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)

Evidence of Thomas Brendan Heller on behalf Hawkeswood Mining Limited

Groundwater Take and Discharge (Hydrology and Water Quality)

Dated 29 April 2024

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Foundry Chambers

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Introduction

1. My full name is Thomas Brendan Heller and I am a Director of Environmental Associates Limited, an environmental consultancy based in Dunedin.

2. I hold the qualifications of New Zealand Certificate in Engineering (Civil) and a National Diploma of Science majoring in surface water and groundwater resources from the Otago Polytechnic, Central Institute of Technology, and the New Zealand Qualifications Authority. I hold a Certificate in Management from the New Zealand Institute of Management and a Master's Degree in Environmental Science completed with first class honours from the University of Otago.

3. I have over 40 years' experience working in surface water and groundwater resource evaluation. A considerable amount of that time has been spent on hydro-geologic and water quality assessment relating to water allocation and land use issues. I have also been involved with technical aspects of groundwater and surface water policy development for the Regional Plan: Water for Otago, the Regional Freshwater Plan for Southland and the Land and Water Regional Plan for Canterbury.

4. The Millers Flat Terrace and the associated aquifer are very well known to me as I was involved in the recent Hawkeswood Mining Limited (**HML**) groundwater hydraulic assessments, assessment of investigation drilling, preparation of the technical groundwater report in relation to groundwater take and discharge, and provision of additional further information required by the Otago Regional Council (**ORC**) for consent assessment purposes. Additionally, I had been involved with well installation (land use) consents and some environmental investigations in the area when I was employed by the ORC as hydrogeologist from the early-90s to 2003.

5. Similar alluvial mine dewatering activities (to that of HML), that I have been involved with include the L & M Earnscleugh project where I was the ORC hydrogeological AEE auditor and technical expert for the joint regional and district council hearing at Alexandra. I was also employed by Waikaia Gold Limited as hydrogeologist in assessment and presentation of their required dewatering proposals and associated environmental effects, to a joint regional and district council hearing at Invercargill. More recently I have provided technical assessment for the Kokiri Lime alluvial mine dewatering proposal at Roxburgh, authorised by joint regional and district council hearing at Alexandra. Since then I have also prepared groundwater technical reports for Bromoore Gold Limited (Waikaia) and Waikaka Gold Limited (Waikaka).

6. In a similar manner to the aforementioned projects, I was instructed by HML to provide independent technical assessment of its proposed mine dewatering and discharge activities and the associated effects upon groundwater and surface waters.

7. Although this is not a hearing before the Environment Court, I record 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. This evidence is within my area of expertise, except where I state that I rely upon the evidence of other expert witnesses as presented to this hearing. I have not omitted to consider any material facts known to me that might alter or detract from the opinions expressed.

Evidence Preparation

8. In preparing this evidence I have focussed on the following documents:

   a. Hawkeswood Mining Limited – Alluvial Gold Mine – Resource Consent Application and Assessment of Effects on the Environment (The HML application), prepared by Town Planning Group (2024) and Macdonell Consulting Limited (2024). This includes the supporting Groundwater Take and Discharge Technical Report by Environmental Associates Limited (2024).

   b. Consent Application Technical review documents and correspondence prepared by E3 Limited (2024) and presented to the ORC.

   c. The submissions received by ORC in relation to HML's application.

   d. ORC's section 42A report (ORC s42A report, 2024), and

   e. HML hearing evidence relating to planning, mine development and operation, and including management and control measures that are proposed to be implemented.

Scope of Evidence

9. This evidence will address the following:

a. The mining proposal brief in the context of the required site dewatering and other related water management activities associated with the mine.

b. A summary of the nature of groundwater (and surface water) at the site.

c. An overview of the effects associated with mine dewatering.

d. An overview of the effects associated with discharge of mine dewatering water to land.

e. Discussion of proposed conditions of the water permit to take groundwater and discharge consent to discharge water to land.

f. Relevant matters, and where there are any outstanding aspects, arising from ORC recommendations as outlined in the staff s42A report.

g. Response to groundwater and discharge issues raised by submitters, and

h. The main conclusions of this evidence.

Main Body of Evidence

10. In relation to the following evidence, it is noted from the ORC staff s42A report that the independent audit of technical aspects of the HML application in relation to groundwater take and discharge (by the Otago Regional Council and E3 Limited), appears to be in general agreement with the HML mining proposal, environmental assessment, scope and scale of effects, and proposed conditions of consents including mitigation provisions.

11. There is only one ORC proposed condition for the discharge consent that could be amended to achieve better efficiency and compliance for HML in relation to aquifer and discharge water quality. Discussion and clarification of this matter is provided below within this evidence.

12. On this basis and within this main body of evidence, a summary of the relevant topics is provided, with additional discussion of items raised within the staff s42A report and by submitters.

13. More detailed application and background information can be found within the Groundwater Take and Discharge Technical Report (Environmental

Associates Limited, 2024), and Application AEE Report (Macdonell Consulting Limited, 2024), and shall not be repeated within this evidence.

Mining (groundwater take and discharge) Proposal

14. The proposed HML groundwater take is for mine dewatering and mine pond water level management purposes. The water is proposed to be discharged to land whereby after a relatively short duration, the abstracted water will diffusely enter the Clutha Mata-Au River.

15. Mine pit pond dewatering assessments have been based on up to a 5 m nominal dewatering requirement for HML to be able to access the lower saturated alluvial gravel wash containing mineral resource. The mine pit dewatering abstraction and associated discharge to land is predicted (from hydraulic analyses), to be up to a maximum of 124.8 L/s with an annual volume of 1,967,846 m^3/annum (approximately 62 L/s steady state).

16. However, the aforementioned rate and volume of dewatering abstraction is a maximum only and may occur if mine start-up is located in an area of maximum aquifer saturated thickness and is adjacent to the Clutha Mata-Au River. Typically, in areas of higher aquifer saturated thickness the steady state (annual) rate of dewatering abstraction is assessed to be in the order of 40 L/s.

Groundwater and Surface Water Environment

17. The Millers Flat area has an associated unconfined alluvial gravel aquifer (known as Clutha Recent Outwash Alluvium). The alluvial sequence is up to approximately 18 m in thickness from land surface down to basement. In the deeper deposits, the depth down to the water table is around 10 m, giving a saturated thickness for the aquifer of about 8 m. The aquifer saturated thickness varies and generally reduces away from the Clutha Mata-Au River (which is noted as a significantly large waterbody).
18. The aquifer receives recharge from rainfall and irrigation water losses, and from stream flow losses (including from the relatively small partially

intermittent Tima Burn flow). Whilst there is connection of the aquifer to the Clutha Mata-Au River with some potential water exchange, the resultant direction of groundwater flow is invariably to the river.

19. Hydraulic properties of the aquifer at the HML site are confirmed by aquifer testing methodologies to be moderate and are generally indicative of Clutha Recent Outwash Alluvial Gravels. The aquifer hydraulic properties have been appropriately applied (and as assessed by the ORC), in respect of assessing mine pond dewatering rates and volumes, and any associated effects upon the environment. Hydraulic properties have also been used to assess the proposed HML discharge of water (that may contain sediment), to land.

20. The water quality of the aquifer is regarded as being generally good, portraying low dissolved metals and semi-metals, and low nutrients. The groundwater has been and continues to be used for drinking water purposes in the greater Millers Flat area.

Effects of Groundwater Abstraction

21. The effects of the proposed mine pit pond groundwater abstraction (for water table lowering and mine pond level management), are local water table drawdown and any associated stream flow depletion.

22. The approximate maximum drawdown or water table lowering required at any location for the mine pond is up to 5 m, although in general, it is more likely to be up to 4 m nearer in proximity of the Clutha Mata-Au River for any significant length of time. The Groundwater Take and Discharge Technical Report provided an assessment of potential seasonal drawdown effect upon wells used for water supply purposes in the immediate area and including Millers Flat Township.

23. Twelve water supply wells being potentially affected by more than a 0.2 m maximum seasonal lowering of water level associated with the HML mining

activity, were identified. Two further wells have been since identified and are discussed below in evidence. The identification of potentially affected wells was consistent with the methodology required by the Regional Plan: Water for Otago, which is very conservative.

24. Of the 14 wells now identified as being potentially affected, only five wells may incur a water level lowering of in excess of 1 m. This indicates that only a limited number of well water supplies may actually need further attention or an alternative water source for the period of time the well is affected by any HML dewatering activity.

25. As further discussed below, additional well alteration or alternate water supplies are proposed by HML when advanced monitoring indicates that any well will be compromised by the mining activity. The ORC proposed conditions of consent for the requested HML groundwater take identify previously consented common practice in relation to continuity of water supply.

26. Effects of stream depletion resulting from the proposed mine pit pond dewatering activity were identified in the Groundwater Take and Discharge Technical Report and more recently in the ORC staff s42A report. Two surface waterbodies may be affected by stream depletion (Clutha Mata-Au River and Tima Burn), although any effect upon the Clutha Mata-Au River would not be measureable and will otherwise be completely offset by the consequent discharge of water to land that re-emerges into the river.

27. Any stream depletion effect upon the Tima Burn is envisaged to be relatively small in relation to the existing environment. The Tima Burn naturally loses flow to groundwater in its upper reach as the stream bed is perched above the water table. However, in its lower reach (below the Teviot Road Bridge), the stream bed is nearer to or at the water table level.

28. In proximity to the Clutha Mata-Au River the water level in the Tima Burn is reflective of the Roxburgh Hydro power generation pattern (of approximately a 1 m variability).

29. Whilst the nature of the Tima Burn stream bed (containing low permeability muds and silts), will most likely provide retention of flow during any temporary lowering of the adjacent water table level by the HML mining activity, proposed conditions of resource consent are provided to address (mitigate) any possible stream depletion effects.

30. The proposed mitigation conditions in relation to the Tima Burn are agreed by the ORC and are further discussed below in this evidence.

Effects of Discharge to Land

31. The only identifiable effect of the proposed HML discharge to land is that the abstracted mine pit pond water (for dewatering and water table level management), may contain sediment. Any mine pond sediment is a result of excavation and mine operation within the pond extents. There are no other contaminants associated with the mining process or that are associated with the mine pond water.

32. Any sediment laden water that is discharged to land will undergo a retention and settling process (in settling ponds), which may involve the use of non-toxic flocculants. The final discharge to land will then seep through approximately 10 m of unsaturated alluvium-gravels and then flow at least 50 m to the Clutha Mata-Au River with the natural (net) direction of groundwater flow.

33. It is assessed that with the above level of sediment treatment within ponds and unsaturated and saturated seepage through alluvial gravels, any effect of the discharge will not be measureable upon the Clutha Mata-Au River.

34. The Groundwater Take and Discharge Technical Report (2024) should be referred to for additional technical detail in relation to the proposed discharge to land.

35. Compliance monitoring and reporting is provided in the ORC proposed conditions of resource consent to assess upstream and downstream water quality of the Clutha Mata-Au River for the discharge to land. Some additional presentation of discharge to land data for a similar mining project in Northern Southland is presented below in evidence to support the HML proposal.

Proposed Conditions of Resource Consent(s)

36. Conditions that the ORC has proposed for the groundwater take and discharge to land activities encompass the regulatory requirements for both resource consents, and all monitoring, compliance and reporting functions that have been identified by the applicant and as required by the ORC.

37. The ORC proposed conditions are generally consistent with that provided and proposed by HML, and are fully agreeable subject to one discharge condition modification that is presented below in relation to aquifer water and discharge quality, and a couple of minor corrections for errors.

38. As discussed above, continuity of all water supplies will be managed on a case by case basis by HML and conditions of consent identify and clarify this arrangement. Assessed groundwater take and discharge to land rates and volumes, together with an appropriate reporting regime is also provided within the proposed ORC consent conditions consistent with the ORC staff s42A report, subject to the one amendment that is proposed below within this evidence.

39. Proposed conditions of consent that address mitigation for any effects upon Tima Burn flow are agreed by ORC and are additionally presented and discussed below in evidence.

Any Outstanding Relevant Matters relating to the ORC s42A Report

40. The following items are provided in evidence to address any outstanding matters in relation to the ORC s42A Report and/or in connection with the ORC proposed conditions of consent.

41. A small **revision of the potential impact of drawdown upon nearby wells** has been made since the HML application was lodged. This has come about by reassessment of effects in line with the updated mining methodology for the activities. The revision is also agreed by ORC/E3 in audit of the application.

42. There are an additional two wells that may be affected by more than a 0.2 m maximum seasonal drawdown from the HML mining activities. These are wells G43/0184 and G43/0185 both owned by Fairhurst and used for domestic water supply. Whilst each well is assessed to be potentially affected by more than 0.2 m, they are both most unlikely to be affected by more than 1 m as a maximum seasonal drawdown from HML activities.

43. There have also been some changes to well owner names for those wells already deemed to be potentially affected by drawdown for the HML mining proposal. This is not unusual as well ownership changes with property sales and that information is not always updated to the ORC Wells database. Irrespectively, the well numbers identified by the effects assessment in the Groundwater Take and Discharge Technical Report for the HML application do not change and can be relied upon.

44. As discussed above in evidence, the ORC proposed conditions of consent allows for any or all wells that are or will be actually affected by the HML mining activities to be remediated or supplied an alternative source of drinking water.

45. Some recent groundwater testing has been undertaken by HML to address the ORC s42A and submitter concerns with respect to **groundwater contamination and potential for acid mine drainage (AMD)**. The results of groundwater quality testing from the existing HML mine pit pond, are attached to this evidence (**Attachment A**).

46. Referring to **Attachment A**, the results show that for the existing mine pit pond, all but one of the parameters tested, including metals and semi-metals are all within the NZ Drinking Water Standards maximum acceptable values (MAV's) and in most cases are well below those limits. There are no signs of any natural or otherwise contamination of the aquifer. The groundwater within the mine pond is reflective of the aquifer, as it represents solely (natural) groundwater movement toward the Clutha Mata-Au River.

47. The result for *E.coli* however, of 3 cfu/100 mL, is most likely attributable to the nature of the open mine pond, which is also reflected in the modest turbidity result of 6.8 ntu.

48. Additionally, the pH/Eh (acidity/oxygenation) state in relation to metals or semi-metals (considering laboratory tested concentrations), identifies that there is no obvious or potential risk of AMD occurring at the site and no risk of metal mobilisation upon abstraction of groundwater from the mine pit pond for site dewatering purposes. With some oxidation of the groundwater in the mine pond the groundwater appears pH-neutral and of which occurs within the MAV for drinking water.

49. Whilst it is acknowledged that this groundwater quality information is additional to that provided with lodgement of the HML application, the results generally show that the groundwater is of good quality and the proposed HML mining activities will not alter that natural state in any way.

50. The ORC s42A report identified this item of concern (solely) in relation to aquifer water quality and potential effects of the proposed discharge to land. The ORC's concern over aquifer water quality and the potential effect of mining on the water quality of the aquifer, does appear to be overly conservative (although the s42A report considered that this was otherwise of a no more than minor impact upon the environment in any case). The groundwater quality monitoring along with the proposed HML mining activities, agrees with and confirms the ORC's latter position.

51. To provide additional support and context for the assessment of **potential effects of the proposed discharge to land**, an available period of compliance monitoring information for the Waikaia Gold Limited (WGL) mine dewatering discharge to land has been obtained and is attached to this evidence (**Attachment B**).

52. The compliance monitoring information is in respect of active mine pond dewatering discharge to land flows, and respective upstream and downstream turbidity monitoring in the adjacent Waikaia River.

53. The WGL discharge to land is a similar activity to that proposed for HML, although at Waikaia (Freshford Flats) the depth to the water table is much smaller, the aquifer permeability is much higher and the adjacent river (Waikaia River) is very small compared to the Clutha Mata-Au River.

54. What the information shows (in **Attachment B**) is that at all times during the WGL discharge, which was significantly larger than that proposed for HML (of an average monthly flow of 129 L/s to 244 L/s over the compliance period), there was full compliance with receiving water limits.

55. To that end, there was no measureable detection of any difference (increase) in turbidity in the Waikaia River between upstream and downstream of the discharge location.

56. Given the comparably favourable circumstances for the HML discharge to land, the WGL discharge performance should provide a sufficient degree of comfort (particularly to submitters) that the assessed effects of the HML discharge will not affect the environment by any measureable nature. However, this assertion is also broadly agreed by ORC/E3 in audit of the application.

57. Within the ORC proposed conditions of consent, HML are required to monitor **additional water quality and water table levels at piezometers** located around the mine site. There is also required monitoring of the **dewatering discharge water quality** (which was additionally requested by submitters).

58. As identified above in evidence, the proposed ORC conditions of consent are generally acceptable. However, whilst HML is able to undertake the required monitoring and compliance within the conditions sets, in respect of ORC proposed condition 15 of the discharge to land permit (in **Attachment C**), an amendment is requested to avoid repeated reporting where it is unnecessary to do so.

59. As part of the ORC proposed conditions for the discharge permit, HML will undertake baseline sampling at the required piezometers and within the existing mine pit pond, prior to commencement of any mine dewatering and discharge activities.

60. This will provide a background to the naturally occurring groundwater quality within the aquifer at those sites. Following on from the baseline monitoring of groundwater quality, the ORC proposed condition 15 of the discharge permit requires HML to provide extensive reporting where any further quarterly monitoring of those sites results in any parameter measured that exceeds the NZ Drinking Water Standards.

61. This requirement within condition 15 does not take into account where the groundwater quality (for any parameter) may already exceed the NZ Drinking Water Standards. It is requested that to prevent onerous and repeated reporting where any measured groundwater quality parameter already naturally exceeds the NZ Drinking Water Standards (of which is totally unrelated to any HML mining activity), a simple amendment to condition 15 may be made.

62. It is requested that the condition 15 wording may include: "……. (as specified in the relevant NZ Drinking Water Standards at the time of sampling), where this was not previously exceeded from the results of baseline monitoring, then the Consent Holder must: ……."

63. The requested amendment to condition 15 will still satisfy the requirements and intention of the condition, and retains all of the monitoring and compliance items proposed by ORC.

64. The potential for some **stream depletion of the lower reach of the Tima Burn** from the proposed HML mine dewatering activity is mutually agreed by ORC/E3 and HML. An agreed set of conditions of consent(s) have been prepared to address and mitigate any plausible stream depletion effect upon the Tima Burn from proposed HML activities.

65. The agreed set of conditions includes for investigations, monitoring, implementation and compliance reporting to ensure that an appropriate environmental flow is maintained within the lower reach of the Tima Burn (below the Teviot Road Bridge). Additional discussion of the background to the environmental flow and associated conditions may be found in the Groundwater Take and Discharge Technical Report for the HML application.

66. To additionally elaborate on the background to how the proposed Tima Burn conditions of consent will work, please refer to the illustration in **Attachment D** showing a subset of relative groundwater level contours in the Tima Burn area. Please note that the figure is provided for illustrative purposes only.

67. Referring to **Attachment D** the relative groundwater level contours depict natural groundwater flow toward the Clutha Mata-Au River and associated natural Tima Burn stream flow losses above the Teviot Road Bridge (with the stream bed being above the water table level in that reach).

68. The advancing mine pit pond with associated dewatering abstraction may move toward the Tima Burn and water table levels are monitored within the piezometers distributed around and alongside the Tima Burn to assess if a more than 0.2 m drawdown response is evident from any mine dewatering.

69. In that instance and during any period where mine dewatering causes a more than 0.2 m response in the monitoring piezometers, Tima Burn flow is measured at the Teviot Road Bridge, and/or an augmentation of flow for the lower reach of up to 21 L/s is made from fresh clean groundwater to the stream at the Teviot Road Bridge. The augmentation also consists of a diffuser to oxygenate the water prior to discharge to the stream.

70. With the adoption of the proposed Tim Burn flow augmentation and associated conditions of consent, the potential effects of the mine pit pond dewatering activity upon Tima Burn flow, water quality and ecology, will be no more than minor.

71. The suggested **ORC land use permit and retrospective water and discharge consent(s) conditions** appear to be fine and are acceptable.

72. **Small corrections to the ORC conditions sets** are suggested as follows:
    a. Water permit condition 3 ii should be m^3/day and not L/day, and
    b. Discharge permit condition 4 b) should be m^3/day and not m/day.

Response to Submissions

73. There were five submissions that raised concerns for water take and discharge to land related issues or effects of the HML mining proposal. These submissions are addressed in turn as below in evidence.

74. **Culling Trust** was concerned about the reliability of the water supply and any permanent effects upon its water bore. Also, Mauri of the Clutha Mata-Au River was raised and is addressed below with the Aukaha submission response.

75. The Culling Trust well is G44/0106 and is used for domestic water supply purposes. That well is comfortably located outside of the assessed zone of a 0.2 m maximum seasonal drawdown interference from HML activities. Therefore, the well will not measurably be affected by the mining activity.

76. It should also be noted that whilst the scope and scale of maximum seasonal drawdown effect has been provided and is agreed to by ORC/E3 in audit of the application, a proposed condition of consent allows for any or all wells that are actually affected by the HML mining activities to be remediated or supplied an alternative source of drinking water.

77. In terms of any permanent effects, during the HML mining operation, materials are excavated and then returned to ground in a similar manner to that which existed prior to the mining activity. The materials in any case occur as poorly sorted alluvial gravels and silts, which do not change as a result of the mining process. The aquifer and associated water level(s) will essentially be the same post mining to that which occurred prior to mining and no existing or future well will be materially affected by that activity in any permanent sense.

78. **Graeme Young** is concerned with any contaminated water discharging to the aquifer and Clutha Mata-Au River. As presented above in evidence, from groundwater quality monitoring results, there do not appear to be any constituents within the groundwater source that are highly elevated in excess of the NZ Drinking Water Standards. The only potential significant "contaminant" from the proposed discharge is that of suspended solids and turbidity, which will be remediated by settling ponds (and possible use of non-toxic flocculants), prior to final discharge to land.

79. Whilst the actual activity can only be undertaken after any resource consent is approved, the Waikaia Gold Limited dewatering discharge information illustrates that the effects of such a discharge to land are not measureable upon the environment.

80. The **Millers Flat Water Company (MFWC)** is concerned about quantity and quality effects on their community water supply well. The water company also suggested additional monitoring and reporting in relation to mine dewatering and discharge (water) quality that is reflected in the proposed ORC conditions of consent that is agreed to by HML.

81. The MFWC well is located downstream of the Millers Flat Bridge on the true left bank of the Clutha Mata-Au River. The well is considerably outside of the assessed zone of a 0.2 m maximum seasonal drawdown interference from HML activities. Therefore, the well will not measurably be affected by the mining activity in any way.

82. Additionally, due to the distance from the mine site and the nature of the HML discharge to land, there is no possibility of any effect upon the MFWC well. As discussed above, the nature of the discharge "contaminant" is solely that of suspended solids and turbidity, which will result in a not measureable effect upon the Clutha Mata-Au River.

83. This in turn provides assurance that the MFWC well located some distance downstream of the HML mine site, will not be affected by any suspended solids or turbidity residual from the discharge.

84. In respect of the groundwater quality monitoring for potential contaminants undertaken by HML (as presented in evidence above), to provide additional assurance to MFWC and other submitters, HML will continue to monitor additional parameters, metals and semi-metals within the groundwater and discharge to land (from the mine pit pond), and provide an independent report (and results) to the ORC and MFWC on a regular and timely basis. This is reflected in the ORC proposed conditions of consent.

85. The **Ministry of Education** was concerned about water quantity and quality effects upon the Millers Flat School well, and any potential for AMD at the HML site.

86. The Millers Flat School well (G44/0028) is located comfortably (at least 600 m) outside of the assessed zone of a 0.2 m maximum seasonal drawdown interference from HML activities. The 0.2 m threshold is the baseline applied in Schedule 5 of the Regional Plan: Water for Otago. Therefore, the well will not measurably be affected by the mining activity.

87. Also, the school well is considerably outside of any connection to or resulting flow path from, the proposed HML mining operation. In that sense there is no possibility of any effect from the proposed HML activities upon the school well.

88. Any risk of AMD at the HML mine site is very low to non-existent. AMD has not occurred and has not been identified in any of the previous Central Otago Clutha River recent outwash alluvial gold recovery activities authorised by the CODC and ORC.

89. On this basis and considering the HML site and mining proposal, there is no precedent for AMD to occur. Any mineral resource is inter-spread (at moderate depth to basement), with the alluvial outwash.

90. HML groundwater quality monitoring results (presented above in evidence) show that the incidence of metals or semi-metals is generally relatively low, and together with the pH/Eh (acidity-oxygenation state), there is no indication that AMD could occur at the site.

91. The proposed HML discharge of the groundwater to land will likely contain suspended sediments (having moderate to high turbidity), which is due to the mechanical mining activity located within the mine pit pond. However, upon settlement and secondary filtration through alluvial gravels and sediments, the effect of the discharge upon the receiving Clutha Mata-Au River environment (within and below the downstream mixing zone), will be very small to not measureable.

92. As discussed above in evidence, some additional discharge quality monitoring (for metals and semi-metals) will be undertaken over time and be reported to the ORC and the MFWC.

93. **Aukaha** (supported by **Te Runanga o Ngai Tahu**), were concerned with the validity of aquifer testing undertaken for the HML application, and with water quality and potential effects upon surface waters. In terms of aquifer testing, a previous irrigation take aquifer test was used to support the HML application. That test was undertaken for a land owner (Mr Parker) and was done to the standards required and to the satisfaction of the ORC. The test included for a sufficient duration and multiple piezometer and river level monitoring, which reflected in the consistency of results.

94. However, some additional “trial pit dewatering” testing was undertaken by HML at the site which provided an actual working mine dewatering activity for which to measure actual and real drawdown effects. This is in comparison to relying on relatively small diameter well testing and applying resultant hydraulic parameters to a much larger open pit mine pond situation.

95. The outcome is that HML have shown (with the trial dewatering test), the possible resulting impact of the full mining activity. Further analysis and discussion of aquifer testing is provided in the Groundwater Take and Discharge Technical Report for consent application purposes.

96. In this respect HML are in a very strong position in relation to prediction of effects of the proposed activity, which in my experience is the primary outcome of aquifer (or other) site testing and appreciation. This was invariably echoed in the E3 technical report to ORC for the HML application.

97. Groundwater quality and related effects of the proposed HML mining activities have been presented above within this evidence. The effects of which are shown to be not-measureable upon the environment.

98. Effects upon surface waters including the Clutha Mata-Au River and the Tima Burn were presented above in evidence for the responses to the s42A report and other matters. This should be specifically referred to in relation to the Aukaha submission.

99. In summary, the stream depletion effect upon the Clutha Mata-Au River will be more than offset by the proposed discharge of water to land whereby it returns to the river. In that sense the activity is mainly non-consumptive. There may be some stream depletion effect upon the lower reach of the Tima Burn.

100. HML have considered the potential stream depletion effect upon the Tima Burn and have provided consent conditions to investigate, monitor and report on stream flows and any required augmentation of water (fresh clean oxygenated water) to the stream. There is agreement between HML and ORC/E3 on the nature of possible effects on the Tima Burn and the content of consent conditions to fully mitigate those effects. Noting that any effect would be of a short term and temporary nature.

101. The outcome of the proposed HML mining activities, together with implementation of the proposed conditions of consents, will ensure that any effect upon surface waters will be appropriately and fully mitigated.

Main Conclusion(s)

102. The existing environment and scope and scale of the proposed mine dewatering and discharge to land activities, inclusive of the type and scale of effects, are very much agreed between ORC and E3, and the HML (applicant) technical proposal documents. Considerable effort has been made to provide as much information and assessment as possible to satisfy the ORC with respect to the HML proposal.

103. The proposed groundwater take and discharge to land activities for mine dewatering and management purposes are able to be undertaken in conjunction with the proffered (and agreed to by ORC/E3), conditions of consents subject to some specific consideration and in respect of correction of obvious errors.

104. Whilst some effect of the mine dewatering activity may result in a reduction of local well water levels and possibly some depletion of water from the lower reach of the Tima Burn, suitable monitoring, mitigation and reporting is included in conditions of consents to suitably and completely mitigate these effects.

105. No measureable effect of the discharge to land activity is anticipated by the proposal. Overall, the connections and interactions between water bodies will be sustained.

106. Where possible and appropriate, any outstanding matters from the ORC s42A report and responses from submissions have been addressed within this evidence and included for within the ORC proposed conditions of resource consents.

Thomas Brendan Heller

Dated 29 April 2024

List of Attachments to this Evidence:

- **Attachment A – HML Mine Pond Groundwater Quality Testing Results.**
- **Attachment B – WGL Discharge to Land Information.**
- **Attachment C – ORC Proposed Discharge Permit Conditions including Monitoring Bore(s) Plan (Appendix A).**
- **Attachment D – Tima Burn Area Illustration.**

Attachment A

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Client:	Rockridge Limited	**Lab No:**	3545957	DWAPv1
Contact:	Simon Johnstone C/- Rockridge Limited 317 Nelsen Ridge Road Waikerikeri Alexandra 9393	**Date Received:**	17-Apr-2024	
		Date Reported:	23-Apr-2024	
		Quote No:		
		Order No:		
		Client Reference:	Mine Pit	
		Submitted By:	Simon Johnstone	

Sample Type: Aqueous

		Sample Name:	Mine Pit 16-Apr-2024 12:30 pm	**Aesthetic Values**	**Maximum Acceptable Values (MAV)**
		Lab Number:	3545957.1		
Individual Tests					
Escherichia coli	MPN / 100mL		3	-	< 1
Routine Water Profile					
Turbidity	NTU		6.8	≤ 5	-
pH	pH Units		8.0	7.0 - 8.5	-
Total Alkalinity	g/m³ as $CaCO_3$		115	-	-
Free Carbon Dioxide	g/m³ at 25°C		2.1	-	-
Total Hardness	g/m³ as $CaCO_3$		130	≤ 200	-
Electrical Conductivity (EC)	mS/m		31.1	-	-
Electrical Conductivity (EC)	µS/cm		311	-	-
Approx Total Dissolved Salts	g/m³		210	≤ 1000	-
Total Arsenic	g/m³		0.0014	-	0.01
Total Boron	g/m³		0.024	-	2.4
Total Calcium	g/m³		44	-	-
Total Copper	g/m³		0.00196	≤ 1	2
Total Iron	g/m³		0.137	≤ 0.3	-
Total Lead	g/m³		0.00040	-	0.01
Total Magnesium	g/m³		4.9	-	-
Total Manganese	g/m³		0.0186	≤ 0.04 (Staining) ≤ 0.10 (Taste)	0.4
Total Potassium	g/m³		2.1	-	-
Total Sodium	g/m³		14.1	≤ 200	-
Total Zinc	g/m³		0.0142	≤ 1.5	-
Chloride	g/m³		15.0	≤ 250	-
Nitrate-N	g/m³		1.33	-	11.3
Sulphate	g/m³		16.3	≤ 250	-

Note: The Maximum Acceptable Values (MAV) are taken from the 'Water Services (Drinking Water Standards for New Zealand) Regulations 2022', published under the authority of the New Zealand Government-2022. Copies of this publication are available from: https://www.legislation.govt.nz/regulation/public/2022/0168/latest/whole.html

The standards set limits for the concentration of determinands in drinking water. The Maximum Acceptable Values (MAVs) for any determinand must not be exceeded at any time.

The Aesthetic Values are taken the publication, 'Aesthetic Values for Drinking Water Notice 2022' issued by the Water Services Regulator ("Taumata Arowai"). Aesthetic values specify or provide minimum or maximum values for substances and other characteristics that relate to the acceptability of drinking water to consumers (such as appearance, taste or odour).

Note that the units: g/m³ are the same as mg/L and ppm.

Routine Water Assessment for Sample No 3545957.1 - Mine Pit 16-Apr-2024 12:30 pm

pH/Alkalinity and Corrosiveness Assessment
The pH of a water sample is a measure of its acidity or basicity. Waters with a low pH can be corrosive and those with a high pH can promote scale formation in pipes and hot water cylinders.
The guideline level for pH in drinking water is 7.0-8.5. Below this range the water will be corrosive and may cause problems with disinfection if such treatment is used.

The alkalinity of a water is a measure of its acid neutralising capacity and is usually related to the concentration of carbonate, bicarbonate and hydroxide. Low alkalinities (25 g/m^3) promote corrosion and high alkalinities can cause problems with scale formation in metal pipes and tanks.

The pH of this water is within the NZ Drinking Water Guidelines, the ideal range being 7.0 to 8.0.
With the pH and alkalinity levels found, it is unlikely this water will be corrosive towards metal piping and fixtures.
The high alkalinity of this water may cause an increase in the pH in the root zones of plants which are irrigated using this water.

Hardness/Total Dissolved Salts Assessment
The water contains a low amount of dissolved solids and would be regarded as being hard.
There will be difficulty in forming a lather with soap, and a 'scum' will form in baths, showers, etc.

Nitrate Assessment
Nitrate-nitrogen at elevated levels is considered undesirable in natural waters as this element can cause a health disorder called methaemaglobinaemia. Very young infants (less than six months old) are especially vulnerable. The 'Water Services (Drinking Water Standards for New Zealand) Regulations 2022' sets a maximum permissible level of 11.3 g/m^3 as Nitrate-nitrogen (50 g/m^3 as Nitrate).

Nitrate-nitrogen was detected in this water but at such a low level to not be of concern.

Boron Assessment
Boron may be present in natural waters and if present at high concentrations can be toxic to plants.
Boron was found at a low level in this water but would not give any cause for concern.

Metals Assessment
Iron and manganese are two problem elements that commonly occur in natural waters. These elements may cause unsightly stains and produce a brown/black precipitate. Iron is not toxic but manganese, at concentrations above 0.5 g/m^3, may adversely affect health. At concentrations below this it may cause stains on clothing and sanitary ware.

Iron was found in this water at a low level.
Manganese was found in this water at a low level.
Treatment to remove iron and/or manganese should not be necessary.

Bacteriological Tests
The Drinking Water Standards for NZ state that there should be no Escherichia coli (E coli) in water used for human consumption. The presence of these organisms would indicate that other pathogens of faecal origin may be present.

The E coli result indicates that this water should be checked again ensuring the sample is collected into a sterile container and, if still high, the water should not be used for drinking without filtration or disinfection

Final Assessment
The parameters Turbidity and Escherichia coli did NOT meet the guidelines laid down in the 'Water Services (Drinking Water Standards for New Zealand) Regulations 2022' and the 'Aesthetic Values for Drinking Water Notice 2022' issued by the Water Services Regulator ("Taumata Arowai") for water which is suitable for drinking purposes.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Sample No
Routine Water Profile		-	1
Filtration, Unpreserved	Sample filtration through 0.45 µm membrane filter. Analysed at Hill Laboratories - Chemistry; Unit 1, 17 Print Place, Middleton, Christchurch.	-	1
Total Digestion	Nitric acid digestion. APHA 3030 E (modified) : Online Edition.	-	1
Turbidity	Analysis by Turbidity meter. Analysed at Hill Laboratories - Chemistry; Unit 1, 17 Print Place, Middleton, Christchurch. APHA 2130 B (modified) : Online Edition.	0.05 NTU	1
pH	pH meter. Analysed at Hill Laboratories - Chemistry; Unit 1, 17 Print Place, Middleton, Christchurch. APHA 4500-H^+ B (modified) : Online Edition. Note: It is not possible to achieve the APHA Maximum Storage Recommendation for this test (15 min) when samples are analysed upon receipt at the laboratory, and not in the field. Samples and Standards are analysed at an equivalent laboratory temperature (typically 18 to 22 °C). Temperature compensation is used.	0.1 pH Units	1
Total Alkalinity	Titration to pH 4.5 (M-alkalinity), autotitrator. Analysed at Hill Laboratories - Chemistry; Unit 1, 17 Print Place, Middleton, Christchurch. APHA 2320 B (modified for Alkalinity <20) : Online Edition.	1.0 g/m^3 as $CaCO_3$	1
Free Carbon Dioxide	Calculation: from alkalinity and pH, valid where TDS is not >500 mg/L and alkalinity is almost entirely due to hydroxides, carbonates or bicarbonates. APHA 4500-CO_2 D : Online Edition.	1.0 g/m^3 at 25°C	1
Total Hardness	Calculation from Calcium and Magnesium. APHA 2340 B : Online Edition.	1.0 g/m^3 as $CaCO_3$	1
Electrical Conductivity (EC)	Conductivity meter, 25°C. Analysed at Hill Laboratories - Chemistry; Unit 1, 17 Print Place, Middleton, Christchurch. APHA 2510 B : Online Edition.	0.1 mS/m	1
Electrical Conductivity (EC)	Conductivity meter, 25°C. APHA 2510 B : Online Edition.	1 µS/cm	1
Approx Total Dissolved Salts	Calculation: from Electrical Conductivity.	2 g/m^3	1
Total Arsenic	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition / US EPA 200.8.	0.0011 g/m^3	1
Total Boron	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.0053 g/m^3	1
Total Calcium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.053 g/m^3	1
Total Copper	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition / US EPA 200.8.	0.00053 g/m^3	1
Total Iron	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.021 g/m^3	1
Total Lead	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition / US EPA 200.8.	0.00011 g/m^3	1
Total Magnesium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.021 g/m^3	1
Total Manganese	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition / US EPA 200.8.	0.00053 g/m^3	1
Total Potassium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.053 g/m^3	1
Total Sodium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.021 g/m^3	1
Total Zinc	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition / US EPA 200.8.	0.0011 g/m^3	1
Chloride	Filtered sample from Christchurch. Ion Chromatography. APHA 4110 B (modified) : Online Edition.	0.5 g/m^3	1
Nitrate-N	Filtered (if required) sample from Christchurch. Ion Chromatography. APHA 4110 B (modified) : Online Edition.	0.05 g/m^3	1
Sulphate	Filtered sample from Christchurch. Ion Chromatography. APHA 4110 B (modified) : Online Edition.	0.5 g/m^3	1
Escherichia coli	MPN count using Colilert 18 (Incubated at 35°C for 18 hours) and 97 wells. Analysed at Hill Laboratories - Microbiology; Unit 1, 17 Print Place, Middleton, Christchurch. APHA 9223 B : Online Edition.	1 MPN / 100mL	1

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 18-Apr-2024 and 23-Apr-2024. For completion dates of individual analyses please contact the laboratory.

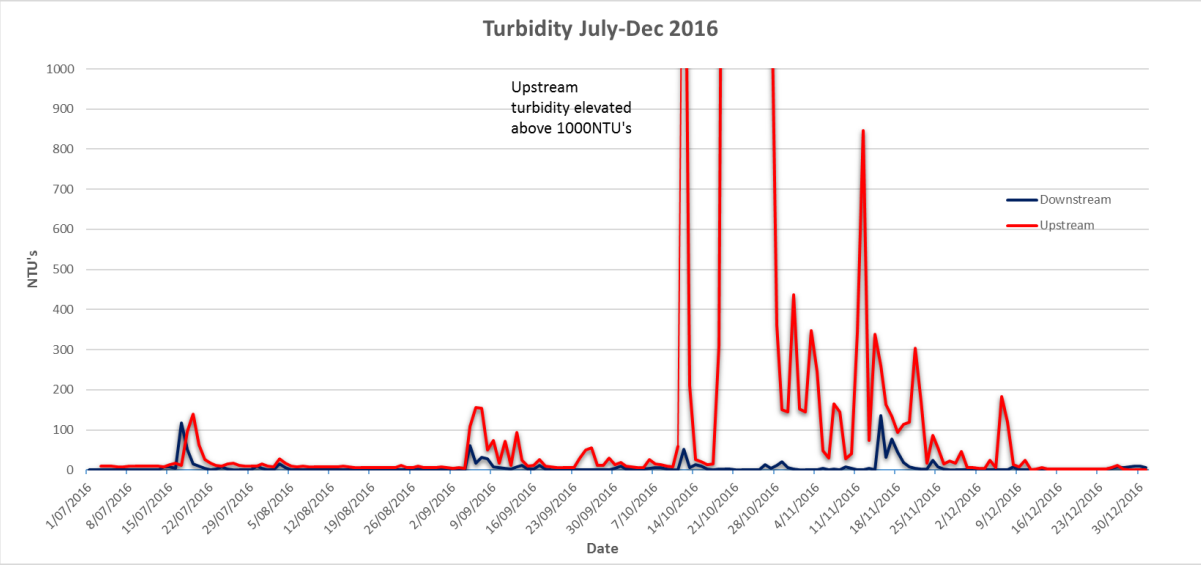
Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

Kim Harrison MSc
Client Services Manager - Environmental

Attachment B

From WGL Compliance Monitoring Report to Environment Southland 2017



WGL Turbidity Values from Upstream and Downstream Monitoring Stations July to December 2016

Average Monthly WGL Mine Pond Dewatering Rates:

July 2016 = 187 L/s

August 2016 = 187 L/s

September 2016 = 129 L/s

October 2016 = 178 L/s

November 2016 = 171 L/s

December 2016 = 244 L/s

Attachment C

APPENDIX 1C – Recommended conditions on discharge to land permit

RM23.819.03 – Discharge Permit to sediment-laden water to water in a bore, and to land in a manner that may enter water.

Specific	
1.	The discharge sediment-laden water to land and to water in a bore must be carried out in accordance with the plans and all information submitted with the application, detailed below, and all referenced by the Consent Authority as consent number RM23.819.03. a) Resource consent application forms, Form 1, Form 5, Form 6, Form 8B, and 9A, signed by the Applicant and dated 18/05/23 b) Assessment of Environmental Effects, *Proposed alluvial gold mine at Millers Flat Resource Consent Applications – Otago Regional Council,* prepared by MacDonell Consulting Ltd, dated 16 November 2023 c) Site Plans, Sheets 1 to 8, prepared by Overview Surveying, dated 26/02/24 d) Groundwater Assessment, *Hawkeswood Mining Limited, - Technical Assessment of Proposed Groundwater Take and Discharge,* prepared by Environmental Associates Ltd, dated October 2023 e) Ecology Report, *Tima Burn Aquatic Ecology Assessment,* prepared by Water Ways Consulting, dated September 2023 f) Archaeological report, *1346 -1536 Teviot Road, Roxburgh, An Archaeological Assessment,* Rev. H, prepared by Heritage Properties Ltd 2024, dated March 2024 If there are any inconsistencies between the above information and the conditions of this consent, the conditions of this consent will prevail.
2.	This consent must be exercised in conjunction with Land Use Consent RM23.819.01, Water Permit RM23.819.02, Discharge Permit RM23.819.04.
3.	This consent authorises the discharge of groundwater containing sediment to land, whereby it may enter water at locations adjacent to the transient mine pit pond between NZTM 2000 grid coordinates E 1318240 N 4939570 and NZTM E 1319440 N 4938130. Sediment retention ponds are to be sized appropriately to allow adequate freeboard, and to ensure they do not overflow.
4.	The volume of water discharged must not exceed: a) 124.8 litres per second; and b) 10,783 metres per day.
5.	The Consent Holder must maintain a discharge buffer zone of at least 50 metres between the discharge to land, and the Clutha River/Mata-Au at all times, and must ensure that there is no direct discharge from the sediment retention ponds to any surface watercourse.
6.	No contaminants other than silt, sediment and biodegradable flocculants shall be discharged.
7.	Under section 125 of the Resource Management Act 1991, this consent lapses five years after the date of commencement of the consent unless: a) The consent is given effect to; or b) The Consent Authority extends the period after which the consent lapses.
Performance Monitoring	

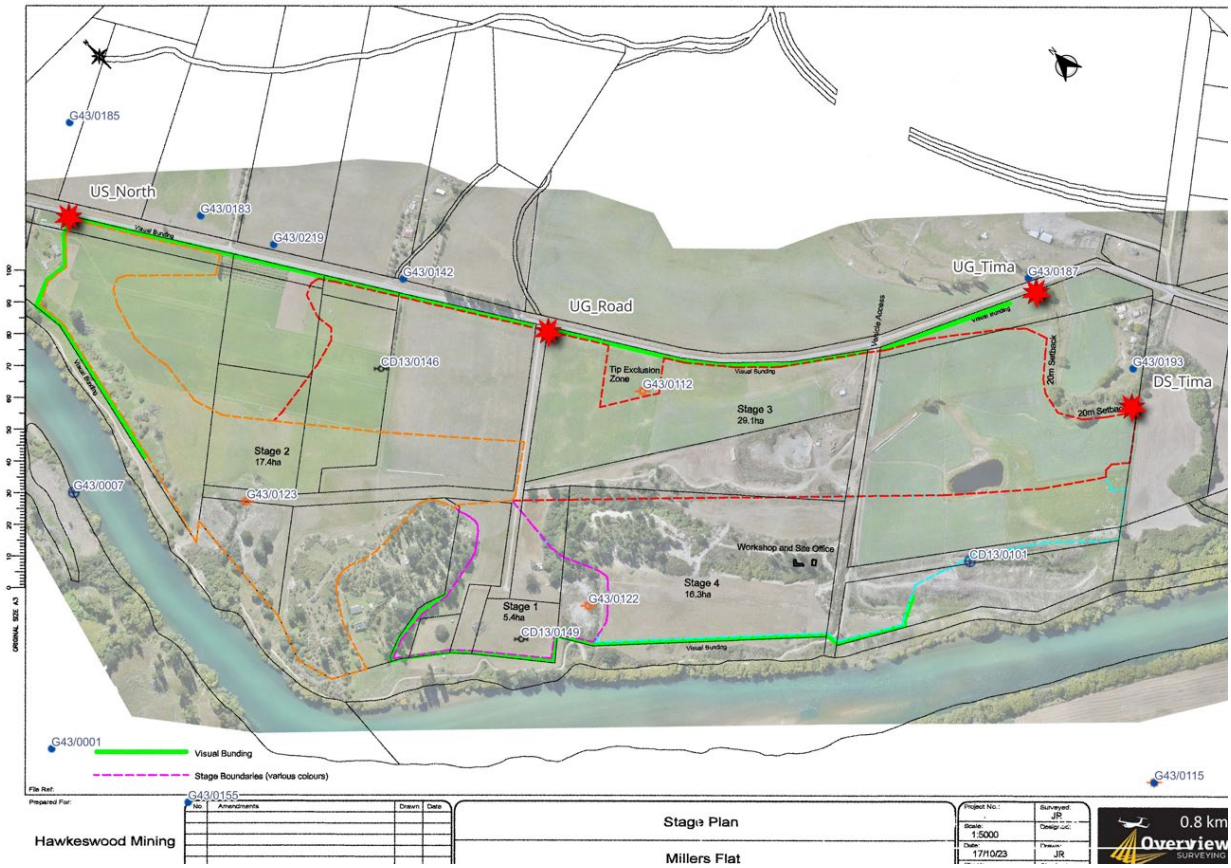
8.	Within three months of this consent being exercised, a water quality monitoring network must be established for the mine which must include: a) Four new groundwater monitoring locations on site boundaries at the following locations (NZTM 2000 co-ordinates), and as illustrated in Appendix A: id X Y 1 1318342 4939666 2 1319425 4938275 3 1319434 4938518 4 1318799 4939004 b) The settling pond and the exposed area of groundwater (mine pit pond), to assess discharge water quality. If the above monitoring bores are relocated due to access, the updated co-ordinates shall be submitted to the Consent Authority before drilling commences.
9.	The bore drilling and installation of the piezometers required by Condition 8 shall be overseen by a suitably qualified person. A report that demonstrates compliance with the requirements of Condition 8 shall be submitted to the Consent Authority within one month of the installation of the bore(s).
10.	The Consent Holder must take quarterly representative water samples from the water quality monitoring network established in Condition 8, commencing within three months of this consent being exercised. Quarterly monitoring must continue for the duration of this consent. During each monitoring event: a) Water levels must be measured and recorded at the time of sampling. b) Field parameters (colour, odour, temperature, pH, Dissolved Oxygen (mg/L and % sat), Electrical Conductivity and Oxidation Reduction Potential) must be measured and recorded at the time of sampling using a calibrated water quality meter in a flow cell. Samples must be collected after field parameters have stabilised to within 5% of the previous three measurements. Field filtering of samples must be completed for dissolved metals analysis. c) Samples must be analysed by a laboratory with IANZ accreditation or equivalent for total petroleum hydrocarbons, total suspended solids, turbidity, major ions (sodium, potassium, calcium, magnesium, alkalinity, chloride, sulphate, nitrate), copper, chromium, zinc, Arsenic and E-coli, iron and manganese. Samples must be analysed for both total and dissolved metals. d) The sampling must be undertaken by a suitably qualified person in general accordance with the National Environmental Monitoring Standards Water Quality Part 1 of 4: Discrete Sampling, Measuring, Processing and Archiving of Discrete Groundwater Quality Data.
11.	Prior to consent being exercised, the Consent Holder must take representative water samples from the monitoring bores and the settling pond(s) in accordance with Condition 10 a) and b).
12.	For the term of this consent, quarterly (four times per year) water monitoring must be undertaken for total suspended solids and turbidity at the following sites: • Final operational infiltration pond/area discharge; • True left bank of the Clutha River/Mata-Au at within 100 m upstream of the site; and

	• True left bank of the Clutha River/Mata-Au at within 500 m downstream of final infiltration pond/area discharge.
13.	Copies of the results of any water quality analyses or aquifer testing performed on the groundwater shall be forwarded to the Consent Authority within two weeks of the analysis or testing being undertaken.
14.	By the 30th of June each year, the Consent Holder must submit an Annual Groundwater Report to the Consent Authority. The report shall: a) Be prepared by a suitably qualified and experienced water quality expert who has reviewed all the available water quality and level data. b) Include a conceptual groundwater model for the site based on the collected data. c) Include an assessment of whether the data indicates activities on the Consent Holder's site are adversely impacting groundwater quality, and in particular, sensitive receptors. d) State the identity, expertise and sampling methodology of the person(s) who collected water samples in accordance with this resource consent; e) Identify any measures required under Condition 15 and 16; and f) Include copies of the complaints record for any complaints in relation to groundwater quality for the preceding 12 months.
15.	Should the measured value of any of the determinants in a sample from monitoring bores measured in accordance with Conditions 10 and 11 exceed a NZ Drinking Water Standard Maximum Acceptable Value or Guideline (Aesthetic) Value (as specified in the relevant New Zealand Drinking Water Standards at the time of sampling), then the Consent Holder must: a) Advise the Consent Authority and affected bore owners within 48 hours of receipt of the results; b) Within one week from the receipt of the results, begin an investigation into the cause of the elevated sample results. The investigation is to be carried out by a suitably qualified water quality expert and is to include, but is not limited to; i. results of water quality sampling; ii. activities at the mine site; iii. activities at the neighbouring property(s); iv. rainfall prior to, and during, the investigation period; and v. any additional water quality monitoring that may be required to assess the potential cause of contamination. c) Within one month of receipt of the elevated sample results, submit a report signed by a suitably qualified water quality expert to the Consent Authority and the bore owner on the investigation undertaken, any potential sources of contamination identified, the likely cause(s) of the contamination and recommend any remedial measures to prevent or mitigate the contamination. d) In the event that the report concludes that it is likely that the contamination was caused by the Consent Holder; and i. the contamination was in potable drinking water supply, the Consent Holder must, within 48 hours of receipt of the report, provide any affected bore owner(s) with an alternative supply of potable drinking water sufficient to provide 2,000 litres per day to each household provided by the supply, until such time as monitoring demonstrates compliance with the relevant

	Maximum Acceptable Values or Guideline values. All costs associated with this shall be borne by the Consent Holder. ii. the contamination was in a monitoring bore, sampling frequency at the closest target monitoring bore identified in Condition 10 (a) shall increase to one per week, until the issue has been rectified.
16.	If a report required under Condition 15 concludes that the discharge is causing a significant adverse water quality effect at a target monitoring bore, the Consent Holder must, within three months of receiving that report, implement additional or alternative sediment treatment/management measures to reduce the concentration of suspended solids entering the infiltration/settling pond and: a) The Consent Holder must report to the Consent Authority as soon as practicable on the completion of any such works; and b) Within 12 months of completion of any additional sediment treatment/management measures, the Consent Holder must provide a report to the Consent Authority written by a suitably qualified person on the effectiveness of those measures.
General	
17.	There must be no direct discharge, or run-off via tile or open drain, of any sediment-laden groundwater from the site.
18.	The discharge authorised by this consent must not result in: a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials. b) any conspicuous change in the colour or visual clarity. c) any emission of objectionable odour. d) the rendering of fresh water unsuitable for consumption by farm animals; or e) any significant adverse effects on aquatic life. In any river, lake, artificial watercourse or wetland.
19.	The Consent Holder shall ensure that the discharge authorised by this consent does not cause any flooding, erosion, scouring, land instability or damage to any adjacent property.
Review	
20.	The Consent Authority may, in accordance with Sections 128 and 129 of the Resource Management Act 1991, serve notice on the Consent Holder of its intention to review the conditions of this consent during the period of three months either side of the date of granting of this consent each year, or within two months of any enforcement action taken by the Consent Authority in relation to the exercise of this consent, or on receiving monitoring results, for the purpose of: a) Determining whether the conditions of this consent are adequate to deal with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage, or which becomes evident after the date of commencement of the consent; b) Ensuring the conditions of this consent are consistent with any National Environmental Standards, relevant regional plans, and/or the Otago Regional Policy Statement; c) Reviewing the frequency of monitoring or reporting required under this consent; d) Amending the monitoring programme set out in accordance with Conditions 8 to 16; or e) Varying the consented quantities and rates of take and monitoring, operating and reporting requirements, and performance requirements to respond to:

	i. the results of previous monitoring carried out under this consent and/or: a) water availability, including alternative water sources; b) actual and potential water use; c) groundwater levels and/or the setting of aquifer restriction levels; d) surface water flow and level regimes; e) groundwater or surface water quality; f) efficiency of water use; g) Instream biota, including fish passage and the functioning of aquatic ecosystems; or h) new requirements for measuring, recording and transmission.
Notes to Consent Holder	
1.	*If you require a replacement consent upon the expiry date of this consent, any new application should be lodged at least 6 months prior to the expiry date of this consent. Applying at least 6 months before the expiry date may enable you to continue to exercise this consent under section 124 of the Resource Management Act 1991 until a decision is made on the replacement application (and any appeals are determined).*
2.	*The Consent Holder is responsible for obtaining all other necessary consents, permits, and licences, including those under the Building Act 2004, the Biosecurity Act 1993, the Conservation Act 1987, and the Heritage New Zealand Pouhere Taonga Act 2014. This consent does not remove the need to comply with all other applicable Acts (including the Property Law Act 2007 and the Health and Safety at Work Act 2015), regulations, relevant Bylaws, and rules of law. This consent does not constitute building consent approval. Please check whether a building consent is required under the Building Act 2004.*
3.	*Where information is required to be provided to the Consent Authority in condition/s 8 to 16, this is provided in writing to compliance@orc.govt.nz, and the email heading is to reference RM23.819.02 and the condition/s the information relates to.*
4.	*The Consent Holder will be required to pay the Consent Authority an administration and monitoring charge to recover the actual and reasonable costs incurred to ensure ongoing compliance with the conditions attached to this consent, collected in accordance with Section 36 of the Resource Management Act 1991.*

Appendix A: Monitoring bore locations



Attachment D

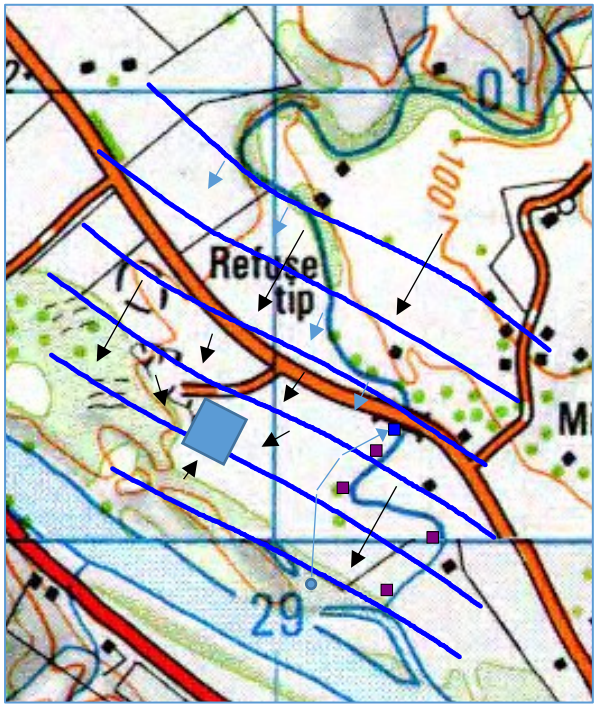


Figure A – Tima Burn Area

Notes:

1. Dark blue natural aquifer head/water table (or pressure) contours in 1 m intervals consistent with AEE report and piezometer/drill-hole data.

2. Black arrows show direction of groundwater flow and typical groundwater flow toward the mine pond (during groundwater abstraction).

3. Large light blue square denotes advancing mine pond.

4. Light blue arrows show Tima Burn stream leakage where stream bed is above natural water table level.

5. Purple squares denote typical piezometer placement to monitor water table levels in vicinity of Tima Burn stream and in advance of the mine pond.

6. Dark blue square shows point of water augmentation to Tima Burn (as required).

7. Light blue circle and pathway arrow shows typical location of groundwater take and conveyance of fresh clean water to the Tima Burn augmentation point (as required).