surface water body."

Whilst the stream may be entirely lost to groundwater during dry seasons, it does not seem that the stream "contains or conveys water only in episodes of high runoff" and there is insufficient evidence that the watercourse is entirely disconnected from groundwater. It appears that the stream bed may be quite incised and that there is sufficient undulation in the landscape to cast uncertainty on whether there is an unsaturated zone beneath stream.

The New Zealand Freshwater Fish Database records the following fish in the Tima Burn. This indicates that there are values for the Tima Burn which should be considered; decreasing temporal and spatial connectivity of the Tima Burn to the Clutha River may have adverse effects on these fish.

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<sup>i</sup> Ephemeral streams only convey water in periods of high runoff

<b>Fish species</b>	<b>Threat Classification</b>
Longfin eel	At-Risk Declining
Shortfin eel	Not Threatened
Lamprey	Threatened Nationally Vulnerable
Koaro	At-Risk Declining
Torrentfish	At-Risk Declining
Upland bully	Not Threatened
Common bully	Not Threatened
Brown Trout	Introduced and Naturalised
Rainbow trout	Introduced and Naturalised
Chinook Salmon	Introduced and Naturalised
Perch	Introduced and Naturalised

#### **Point 6: Closed Landfill effects**

The PSI only assessed surface contamination and hence has limited value for this discussion. The unsaturated zone beneath the landfill does not mean that there is not a contaminated plume of water beneath the landfill that can be mobilised during pumping. Dilution of contaminated waters is however likely to attenuate effects, if the extent of the plume is not large.

#### **Consent conditions**

Given the uncertainty within the assessment and the neighbouring sensitive receptors, monitoring conditions previously stated in my original technical review are recommended.