

Before the Independent Hearing Panel

In the Matter of the Resource Management Act 1991
(RMA)

And

In the Matter of an application to the Central Otago District Council and Otago Regional Council for resource consent to establish and operate a gold mining activity at 1346 – 1536 Teviot Road, Millers Flat

Reference RC230325 (Central Otago District Council)
RM23.819 (Otago Regional Council)

**Supplementary Statement of Thomas Brendan Heller on behalf of
Hawkeswood Mining Limited**

(Groundwater Take and Discharge - Hydrology and Water Quality)

Dated 25 June 2024

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Introduction

1. My full name is Thomas Brendan Heller and I provide this supplementary statement of evidence in relation to the Hawkeswood Mining Limited (**HML**) mining proposal at Millers Flat.
2. My qualifications and expertise statements are provided within my brief of evidence in-chief dated 29 May 2024. I reaffirm that I have read and agree to and abide by the Environment Court's Code of Conduct for Expert Witnesses as specified in the Environment Court's Practice Note 2023.

Supplementary Statement

3. This supplementary statement is provided to clarify matters arising during the hearing relevant to my expertise, including those raised within the additional summary statement of evidence tabled at the hearing by Ms Alexandra Badenhop on behalf of the Otago Regional Council (**ORC**).¹
4. The matters which this supplementary evidence addresses are:
 - a. General Groundwater Information and Prediction of Effects.
 - b. Millers Flat Closed Landfill.
 - c. Replacement Water Supplies.
 - d. Discharge to Land, and
 - e. The Tima Burn.

¹ Summary Statement of Badenhop, dated 16 May 2024.

Groundwater information

5. Ms Badenhop suggested that there was some uncertainty around aquifer parameters and investigation data pertaining to the HML proposal.² Ms Badenhop has not provided any technical evidence to illustrate her concern. Ms Badenhop did acknowledge that the mine pit pumping test provides the best information regarding the required pumping rates (and that also follows on to assessment of effects of the activity).³ I have revisited my assessments given her comments and confirm my earlier opinion that the aquifer testing, trial dewatering testing and other aquifer information have been undertaken to reasonable required standards and provide an appropriate basis for assessment of the proposal. I note this information was provided to ORC both within the application for resource consent and within s92 further information requests. ORC was satisfied with the information provided and did not request any further information in that respect.

6. Additionally, Ms Badenhop identifies that the site is complex and there is variability across the site.⁴ To clarify, all groundwater systems are relatively complex. In my opinion the HML application provides sufficient information and conservatism within assessments, to provide a robust proposal. I have given careful consideration during my initial assessments to the issue of variability within the site. The variability across the site is not at any one location. Any variability is relatively evenly spread and trends across the whole site in any direction. In my view the number and location of investigation drill holes are appropriate to reasonably determine site characteristics.

² Summary Statement of Badenhop, at [Paragraph 6].

³ Summary Statement of Badenhop, at [Paragraph 6].

⁴ Summary Statement of Badenhop, at [Paragraphs 5 and 7].

Prediction of Effects

7. Ms Badenhop considers that there is “considerable” uncertainty around the actual effects that may occur from the HML mining proposal.⁵ I accept there is a degree of uncertainty, but the position is more nuanced than Ms Badenhop’s statement suggests, given the way I approached my assessment. My analysis was undertaken allowing for that consideration. I am of the view that her characterisation is unhelpful, to the extent that it might suggest the potential for effects beyond the bounds of what has been assessed. That is not the case. In my opinion the scope for variance of effects is constrained to within the conservative effects assessment (based on known factual data and science), provided by HML.

8. It follows from my observation above that any uncertainty is only concerned with the potential for actual effects to be of a lesser nature than was assessed, given the conservative scope and scale assessed. The uncertainty in relation to effects is in my opinion no more than minor in nature from the perspective of an effects outcome. Some further discussion of specific effects is provided in evidence below.

9. I have also reviewed the most recent ORC recommended conditions of consent amended by HML and attached to Ms Collie’s Supplementary Statement including all monitoring and trigger level/limit requirements, and my professional opinion is that they are appropriate in respect of the requested HML activities and in respect of site hydrogeology and water quality. My position regarding any minor modification to ORC recommended conditions of consent(s) has not changed from my evidence in-chief.

⁵ Summary Statement of Badenhop, at [Paragraph 8].

Millers Flat Closed Landfill

10. Ms Badenhop presents a key issue in respect of groundwater quality as the “mobilisation” of contaminants from the Millers Flat Closed Landfill. However, her summary statement then acknowledges dewatering will not increase contaminant mobilisation from the landfill due to an unsaturated zone occurring beneath the landfill.⁶ I have relooked at this matter. My opinion remains that no issue arises. It is confirmed by piezometric data that there is at least a 5 metre unsaturated zone (Vadose zone) that occurs below the base of the landfill to the water table, and as such there can be no effect of mine dewatering upon any landfill contaminant mobilisation.

11. In relation to groundwater quality that currently exists beneath the landfill, while Ms Badenhop suggests there was delay in provision of water quality data, the ENGEO (CODC Landfill Monitoring) report (containing the water quality data) was available to her when preparing her summary statement. Irrespective of timing of provision of the report, the results in that report indicate good water quality from the samples analysed. Ms Badenhop does not disagree with those results. In my opinion this report is robust.

12. Ms Badenhop questions the location of the dedicated landfill monitoring well (G43/0112).⁷ Her concern does not appear to take proper account of the regional groundwater mapping provided by HML, the location of the well plotted against the extent of the landfill (exclusion zone) in HML site plans, and that the landfill monitoring well was placed in conjunction with ORC direction and authorised ORC resource consent 95233. Whilst the monitoring well is offset from the landfill centroid, it is clearly located in a south westerly direction on the Clutha Mata-au River side, downgradient of the landfill. Also to note is that resource consent 95233 authorises discharge from the landfill (as seepage through the landfill) at 0.032 L/s, which is a

⁶ Summary Statement of Badenhop, at [Paragraph 9].

⁷ Summary Statement of Badenhop, at [Paragraph 14].

very small potential for contamination of groundwater and which supports the monitoring results obtained from the dedicated monitoring well.

Replacement (Well) Water Supplies

13. Potential effects of the proposed HML mine dewatering drawdown upon adjacent water supply wells are clearly identified within the HML application and proposal. In my opinion there is likely to be only 4 wells used for drinking water supply that may be adversely affected by the mining proposal (a lesser number than identified in the conservative assessment), and those 4 well owners have provided written approval. In any event, water supply is secured through conditions of consent if effects occur.

14. The most recent recommended resource consent conditions as attached to the supplementary evidence of Ms Collie provide specific requirements for HML in respect of maintaining water supply continuity to well owners (for both quantity and quality of supply). I agree with these conditions. At the direction of the panel, HML has completed a draft water management plan that outlines all monitoring and compliance requirements and presents a specific trigger level assessment approach and methodology to address all potentially affected well owners in relation to the proposed HML mining activity.

15. In that respect, I confirm that I have prepared the technical specifications for the draft HML water management plan in relation to required water related monitoring and compliance, and it is my professional opinion that they are appropriate in respect of any hydrogeological and water quality effects of activities. I consider that the content of the HML water management plan is consistent with other previously authorised mining

activities (in Otago and Southland) I am aware of, in addressing replacement water supplies (for quantity and quality) where and as required.

Discharge to Land

16. Ms Badenhop has presented an assumption on her part that in the location of the proposed discharge to land areas, there could be significant migration of groundwater flow parallel to the Clutha Mata-au River, toward groundwater users.⁸ That assumption is not validated by the HML assessment of groundwater flow direction based on the piezometric data. The direction of groundwater flow, irrespective of the discharge to land is in a south westerly direction, toward the Clutha Mata-au River. There are no groundwater users in any location that would be affected by the discharge to land, that are not within the mine footprint and have already provided written approval.

17. I add with respect to discharge to land, that I have prepared a plan showing a discharge to land envelope (**Appendix A**). This is appended to the Water Management Plan and Master Plan set. The discharge to land area is located at or about areas of old tailings, where suitable infiltration is able to be achieved.

18. The proposed and accepted HML river water quality monitoring (as presented in the ORC recommended conditions of consent), provides for upstream and downstream monitoring and assessment for the effects of the discharge to land upon the Clutha Mata-Au River.

19. Ms Badenhop has expressed concern that a single water sample from the mine pit pond does not reflect discharge water quality under operational conditions.⁹ Whilst that is true, in my view no issue of concern arises as a

⁸ Summary Statement of Badenhop, at [Paragraph 10].

⁹ Summary Statement of Badenhop, at [Paragraph 17].

consequence of her observation. Firstly, the sample results were presented as being reflective of groundwater quality in that location. There is no challenge to that position. I accept that operational discharge will differ from water sitting in the non-operational mine pond, but the difference discharge quality is invariably the increase in suspended solids and turbidity, as the mining operation does not introduce any contaminants. Potential effects of suspended solids and turbidity have been assessed and mitigation and management measures put in place secured by proposed conditions of consent to address those issues.

20. Ms Badenhop also questions the extent of a 10 metre Vadose Zone in vicinity of the proposed discharge to land location(s).¹⁰ To clarify, the depth to water table (from land surface) information provided to ORC in the s92 information request, clearly shows an approximate 10 metre thickness of unsaturated gravels in vicinity of the proposed discharge to land location(s).
21. The information is supported by investigation well data. While any excavation below land surface for discharge infiltration purposes will reduce the depth to the water table, in my opinion it remains comfortably sufficient for the purposes of discharge to land.

The Tima Burn

22. The HML application and proposal provided an assessment of the potential effect of stream depletion of the Tima Burn in relation to drawdown effects of mine dewatering. The assessment considered that the Tima Burn waterbody was either not in hydraulic connection with the adjacent aquifer, or was perched above the water table aquifer, and any effect of the mine dewatering was unlikely upon stream flow. However, as a conservative approach, HML have provided adaptive management conditions which are proposed in the ORC recommended conditions of consent, to fully mitigate any stream depletion effect upon the Tima Burn. This was considered by Ms

¹⁰ Summary Statement of Badenhop, at [Paragraph 15].

Badenhop to be a “reasonable response” as effects would be temporary.¹¹
We are in agreement on that point.

23. In relation to the panels’ directive for a suitable management plan to consider trigger levels and flow augmentation methodology for the Tima Burn, HML have since installed two monitoring piezometers adjacent to the Tima Burn on the true right bank (under permitted activity rules). I have prepared a written report for HML based on the information gained which provides analysis of the stream-groundwater connection, and likelihood of stream depletion from HML dewatering activities. The report is included as **Appendix B** to this evidence. I have summarised the report as below.

24. The piezometers (MF249 and MF250) were placed at set distances adjacent to the Tima Burn, downstream of the Tima Burn Bridge, being representative of the stream reach below the bridge. The piezometer(s) reference level along with adjacent Tima Burn water level(s) were surveyed (**Appendix C**).

25. From measured groundwater and surface water levels, and well log depths, a long section schematic of stream and groundwater (aquifer) occurrence has been developed and is shown as Figure 1 in **Appendix D** to this evidence.

¹¹ Summary Statement of Badenhop, at [Paragraph 19].

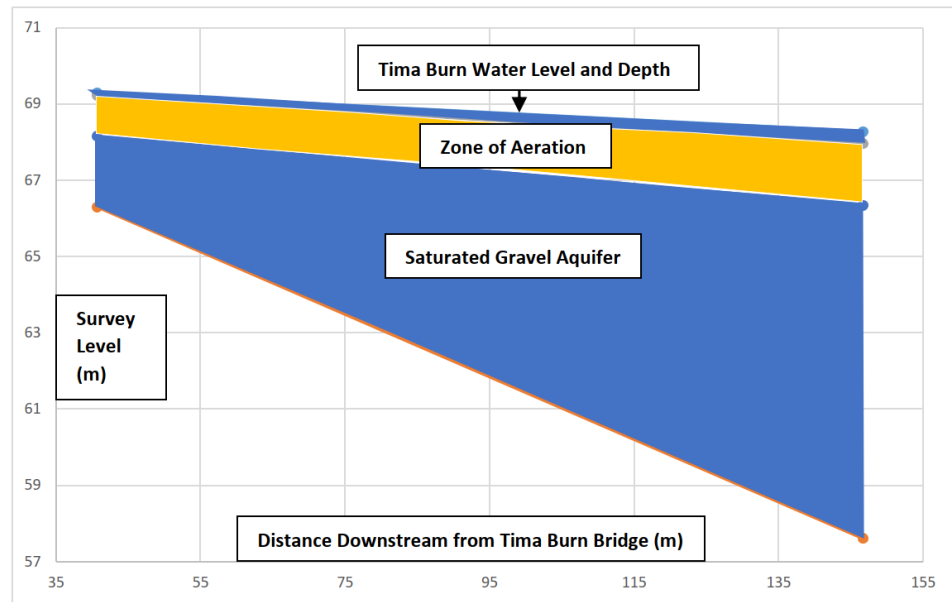


Figure 1 Section showing Tima Burn and adjacent aquifer water levels, from piezometers MF250 (40.7 m below Tima Burn Bridge) and MF249 (146.7 m below Tima Burn Bridge)

26. In summary the piezometer and stream level data physically measured (shown in Figure 1 above), conclusively shows that the Tima Burn in the reach below the Tima Burn Bridge is perched above the local water table aquifer.
27. Additionally, the thickness of the unsaturated zone of aeration (or Vadose Zone) is much greater than 5-times the stream depth over the reach.
28. This means that any drawdown of the water table level as a result of HML mine dewatering, is highly unlikely to affect the natural flow (or any natural losses), in the Tima Burn.
29. Upstream extrapolation of the base of the aquifer (at bedrock) in Figure 1 above, indicates that bedrock will occur at just upstream of the Tima Burn Bridge. This correctly coincides with observed rock in the stream bed occurring just above the bridge and confirms the original HML assessment that the Tima Burn reach above the bridge would also not be affected by any HML mine dewatering.

30. Recent (12 June 2024) Tima Burn (winter) stream flow measurements (or gaugings) were undertaken at the Tima Burn Bridge site (of 59.75 L/s) and the Downstream site (of 52.55 L/s) respectively (**Appendix E**). The gaugings were carried out by a qualified and certified (Landpro) field hydrologist to appropriate New Zealand Standards. Whilst this is just one set of gaugings undertaken at a relatively higher stage than a typical summer flow, the measured flows indicate a naturally occurring flow loss of 7.2 L/s (about 12%) between the Tima Burn Bridge site and the Downstream site .
31. Given that the Tima Burn in that stream reach is perched above the adjacent aquifer (as identified in Figure 1 of **Appendix D**), the natural flow loss is not unexpected, and would otherwise continue to occur irrespective of any HML mine dewatering activity in vicinity of the Tima Burn.
32. The above data confirms that any effect of the proposed HML mine dewatering upon flow in the Tima Burn is highly unlikely, consistent with the original HML assessment.
33. Notwithstanding the above finding, HML are still committed to providing an augmented flow to the Tima Burn on the basis of the agreed and proposed ORC recommended adaptive management conditions of resource consent, in the event of mine pit dewatering induced stream depletion.
34. For this purpose and at the direction of the panel, HML has completed a draft water management plan which details all monitoring and compliance requirements and presents specific trigger level and flow responses to address the required flow augmentation to the Tima Burn. While the content of the management plan is specific to the Tima Burn environment, in my experience it is consistent with the type of methodology for augmentation to mitigate groundwater abstraction activities used in other authorised mining operations.

35. For the above HML draft water management plan in respect of the Tima Burn, I have prepared the technical specifications for water monitoring and compliance, and the augmentation design. It is my professional opinion that they are suitably appropriate in respect of any hydrologic effects of HML activities.

36. Also, following my technical specification input to the draft HML water management plan, I have since reviewed the plan and I consider it to appropriately reflect water related monitoring and compliance, and also Tima Burn augmentation requirements.



Thomas Brendan Heller

Dated 25 June 2024

Attachments

Appendix [A] Plan showing water monitoring locations and discharge to land area.

Appendix [B] Tima Burn Investigation Report.

Appendix [C] Piezometer MF249 and MF250 data.

Appendix [D] Tima Burn Long Section.

Appendix [E] Tima Burn Flow Measurement Report.