DRAFT Water Management Plan

Millers Flat Gold Mine

1346 – 1536 Teviot Road

Prepared for Hawkeswood Mining Limited

24th June 2024
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Revision 4

Document control

Revision 4

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Disclaimer:

This Water Management Plan provides the key design outline for control measures to be provided on site. It is not possible at initial design stage to anticipate and include all site-specific design details, as some detail can only be included on the basis of in situ monitoring and adjustments. In order to be effective on site the plan will need to be implemented by a contractor experienced in water management. Ongoing monitoring will be required to assess its performance and make specific adjustments to its detail to respond to specific conditions on site and changes to those conditions. It is not suitable for unmonitored or unmanaged implementation or implementation by personnel who lack appropriate expertise and experience in water management and monitoring. It is recommended that the Water Management Plan will be monitored regularly by appropriately experienced personnel in water management, who is to make such adjustments as are necessary to ensure its effective operation in view of the features, the condition or state of the site or changes to conditions on site.

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1 Introduction

EnviroCo Ltd. has been engaged by Hawkeswood Mining Limited (HML) to prepare this Water Management Plan (WMP) for works associated with an alluvial gold mining operation at Millers Flat.

The WMP is a working document that is periodically reviewed and amended throughout the project life to reflect changing environmental conditions and developments.

The WMP will make reference to and summarises information from the report prepared by Hydrologist Tom Heller (2024)[1] of Environmental Associates Ltd (EAL). Tom Heller has detailed knowledge of the site and has relevant experience, qualifications and environmental/hydrological expertise. For these reasons his understanding and knowledge have been used in the preparation of this document. EAL's specification document should be referred to throughout this document as the WMP provides only summary information. The document is provided in **Appendix A**.

All environmental monitoring information/data collected in relation to this WMP, shall be stored in an appropriate database to enable monitoring/assessment and subsequent analysis and reporting as required by conditions of resource consent(s).

For additional detail and specific requirements in relation to the HML groundwater take for dewatering and the discharge to land activities monitoring and compliance, refer to conditions of resource consents RM23.819.02 and RM23.819.03.

The HML Project Manager is responsible for the implementation of this WMP with support from EnviroCo and EAL.

1.1 Site information

The project site is located at Millers Flat and covers an area of 69 hectares (**Figure 1**). The area of land used for this activity is modified and consists of exposed gravels, soils and shrub vegetation. The remaining area of the site consists predominantly of grass pasture and has been used for pastoral farming activities. There are also some remains of historical use of the land for gold mining activities and associated domestic dwellings.

The site's terrain is gently rolling in character and is positioned on a plateau above the Clutha River to the South and West. Teviot Road forms the north-eastern perimeter. The Tima Burn intersects and meanders through the northeastern portion of the site.

[1] Heller (2024). *HML Water Related Management Plan Information.* June 2024. Prepared by Tom Heller.

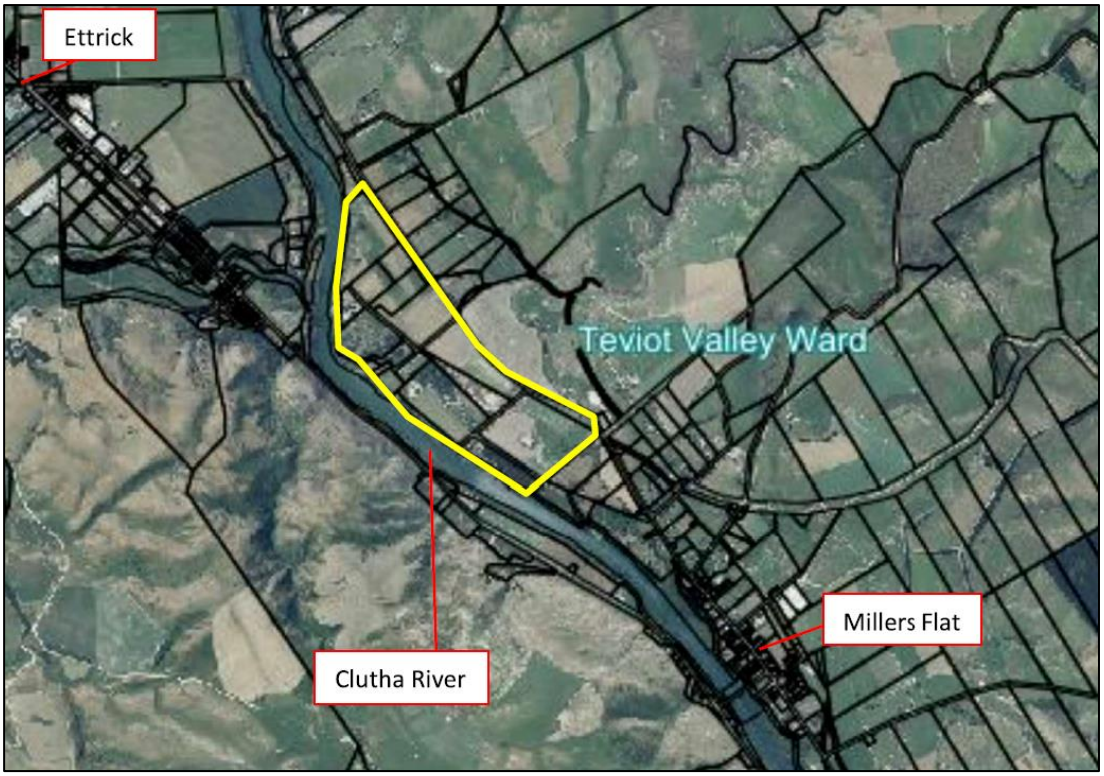

Figure 1 Site Location - indicated with yellow outline (Source: Enviroscope ESCP).

1.2 Project Contacts

Name	Company	Position	Mobile	Email
Simon Johnstone	HML	Project Manager	027 415 8406	simon@hawkeswood.co.nz
Tom Heller	Environmental Associates Limited	Environmental Consultant / Director	027 7255 703	theller@gmail.com
Richard Ablitt	EnviroCo	Senior Environmental Consultant	027 226 9294	richard@enviroco.nz
Ciaran Keogh	Environmental Consultants Otago Ltd.	Principal and Senior Environmental Planner. CLS SQEP	0274 128 004	ciaran@ecotago.co.nz
Tony Dons	Millers Flat Water Company	Chairman	027 479 8333	mfwater@gmail.com
TBC	Central Otago Regional Council (CORC)	Monitoring Officer	03 446 8105	TBC
TBC	Otago Regional Council	Resource Management Officer	TBC	TBC
Pollution Hotline (Otago)	Otago Regional Council (ORC)	Spill Hotline	0800 800 033	-

The Project Manager (HML) shall be responsible for the implementation and maintenance of the WMP. However, all updates/revisions to the plan will be documented and reviewed by EnviroCo and EAL.

The Environmental Consultant (Environmental Associates Limited) is the functional lead for the Water Management Plan and is the primary contact for environmental and hydrological related issues.

2 Groundwater risk and protection measures

If project operations are not appropriately managed, then there is the potential for negative impacts to ground water and the surrounding environment. Regular and ongoing monitoring will be necessary to ensure that operations do not impact the groundwater. The level of risk is determined by the actual operations and hydrological connection to groundwater. The operations will be routinely reviewed by Project staff with assistance as required by EnviroCo and EAL.

Groundwater risk may include;

- Groundwater abstraction for water supply resulting in local groundwater drawdown.
- Groundwater drawdown and alteration of hydrological processes as a result of mine dewatering and water supply abstraction.
- Groundwater contamination through risk of spillage or sedimentation.

Technical assessments have concluded that dewatering the mine pit is highly unlikely to result in any mobilisation of contaminants from the nearby closed landfill, however groundwater quality monitoring has been designed to verify these assessments and complement existing landfill monitoring by Central Otago District Council.

This WMP presents a detailed monitoring programme of water level and water quality parameters, with associated trigger / response actions:

- Section 2.1 addresses groundwater protection measures from operating machinery in an open mine pit.
- Section 6 addresses surface water flow monitoring and augmentation response should the dewatering cause depletion of the Tima Burn.
- Section 7.1 addresses water level monitoring of surrounding groundwater and provision for water supply to neighbouring bores potentially affected by groundwater drawdown.
- Section 7.2 addresses general groundwater quality monitoring and trigger / response actions if parameters change as a result of dewatering.
- Section 8 addresses groundwater quality monitoring adjacent to a closed landfill and trigger / response actions if monitoring results demonstrate change to any groundwater leachate caused by dewatering.

2.1 Groundwater protection measures from operating machinery in open pit

Groundwater quality can potentially be impacted by operating machinery in an open mine pit, such as from spills of hydrocarbons and other chemicals. Below provides a summary of groundwater protection measures in relation to machinery operation.

- The Site Emergency Management Plan[2] will be updated regularly and all staff aware of their responsibilities. .
- The Spill Response Plan is communicated to all staff (refer to **Appendix B**).
- Machinery operating in the mine pit is maintained regularly to ensure risk of breakdown and unintentional spills / leaks are minimised.
- Any machinery observed to be leaking hydrocarbons or other chemicals is immediately removed from the mine pit and sent for maintenance to rectify the problem.
- Refuelling will be undertaken by a mobile tanker with spill protection measures in place.

3 Groundwater abstraction and mine pond discharge management

The mining operations will require dewatering undertaken to effectively lower the excavation pond level within the mine pit. This will be necessary to enable the efficient excavation and extraction of mineral resource for the floating plant. Water abstraction is undertaken with the use of a floating or fixed surface pump. The pump abstracts the water and discharges to land within designated areas designed for this purpose. The process has been illustrated in **Figure 2**.

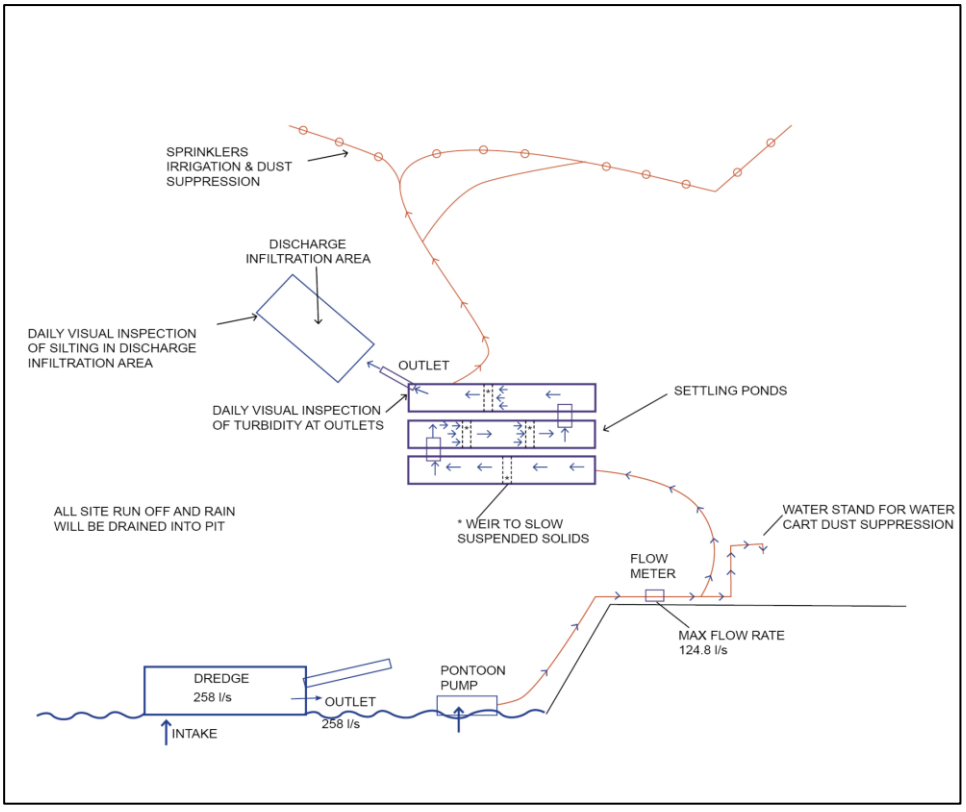

Figure 2 Water circuit diagram (source: Town Planning Group).

[2] Site Emergency Management Plan (2024). Prepared by Hawkeswood Mining Limited.

The following abstraction limits[3] shall not exceed:

- 124.8 litres per second.
- 10,783 cubic metres per day.
- 222, 394 cubic metres per month, and
- 1,967,846 cubic metres during any year ending on 30 June as a rolling average over three consecutive years.

These rates and volumes must also account for water that is taken for the purposes of Tima Burn flow augmentation (see **section 6**).

Dewatering abstraction will be undertaken with standard metering techniques and the location of the meter will be post pumping abstraction and prior to land discharge. The exact location of the water meter to be determined by HML in accordance with the condition of resource consent RM23.819.02.

Daily checks will be undertaken to:

- Determine whether pond water levels are suitable for mining operations.
- Visually inspect the turbidity at the pond outlet to ensure the settling pond is operating effectively.
- Visually inspect silting in the land infiltration area to ensure effective operation.
- To ensure that the dewatering pumps and delivery pipelines are functioning correctly.
- Ensure the meter is functioning correctly (on the basis of expected abstraction flows).
- Determine and ensure that water abstraction is occurring within the limits provided above.

HML will ensure that flow meter records are logged appropriately to the requirements as outlined in the conditions of RM23.819.02. The information shall be routinely submitted to the ORC on an annual basis by 31 July each year. In addition, the requirements for certification, maintenance and recording shall be logged to the specifications provided within the conditions of consent RM23.819.02.

The discharge of mine water to land will be to specified locations and these are shown on **Figure 3** in the following section. Prior to the discharge infiltration the water will be initially treated with the use of settling ponds which will lower sediment concentration. It is anticipated that there is likely to be some ground seepage in these locations due to the infiltration capacity of the ground. The maximum discharge rate to land is consistent with abstraction limits for the mine pond dewatering, and are as follows:

- 124.8 litres per second, and
- 10,783 cubic metres per day.

The daily checks on mine pond abstraction within the limits specified will ensue compliance with the limits for discharge to land.

During dewatering discharge to land, at least a daily check shall be undertaken to:

[3] RM23.819.02 (2024) *Resource Consent. Condition 3Post hearing.* Otago Regional Council.

- Ensure that the discharge area is not within 50 meters of the Clutha River.
- Ensure there is no direct run off of sediment laden water or discharge to any surface watercourse.
- Ensure there is no flooding or erosion of land instability as a result of the discharge.
- Checking to confirm the land discharge area is suitably sized to allow appropriate treatment of sediment laden water prior to the discharge infiltration area. If the discharge is visually dirty, then additional sediment pond area and/or use of non-toxic and biodegradable flocculants can be used to lower sediment concentrations.
- As above, to ensure that the discharge sediment ponds and final infiltration area is suitably sized to enable effective treatment, including freeboard of at least 400mm to ensure there is no overflow of sediment laden water from the discharge area.

Additional inspections will be undertaken following a rainfall event when either the intensity is equal to or greater than five millimetres per hour or 10 millimetres or greater rainfall depth occurs in a 24 hour period.

Discharge quality monitoring is to be undertaken quarterly from the settlement pond outlet (to discharge to land) for the final operational discharge infiltration area. Monitoring/sampling methodology, parameters and reporting (for the surface grab sample) shall be consistent with that required in the Technical Specification document (**Appendix A**; section 5.3).

Figure 3 provides a graphical illustration of the project site's potential for ground water discharge.

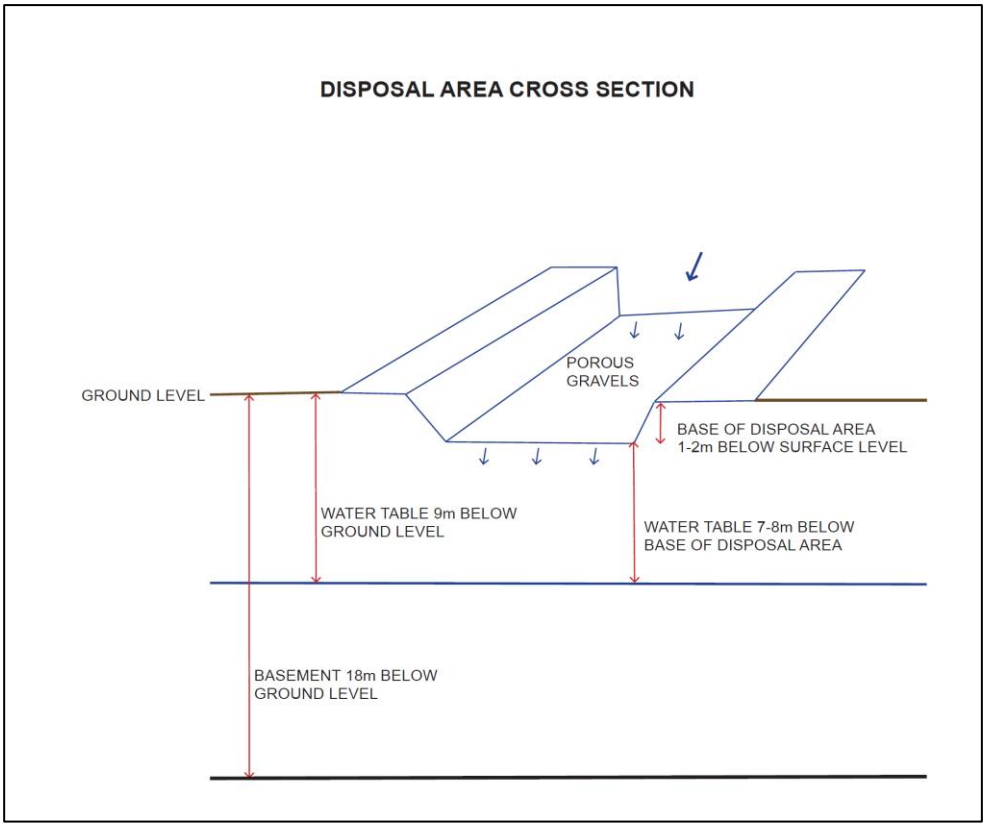

Figure 3 Cross section of typical ground discharge (source: Town Planning Group).

4 Water monitoring locations

The locations for water monitoring have been illustrated in **Figure 4**. The full detailed drawing has also been provided in **Appendix C** for ease of viewing.

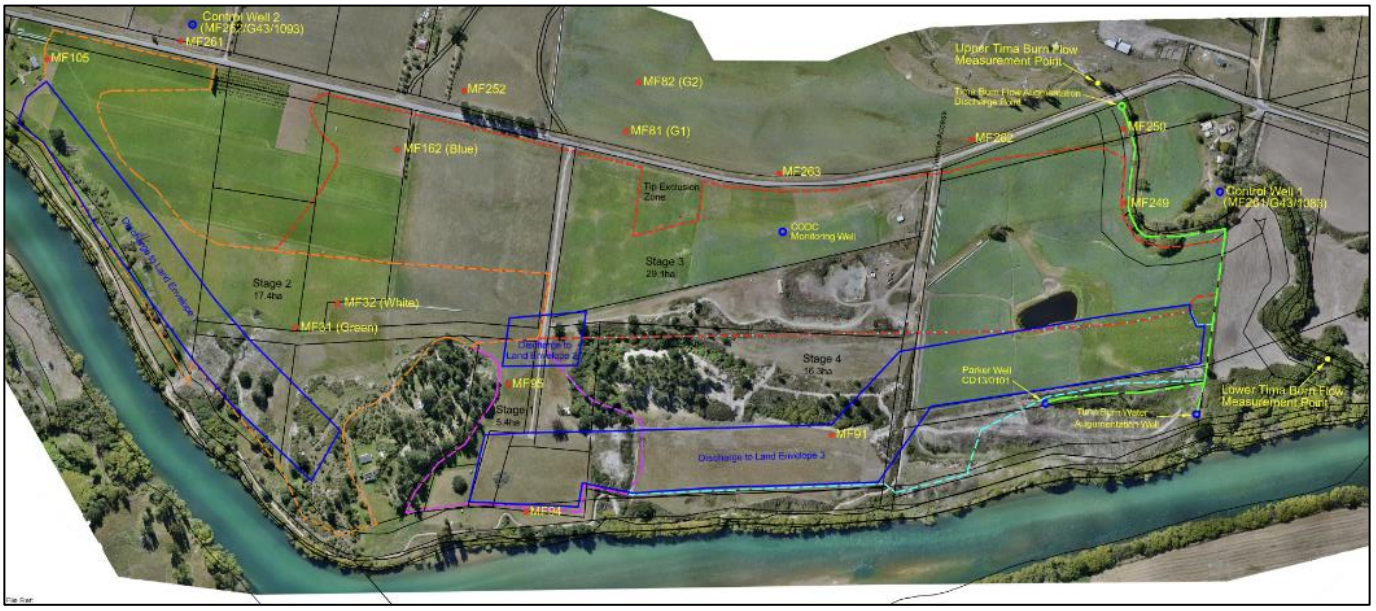

Figure 4 Illustration to provide the monitoring locations and discharge areas (source: HML).

Water quality monitoring will be undertaken on a quarterly basis from bores that are located around the perimeter of the HML mine site. The bore locations shall be determined by the Hydrologist, Tom Heller. The remaining piezometers will be used for water level monitoring purposes (refer to Appendix A, Technical Specification).

5 Tima Burn monitoring

5.1 Introduction

The Tima Burn is located on the northeastern portion of the site. A proposed set back of 20 meters from operations will minimise adverse impacts on the stream. However, there is the potential for stream flow depletion from the mining operations between Tima Burn Bridge and the Clutha River.

The monitoring of the Tima Burn will be of importance throughout duration of the project for the purposes of potential stream flow depletion effects and determining the quantum of augmentation required to maintain flows. For this reason, monitoring locations will be established upstream of the Tima Burn Bridge and near to the Clutha River for downstream monitoring. These locations are depicted in **Figures 5 to 7.**

Stream augmentation flows shall be used to ensure that any stream depletion as a result of dewatering is mitigated. Water for augmentation will be sourced from either a well near to the Clutha River or the Parker irrigation bore CD13/0101. Refer to **Section 6** for further information.

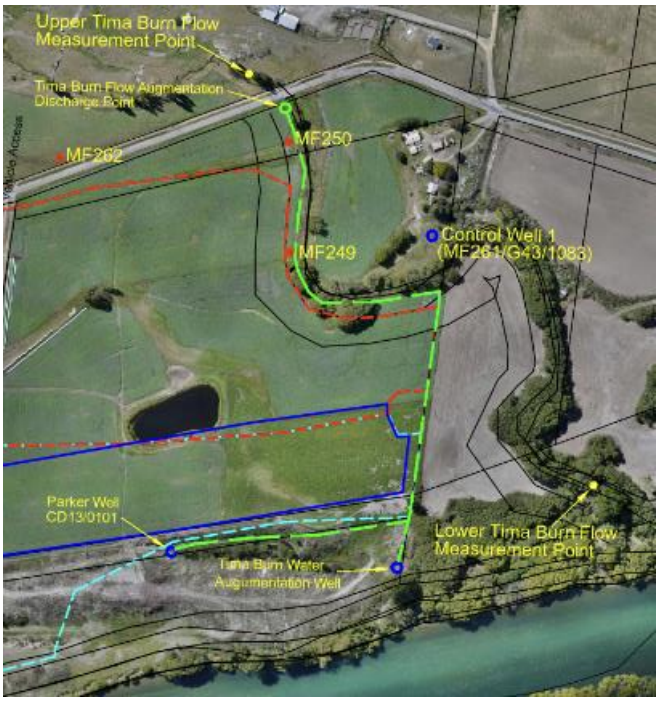

Figure 5 Location of Tima Burn and upper and lower measurement points. The augmentation well and associated transfer pipe is also illustrated.

Figure 6 Photo illustrating upper monitoring location / Tima Burn NZTM 1319441 4938561 (source; HML).

Figure 7 Photo illustrating the lower monitoring location / Tima Burn NZTM 1319420 4938028 (source; HML).

5.2 Gauge installation and flow calculation

- At each of the flow monitoring sites a vertical staff gauge will be installed in the waterway. This can be installed with a pipe driven into the stream bed.
- Each staff gauge is required to manually monitor water levels within the Tima Burn, over a suitable range of flow and allow conversion to flow (in litres per second) with a stage flow rating curve. The downstream site has been located at just above the influence of the Clutha River / Mata-Au power generation flow fluctuations and is representative for the purposes of measurement of any stream flow losses in the downstream reach.
- Measurement of flow at each site location is be undertaken by open channel flow measurement techniques and each stage (stream water level) is to be recorded and attributed to each flow measurement. After at least three flow measurements at varying flows, a stage-discharge (flow) rating curve is to be derived. A quadratic curve is drawn through/encompassing each stage-flow measurement point to establish the rating for comparison of level and flow at each site. Additional information is summarised in **Figure 8** below.

Process for open channel flow measurement and the development of a stage-discharge rating curve:

1. **Velocity Measurement**:
    - Use a portable open channel flow meter to measure the velocity of the liquid. Techniques include doppler, electromagnetic, or ultrasonic methods.
    - Accurate flow measurement requires precise data on the cross-sectional area of the channel.
2. **Cross-Sectional Area Measurement**:
    - Measure the channel's cross-sectional area at the flow measurement site. This involves determining the shape and dimensions of the channel (e.g., rectangular, trapezoidal, etc.).
    - For a rectangular channel, the cross-sectional area (A) is given by: A=b*h (where (b) is channel width and (h) is the water depth (stage).
    - For other channel shapes, adapt the appropriate formula.
3. **Flow Rate Calculation**:
    - Calculate the flow rate (discharge) using the velocity and cross-sectional area: Q=A·V (where (Q) is the flow rate (m^3/s) (A) is the cross-sectional area (m^2) and (V) is the velocity (m/s).
4. **Stage-Discharge Rating Curve**:
    - Conduct at least three flow measurements at varying flows (different water depths).
    - Record the stage (water level) and the corresponding flow rate (discharge) for each measurement.
    - Plot the data points on a graph.
    - Fit a quadratic curve (or another appropriate function) through/encompassing the data points.
    - The resulting curve represents the relationship between stage (water level) and flow rate (discharge) for that specific site.
    - Use this rating curve to estimate flow rates based on observed water levels.

Note: Remember to validate your instruments, calibrate them, and follow best practices for accurate measurements.

Figure 8 Process for open channel flow measurement and the development of a stage-discharge rating curve (source HML).

The location of flow measurement points, process for water level measurement and method for conversion to a flow rate has been determined by EAL (refer **Appendix A**). EAL will oversee the establishment of the flow monitoring points, initial water measurements and develop the rating curve. HML staff will be responsible for regular measurement of water levels in the Tima Burn and conversion to a flow rate using the method provided by EAL.

5.3 Monitoring frequencies

Flow monitoring will be undertaken on a weekly basis. If flow reduces to within 10% of 21 L/s at the Tima Burn Bridge Site (23.1 L/s), and there is a 0.2 m+ drawdown effect in monitoring piezometers flows shall be monitored daily (refer to **Appendix A**).

All monitoring shall be recorded by HML and provided to ORC and Aukaha on request.

5.4 Data Analysis

By using the observed flow data an assessment of natural stream flow losses or gains can be determined. A relationship of Tima Burn Bridge flow versus natural flow loss in the downstream reach can be derived.

EAL will provide a spreadsheet with the appropriate formula to allow HML staff to input the flow levels and be provided with the Tima Burn flow rate. An example of the spreadsheet is included in **Appendix D**.

Please refer to **Appendix A (section 2.3)** for further detailed information on calculations.

6 Tima Burn augmentation and monitoring

As mentioned in previous sections there is the potential for stream depletion from the dewatering operations that are required for the mining operations. The Tima Burn may be impacted from these operations. For this reason, clean/fresh water for augmentation flows shall be used to supplement existing flows in the event that there is any decrease in water flow rate.

The water for augmentation flows will be either sourced from the existing Parker Irrigation well (CD13/0101) or alternatively a new well will be installed for the specific purpose (location; NZTM E 1,319,211 m N 4,938,096 m). The locations have been illustrated on **Figure 4** and **Appendix C**. The water will be metered at the point of take. During any augmentation period the rates and volumes of the take (augmentation) will be logged and stored by HML. The information will be provided to the ORC on an annual basis by the 31 July each year.

Prior to the commencement of augmentation all transfer pipes and water pumps will be flushed prior to any discharge of water to the Tima Burn. The water will also be tested to ensure that there is not any water contamination.

The augmented water will be conveyed to a box diffuser by a sealed pipeline located on the true right bank of the Tima Burn at the Tima Burn Bridge (**Figure 9**). The diffuser is to be constructed and installed to ensure that the augmentation water appropriately mixes and aerates to achieve at least a mean 7-day dissolved oxygen (DO) level of 8 mg/L prior to discharge to the Tima Burn. A typical design has been illustrated in **Figure 10**. The diffuser shall not cause any scour, bank erosion or impede natural flow, and is to be located adjacent to a natural rock outcrop at the Tima Burn Bridge (**Figure 11**). During any augmentation, Dissolved Oxygen (DO) shall be monitored on a daily basis using a DO meter. HML will use a DO meter and all information will be recorded in a logbook (or equivalent) by HML. The DO meter will be calibrated prior to use. The specific requirements for use will be dependent on manufacturers requirements, however in summary;

a) Immerse the probe or meter in water, ensuring that the device is away from vegetation or other matter.

b) Allow time for the reading to stabilise (few seconds to a minute) and the reading noted (often measured in mg/l or saturation percentage).

c) It is preferable to take water temperature as some DO meters can be affected by temperature.

d) Post measurement – rinse the probe with distilled water and store as recommended by manufacturer.

For additional detail and specific compliance requirements in relation to any Tima Burn flow augmentation, refer to conditions of resource consent RM23.819.02 (**Appendix C**).

Figure 9 Location for the installation of the diffuser. NZTM 2000 E 1,319,445 m N 4,938,514 m. (Source; HML).

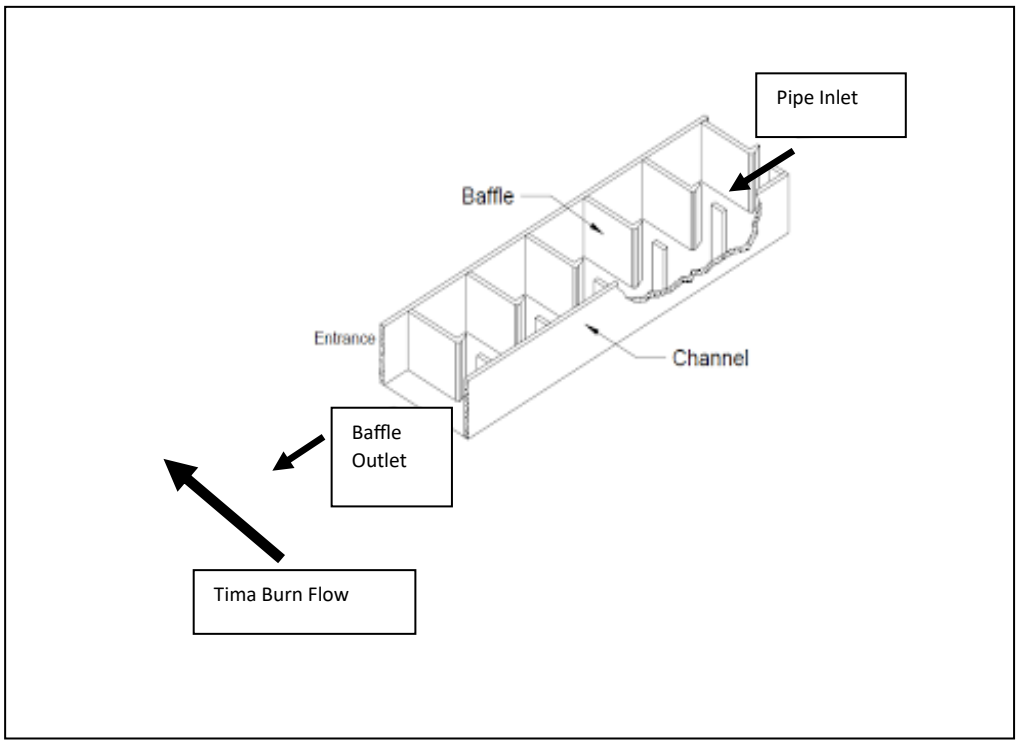

Figure 10 Typical design of the box diffuser. (Source; EAL).

Figure 11 Diagram of the Diffuser and discharge location (Source; HML).

7 Groundwater Monitoring

7.1 Water level monitoring

The monitoring of groundwater will be undertaken with the use of a series of piezometers at the lateral boundaries of the mine site. HML have been routinely monitoring water levels across the site on a monthly basis from November 2022. This data will be used by the hydrologist, Tom Heller, to determine baseline water levels. During active works the monitoring will be completed on a weekly basis.

The monitoring network and locations for piezometers has been provided on **Figure 4** and the complete mapping illustration and construction details (TBC) have been provided **Appendix C**. Photos of two of the piezometers are shown in **Figures 12** and **13** below.

Figure 12 Photo of piezometer (source; HML).

Figure 13 Photo of piezometer (source; HML).

Monitoring will be undertaken with a standard dip meter and be referenced and recorded in relation to a surface reference point (typically the top of casing). All recorded water levels shall be referenced by piezometer number, and be kept in a spreadsheet for analysis, and reporting purposes to the Consent Authority. Water level monitoring is also required after the completion of HML activities until such time steady state conditions are reached in the aquifer (determined by Project Hydrologist).

All monitoring shall be recorded by HML and provided to the ORC on request.

Water levels within monitoring piezometers should be measured at least weekly during mine dewatering operations, and when/if any piezometer is affected by more than a 0.2 m drawdown as a result of mine dewatering (that is 0.2 m in addition to seasonal variation at that time), monitoring should be undertaken on a daily basis. Seasonal variation may be obtained from monitoring at piezometers HML123 and/or HML456 depending upon current mine pit pond position, or as established from existing baseline piezometer measurements.

For additional detail and specific compliance requirements in relation to any groundwater level monitoring and replacement well water supplies, refer to conditions of resource consent RM23.819.02.

7.2 Groundwater quality monitoring

Monitoring will be initially undertaken prior to the start of activities and form baseline information (within 3 months of commencement). Existing wells in the local area will also be utilised for this purpose (subject to authorisation). Following this periodic groundwater quality monitoring will be undertaken on a quarterly basis.

Please refer to **Appendix A** for further information.

7.2.1 Procedures and notification requirements

- Initially purging of wells will be undertaken ensuring that at least 3 well volumes of water are removed.
- Groundwater will be abstracted with a portable sampling pump.
- A representative sample shall then be obtained by undertaking and verifying stable field testing (metered) parameters (the parameters are identified in conditions of resource consent RM23.819.03).
- Electrical Conductivity, pH, Dissolved Oxygen and Oxidation-Reduction Potential shall be measured within a sealed flow cell to prevent surface aeration of the sample.
- Each water sample shall be labelled, including well identifier number and sample date & time.
- Samples will be analysed for dissolved metals analysis and other parameters in accordance with RM23.819.03.
- If any measured value exceed a NZ Drinking Water Standard (NZDWS) or Guideline value, that had not been previously exceeded (as identified) from the results of baseline monitoring. In the event of an exceedance HML will advise the ORC and any potentially affected well owners.
- In the event of an exceedance HML are required to engage a suitably qualified water quality expert (within 7 days) to assess the cause and significance of the sample result. A signed report must be completed within 1-month of the sample result which assesses the items as required by conditions of resource consent RM23.819.03.
- If the exceedance is caused by HML operations, then HML will provide a supply of potable drinking water of 2,000 L/day until such time that any exceedance of the NZDWS has been rectified and/or is determined to be not as a result of HML activities.

7.3 Annual reporting requirements

Annual reporting of general site groundwater quality monitoring in conjunction with groundwater abstraction and mine pond discharge management, is to be undertaken and provided to the ORC by 30 June of each year. The report will be prepared by a SQEP and include the following:

- A summary conceptual model for the site based on monitoring data. The assessment summarises groundwater level and flow, and water quality results. The conceptual model will be compared to data / information provided by the HML application.
- An assessment of groundwater quality will be provided, in conjunction with ground water flows and levels.
- To include any incidences where any measured or reported value of any determinants (from water quality monitoring at designated monitoring piezometers), exceed a NZ Drinking Water Standard MAV or Guideline values. Subsequent investigations and resolutions will also be provided.
- The report will identify persons involved in the monitoring and report preparation and analysis.
- Any complaints (recorded) in relation to groundwater quality will be reported.

8 Landfill Monitoring

The monitoring of groundwater quality from the existing landfill will be necessary throughout the project. The monitoring location will be on the boundary of the landfill exclusion zone, which is directly down groundwater gradient of the landfill (**Figure 14**).

The proposed location for a new well is at NZTM 2000 E 1,318,828 m N 4,938,844 m or there is the potential to utilise an existing landfill monitoring well at G43/0112.

All monitoring and data analysis will be coordinated by suitably qualified water quality expert.

Monitoring will include initial baseline groundwater quality monitoring prior to dewatering activities. Following this monitoring will be on a quarterly basis.

A similar procedure shall apply as previously discussed in section 7 and water shall be abstracted by a portable sampling pump (section 7.2.1). All samples will be analysed by an IANZ[4] accredited laboratory and sampling undertaken in general accordance with the NZDWS. Any exceedance will be managed in accordance with RM23.819.03 and relevant notification requirements.

[4] International Accreditation New Zealand.

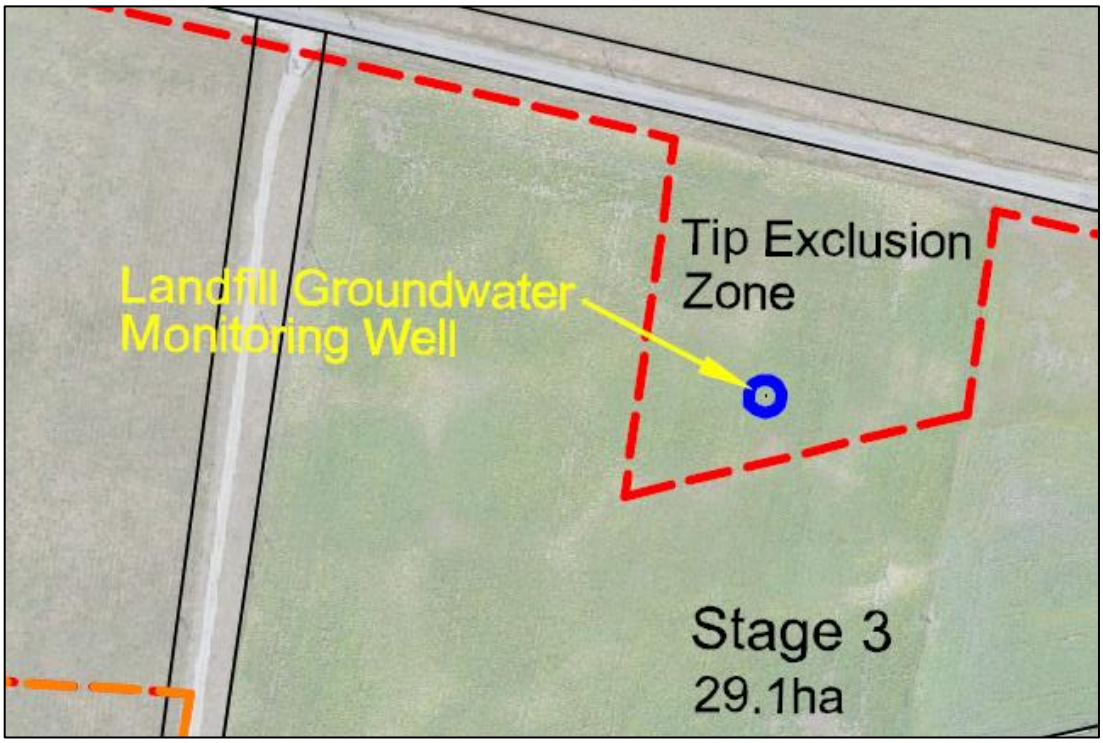

Figure 14 Location of existing landfill and monitoring well points.

9 Appendices

Appendix A: Water Related Management Plan HML (Heller, 2024)

Appendix B: Spill Response Plan – HML

Appendix C: Water Management Plan Diagram – HML

Appendix D: Draft Monitoring spreadsheets

Appendix E: ORC Consent conditions – post hearing amended 2024 RM23.819.01

Appendix A: Technical Specification for Water Monitoring HML (Heller, 2024)

▪ report

Hawkeswood Mining Limited, – Water Related Management Plan Information

Environmental Associates Ltd

▪ report

Hawkeswood Mining Limited, – Water Related Management Plan Information

Prepared for

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June 2024

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Revision History

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A	Tom Heller	Draft Information Report	June 2024

Document Acceptance

Action	Name	Signed	Date
Prepared by	Tom Heller	TH	Jun 2024
Reviewed by	Tom Heller	TH	Jun 2024
Approved by	Tom Heller	TH	Jun 2024
	Environmental Associates Ltd		

Hawkeswood Gold Mine

Teviot Road, Millers Flat

Technical Specification for Water Monitoring

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1 Introduction

This document has been prepared for Hawkeswood Mining Limited to provide technical specifications in support of resource consent compliance requirements relating to water monitoring and associated trigger / response actions.

The relevant resource consents are:

- RM23.819.01 – Land Use Consent to construct a bore for the purpose of digging a mine pit that intercepts groundwater.
- RM23.819.02 – Water Permit to take and use groundwater for the purpose of transient mine pit dewatering and/or augmentation purposes, plant processing, dust suppression and rehabilitation
- RM23.819.03 – Discharge Permit to discharge sediment-laden water to water in a bore, and to land in a manner that may enter water.

Resource consents which also relate to the project but are not relevant to water management are:

- RM23.819.04 – Discharge Permit to discharge contaminants to air for the purpose of operating an alluvial gold mine.
- RC230325 – Land use consent for the operation of a gold mine.

This document is technically focused and should be read in conjunction with the Water Management Pan.

This document provides specifications for the monitoring and relevant trigger / response actions in relation to:

- Potential stream depletion of the Tima Burn and augmentation facility.
- Groundwater level monitoring and replacement water supply.
- Groundwater quality monitoring and response to any exceedances.
- Dewatering and discharge of dewatering water

Monitoring requirements throughout this report are referenced to the plan shown in Figure 1 below. A larger version is attached to the Water Management Plan as Appendix B.

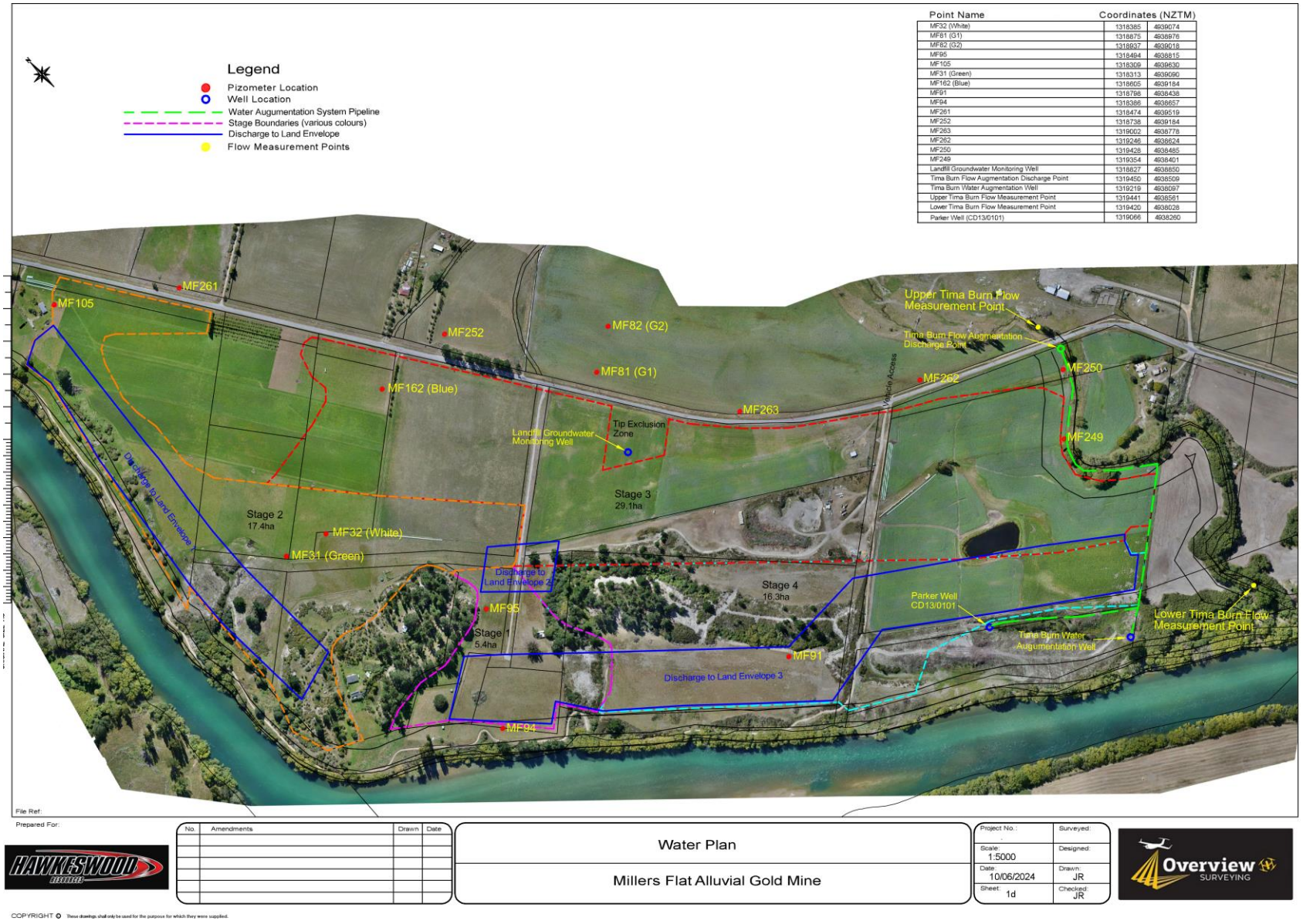


Figure 1 Water Monitoring Plan

2 Tima Burn Flow Augmentation Management

2.1 Summary

The Tima Burn is divided into two reaches:

a. **Upstream Reach (Above Tima Burn Bridge):** This section has no direct connection to the aquifer. The stream bed is perched above the local aquifer and underlain by basement rock. Water leakage to the water table aquifer occurs naturally.

b. **Lower Reach (Tima Burn Bridge to Clutha Mata-Au River):** Here, potential stream flow depletion effects may occur due to the mine pond dewatering activity.

Monitoring will take place at two sites:

a. **Tima Burn Bridge Site**: A vertical staff gauge will be installed within the waterway upstream of any bed/flow control.

b. **Downstream Site:** Located just above the influence of Clutha Mata-Au River power generation flow fluctuations, this site represents the downstream reach for measuring stream flow losses.

Flow measurements will be conducted by a full-time Compliance and Safety Officer employed by HML, using open channel flow techniques (e.g., current meters). Stream water levels will be recorded and associated with each flow measurement. A stage-discharge (flow) rating curve will be derived based on at least three flow measurements at varying flows. The rating curve will allow comparison of water level and flow at each site.

Initially, flow monitoring at both the Tima Burn Bridge Site and the Downstream Site will occur two-weekly. Once, the mining footprint crosses the southern paper road, monitoring will switch to a weekly basis. If flow reduces to within 10% of 21 L/s (i.e. the lower acceptable flow threshold) at the Tima Burn Bridge Site and there's a 0.2 m+ drawdown effect in monitoring piezometers, daily flow monitoring will be implemented.

If any water table level measured exceeds 0.2 m as result of HML dewatering, augmentation of the Tima Burn flow shall be undertaken by discharging local clean groundwater at the Tima Burn Bridge, to maintain a 21 L/s flow within the downstream reach. Augmentation shall be monitored and adjusted accordingly on a daily basis during any 0.2 m+ effect of HML mine dewatering activity drawdown. The volume of water to be augmented is calculated using Equation 1, as described in detail below, which considers the current flow rate at the Tima Burn Bridge and any apparent flow losses downstream. A spreadsheet can be used to facilitate this calculation, allowing the Compliance and Safety Officer to input necessary data and obtain the required augmentation value.

HML may also establish an Upstream Reference Site where the Tima Burn debouches onto the alluvial terrace. Similar stage and flow monitoring will occur as at the Tima Burn Bridge and Downstream sites with assessments of natural stream flow losses or gains being made between the Reference Site and the Tima Burn Bridge Site.

The goal is to keep the natural flow intact and account for any flow losses downstream as a result of dewatering at the mine. Augmentation water will be conveyed through a sealed pipeline to a box-diffuser on the right bank of the Tima Burn at the Tima Burn Bridge ensuring proper mixing and aeration without causing erosion or impeding natural flow.

2.2 Background

Potential stream flow depletion effects of the HML mine pond dewatering activity are possible in the lower reach of the Tima Burn from the Tima Burn Bridge to the Clutha Mata-Au River. The Tima Burn reach upstream of the Tima Burn Bridge has nil connection to the aquifer as the bed is perched above the local aquifer and it is directly underlain by basement rock. The Tima Burn in this reach may only naturally leak water to the water table aquifer.

2.3 Monitoring

2.3.1 General Overview

Consistent with conditions of resource consent, and for the purposes of any stream flow depletion effects of the HML activities, monitoring of Tima Burn flow is to be undertaken at the Tima Burn Bridge site and the Downstream site as identified on Figure 1. At both sites, a vertical staff gauge is to be installed within the waterway and upstream of any bed/flow control. This can be undertaken with a driven pipe into the bed of the stream. Each staff gauge is required to manually monitor water levels within the Tima Burn at both locations over a suitable range of flow and allow conversion to flow with a stage-flow rating curve (see below). The Downstream site has been located at just above the influence of the Clutha Mata-Au River power generation flow fluctuations and is representative for the purposes of measurement of any stream flow losses in the downstream reach.

Measurement of flow at each site location is be undertaken by open channel flow measurement techniques (using a current meter or similar device), and stage (stream water level) is to be recorded and attributed to each flow measurement. After at least three flow measurements at varying flows, a stage-discharge (flow) rating curve is to be derived. The rating curve consists of stage (level) plotted from the Y-axis and flow from the X-axis. A quadratic curve is drawn through/encompassing each stage-flow measurement point to establish the rating for comparison of level and flow at each site. These measurements will be undertaken by a Compliance and Safety Officer employed by HML.

2.3.2 Baseline

To establish a baseline, the above stage/flow assessments are to be undertaken prior to any potential impact of the dewatering activity upon flows in the Tima Burn (where there is less than a 0.2 m drawdown in monitoring piezometers as shown below). Additionally, flow

measurements should be repeated after a high flow event and/or at least on an annual basis to ensure the rating curve remains current for each site.

2.3.3 Monitoring Methodology

The monitoring of flow at both sites (as above from the rating curves), is to be undertaken on a weekly basis, and if flow reduces to within 10% of 21 L/s at the Tima Burn Bridge Site (23.1 L/s), and there is a 0.2 m+ drawdown effect in monitoring piezometers as below, flows shall be monitored daily. All visual staff gauge readings and corresponding flows derived from the rating curve(s) shall be kept in a logbook for that purpose. From the observed flow data, an assessment of natural stream flow losses or gains (denoted as **R**) particularly at an upstream flow of 21 L/s or less (between the Tima Burn Bridge and Downstream Site), can be made. A relationship of Tima Burn Bridge flow versus natural flow loss in the downstream reach can be derived.

The monitoring of water table levels (at a weekly frequency) is to be undertaken adjacent to the Tima Burn at piezometers MF249 and MF250 (prior to any site dewatering activities and then during mine operations). Where Tima Burn flow at the Tima Burn Bridge Site and/or the Downstream Site reduces to 21 L/s, water table level measurements at MF 249 and MF250 are to be made daily, and if any water table level as measured at MF249 and/or MF250, exceeds 0.2 m as result of HML dewatering activities (an exceedance of 0.2 m is 0.2 m in addition to any natural seasonal variation as measured from the reference piezometers MF261/G43/0183 or MF262/G43/0193 depending on mine location, or as established from existing baseline piezometer measurements), augmentation of water to the augmentation point shall be made (to the Tima Burn at the Tima Burn Bridge), as calculated by the following equation (1):

Equation 1*: $Q1 = 21\ L/s - Q2 + \Delta R$*

Where:

Q1 is the water flow required to be augmented to/at the Tima Burn Bridge.
Q2 is the currently measured flow (by rating curve) at the Tima Burn Bridge.
ΔR is any apparent difference (increase) in flow losses between the Tima Burn Bridge and the Downstream Site at the currently measured flow at the Tima Burn Bridge.

An example is where piezometer MF249 just exceeds 0.2 m drawdown (accounting for any currently occurring natural seasonal variation), the flow at the Tima Burn Bridge is 15 L/s, and the difference in flow loss in the downstream reach is 2 L/s.

In this scenario:

Q2 = 15 L/s
ΔR = 2 L/s

Therefore, the augmentation rate (**Q1**) = 21 L/s – 15 L/s (**Q2**) + 2 L/s (**ΔR**)

Q1 = 8 L/s

This maintains a 21 L/s flow within the downstream reach and is monitored and adjusted accordingly on a daily basis during any 0.2 m+ effect of HML mine dewatering activity drawdown on piezometers MF249 and/or MF250.

2.3.4 Alternative Monitoring Methodology

Optional for HML, is to establish a flow monitoring site in the Tima Burn at where flow debouches onto the alluvial terrace (Upstream Reference Site). Stage and flow monitoring at the site can be undertaken in a similar manner as for the Tima Burn Bridge and Downstream sites. From the observed flow monitoring data, an assessment of natural stream flow losses or gains (denoted as **S**) between the Reference Site and the Tima Burn Bridge Site, can be made. A relationship of Reference Site flow versus natural flow loss in the reach between the Reference Site and the Tima Burn Bridge Site can be derived. Where this has been undertaken, and if any water table level as measured at MF249 and/or MF250 exceeds 0.2 m as result of HML dewatering activities (an exceedance of 0.2 m is 0.2 m in addition to any natural seasonal variation as measured from the reference piezometers MF261/G43/0183 or MF262/G43/0193 depending on mine location, or as established from existing baseline piezometer measurements), augmentation of water to the augmentation point shall be made (to the Tima Burn at the Tima Burn Bridge), and is alternatively calculated by the following equation (2):

Equation 2*: $Q1 = Qref - S - Q2 + \Delta R$*

Where:

Q1 is the water flow required to be augmented to/at the Tima Burn Bridge.
Qref is the currently measured flow (by rating curve) at the upstream Reference Site.
S is the natural flow loss at a Qref low of 21 L/s or less, between the Reference Site and the Tima Burn Bridge at the currently measured (by rating curve) flow at the Reference Site.
Q2 is the currently measured flow (by rating curve) at the Tima Burn Bridge.
ΔR is any apparent difference (increase) in flow losses between the Tima Burn Bridge and the Downstream Site for the currently measured (by rating curve) flow at the Tima Burn Bridge.

An example (similar to above) is where piezometer MF249 just exceeds 0.2 m drawdown (accounting for any currently occurring natural seasonal variation), the Reference Site flow is 21 L/s and the flow at the Tima Burn Bridge is 15 L/s (a natural 6 L/s loss for a Qref flow of less than 21 L/s), and the difference in flow loss in the downstream reach is 2 L/s.

In this scenario:

Qref = 21 L/s
S = 6 L/s
Q2 = 15 L/s
ΔR = 2 L/s

Therefore, the augmentation rate (**Q1**) = 21 L/s (**Qref**) – 6 L/s (**S**) – 15 L/s (**Q2**) + 2 L/s (**ΔR**)

Q1 = 2 L/s

This maintains the naturally occurring flow and accounts for any induced losses within the downstream reach and is monitored and adjusted accordingly on a daily basis during any 0.2 m+ effect of HML mine dewatering activity drawdown on piezometers MF249 and/or MF250.

2.3.5 Augmentation water supply and delivery

The clean/fresh water for augmentation flows may be sourced from either the existing Parker Irrigation Well (CD13/0101) or a new well installed for that purpose (as shown in Figure 1). At each site and if water is to be used for augmentation, water metering of the abstraction must be undertaken at close to the point of take. During any augmentation period, the rates and volumes of take (augmentation) must be logged and stored and be available to provide to the consent authority at an annual interval on/by 31 July each year or as requested.

The augmentation water is to be conveyed by a sealed pipeline to the box-diffuser located on the right bank of the Tima Burn at the Tima Burn Bridge (Figure 1). The diffuser is to be constructed and installed to ensure that the augmentation water appropriately mixes and aerates to achieve at least a mean 7-day dissolved oxygen (DO) level of 8 mg/L prior to discharge to the Tima Burn. The diffuser shall not cause any scour, bank erosion or impede natural flow, and is to be located adjacent to a natural rock outcrop at the Tima Burn Bridge (right bank – refer to diagram). During any augmentation, DO shall be monitored on a daily basis and shall be recorded in a logbook for that purpose.

For additional detail and specific compliance requirements in relation to any Tima Burn flow augmentation, refer to conditions of resource consent RM23.819.02.

3 Groundwater Level and Replacement Water Supply Management

3.1 Summary

Regular monitoring of groundwater levels (static water table) in piezometers at the mine/site boundaries is to occur at least weekly, starting one month before any HML dewatering activity, using a standard dip meter. Measurements are referenced to a surface point (usually the top of the casing). All recorded water levels are associated with their respective piezometer numbers with data being stored in a spreadsheet for analysis and reporting to the Consent Authority. Water level monitoring continues even after mining activities are completed until steady state conditions are reached in the aquifer.

If any piezometer exceeds 0.2 m drawdown due to mine dewatering, nearby water wells are monitored weekly. If water well static levels drop by more than 0.2 m due to dewatering (considering seasonal variation), daily recording will be undertaken.

If the daily water level monitoring data for any water well indicates that the seasonal water table variation will likely be exceeded within a 20-day period, an alternative water supply arrangement will be initiated and discussed with the property owner. These arrangements must be completed at least 48 hours before the well's water supply becomes non-viable. The 20-day lead-in time allows for adequate warning and planning to provide an alternate water supply.

3.2 Groundwater Level Monitoring

3.2.1 General

Monitoring of groundwater (static water table) levels in piezometers at the lateral boundaries of the mine/site shall be undertaken at least on a weekly basis (and at least one month prior to any HML dewatering activity). The water level monitoring site network is as identified on Figure 1, showing piezometer reference number and location. The water levels monitored shall be undertaken with a standard dip meter and be referenced and recorded in relation to a surface reference point (normally top of casing). All recorded water levels shall be referenced by piezometer number, and be kept in a spreadsheet for analysis, and reporting purposes to the Consent Authority. Water level monitoring is also required after the completion of HML activities until such time steady state conditions are reached in the aquifer. All groundwater monitoring piezometer construction and completion details (including all survey and datum information) are to be provided to the Consent Authority in accordance with conditions of resource consent RM23.819.01 and RM23.819.03.

3.2.2 Methodology

Water levels within monitoring piezometers should be measured at least weekly during mine dewatering operations, and when/if any piezometer is affected by more than a 0.2 m drawdown as a result of mine dewatering (that is 0.2 m in addition to seasonal variation at that time),

monitoring should be undertaken on a daily basis. Seasonal variation may be obtained from monitoring at piezometers MF261/G43/0183 and/or MF262/G43/0193 depending upon current mine pit pond position, or as established from existing baseline piezometer measurements.

Initially, prior to or immediately upon commencement of mine dewatering, existing nearby water supply wells (most adjacent to the mine pit pond), with the well owner's agreement, should be inspected to determine and record the following:

- Static water level from surface reference point (normally top of casing).
- Conservative depth to above top of pump or suction intake from reference, and
- Pumping (operational) water level in the well from reference.

The difference in the pumping water level and the top of pump or intake level determines the quantum of seasonal (or otherwise) water table variation (**V**) from the static water level measured at that time, which can be incurred whilst maintaining a viable water supply from the well. It should also be noted that no well (or piezometer) will incur a drawdown of more than four metres, as limited by the HML dewatering activity.

A standard dip meter can be used to measure the above items and/or well records may be used to inform pump placement. If there is no access for well dipping, an inspection hole in the top cap may be drilled for that purpose (and capped as appropriate). As/if the drawdown effect of mine pit pond dewatering laterally extends (as confirmed by piezometer and well measurements), additional distal water supply wells should be inspected as above.

When any piezometer is deemed to have exceeded 0.2 m drawdown as a result of mine dewatering, the most adjacent water wells (previously inspected) should be monitored to record static water level at least on a weekly basis. When/if any water well static water level reduces by more than 0.2 m from the impact of mine dewatering (in consideration of seasonal variation as above), water supply well (water) levels should be monitored and recorded daily.

3.3 Alternative Water Supply Arrangements

If at any water well the daily water level (drawdown) recorded monitoring data (plotted chronologically), indicates that variable **V** (as determined above) will be conservatively exceeded within a 20-day period, an alternative water supply arrangement for that property should be initiated and determined as appropriate with the property owner. All alternative water supply arrangements should be completed at least prior to 48-hours of any well water supply becoming non-viable. A 20-day lead-in time period is considered sufficient to enable suitable advanced warning and for arrangements to be made to provide alternate water supply.

Alternative water supply arrangements are as agreed between HML and the property owner, which include but are not limited to:

- Use of an alternative existing water supply for the property.
- Connecting the property to the Millers Flat Water Company supply.
- Well remedial works to improve available seasonal variation (V).
- A short-medium term tanker water supply as appropriate, and
- Any other alternative water supply arrangements as agreed to by the landowner.

As above, all suitable communication and arrangements between relevant parties (including the Consent Authority), and infrastructure works required to establish the alternative water supply to the property, shall be completed at least prior to 48-hours of any water supply well becoming non-viable.

For additional detail and specific compliance requirements in relation to any groundwater level monitoring and replacement well water supplies, refer to conditions of resource consent RM23.819.02.

4 General Site Groundwater Quality Monitoring and Reporting Management

4.1 Summary

Before any mine dewatering activities begin, initial baseline groundwater quality monitoring will take place to establish a starting point for water quality assessments. Regular groundwater quality monitoring will occur at quarterly intervals and will start prior to commencing mine dewatering and continue throughout the authorised mine dewatering period.

Monitoring sites around the mine perimeter (as identified in Figure 1) will be sampled, including the bore adjacent to the Millers Flat Landfill. Static water levels in monitoring wells will be measured before sampling with groundwater samples obtained using a portable pump. Field testing parameters (such as Electrical Conductivity and Oxidation-Reduction Potential) will be verified with water samples collected in labelled bottles, following specific procedures. Dissolved metals analysis will involve filtering the sample with a 20-micron filter. All groundwater quality samples will be refrigerated and sent to the laboratory promptly.

If any measured value exceeds New Zealand Drinking Water Standard MAV or Guideline values (not previously exceeded during baseline monitoring), HML must notify the Consent Authority and potentially affected well owners within 48 hours and promptly engage an experienced expert to assess the cause and significance of the result to determine if the exceedance was due to mine dewatering and if it affects any current drinking water wells.

If a sample exceeds NZDWS values, affected well owners must receive an alternative water supply (2,000 L/day of potable water) within 48 hours. Weekly monitoring of water quality determinants at the closest monitoring piezometer and affected well will continue until a permanent alternative supply is arranged or the exceedance is resolved. HML will provide an annual groundwater quality report to the Consent Authority along with storing all environmental monitoring data for analysis and reporting as required.

4.2 Groundwater Quality Monitoring

The following monitoring and compliance for groundwater quality at the designated groundwater quality monitoring piezometers/sites located around the perimeter of the HML mine site, as identified on Figure 1, shall be undertaken as follows:

- Initial baseline groundwater quality monitoring shall be undertaken prior to mine dewatering activities.
- Periodic groundwater quality monitoring shall be undertaken at quarterly intervals and initially within 3-months of the commencement of any mine dewatering activity, for the duration of the mine dewatering activity authorised by resource consent.

The above monitoring includes for water quality sampling at the Millers Flat Landfill monitoring piezometer G43/0112, as identified on Figure 1.

Static water level measurement at monitoring wells and well identification number shall be initially obtained and recorded prior to any water quality sampling event.

For groundwater quality monitoring (undertaken at the sites and frequency as above), groundwater shall be abstracted by a portable sampling pump (or similar device) by firstly abstracting 3-well volumes of water for the purposes of purging wells to obtain a fresh sample. Following well purging, a representative groundwater sample shall be obtained by appropriately undertaking and verifying stable field testing (metered) parameters (the parameters are identified in conditions of resource consent RM23.819.03). Electrical Conductivity,Oxidation-Reduction Potential, pH and Dissolved Oxygen shall be measured within a sealed flow cell to prevent surface aeration of the sample. Upon completion of field testing, water samples shall be obtained by filling each sample bottle (which are labelled consistent with the monitoring well identifier and date/time of sampling event). Field filtering of the water sample with a 20 micron filter shall be undertaken for dissolved metals analysis. Care should be taken to not overfill the acid preservative dissolved metals bottle. Otherwise, all bottles should be completely filled and where appropriate, any air bubbles or pockets should be removed by squeezing the bottle and then tightening the cap. The sampling event laboratory form shall be completed in full and with monitoring well identification and date/time of sampling event. The list of groundwater quality (laboratory) tested parameters are found in conditions of resource consent RM23.819.03.

All groundwater quality monitoring samples shall be appropriately refrigerated and dispatched to the laboratory within appropriate timeframes. Additional groundwater sampling requirements may be found within conditions of consent RM23.819.03.

Upon receipt of any/all groundwater quality sampling results for the above quarterly monitoring, should any measured or reported value of any determinants exceed a NZ Drinking Water Standard MAV or Guideline value, that had not been previously exceeded, or if previously exceeded, the exceedance is greater than previously recorded (as identified) from the results of baseline monitoring, within 48 hours of sample receipt HML must directly advise the Consent Authority and any potentially affected well owners (within vicinity) of the result(s). This may be done by phone calling, email and in-person.

4.3 Exceedance Report

Within 7-days of receipt of a sample result that exceeds the NZDWS (as above), HML is to engage a suitably experienced and qualified person to assess the cause and significance of the sample result, which includes and may not be limited to the items identified within resource consent RM23.819.03. A signed report must be completed within 1-month of the sample result which assesses the items as required by conditions of resource consent RM23.819.03 and determines if the sample result was caused by HML mine dewatering and discharge activities and will directly cause exceedance of the NZ Drinking Water Quality Standards at any current water supply well used for drinking water purposes. The report is also to be provided directly to the Consent Authority.

4.4 Alternative Drinking Water Supplies

Within 48 hours of receipt of a sample result that exceeds the NZDWS, any affected well owners shall be supplied by HML with an alternative water supply (refer to replacement water supply management), of potable drinking water of 2,000 L/day, until such time that any exceedance of the NZDWS has been rectified and/or is determined to be not as a result of HML activities. If a replacement alternative water supply is already being provided to the well owner, then compliance with the above requirements is achieved. During any period where a water supply well is affected (as above) weekly monitoring of the identified water quality determinants at the closest target monitoring piezometer (and at the affected water well), shall be undertaken until such time either an alternative permanent water supply has been arranged or that any exceedance of the NZDWS has been rectified and/or is determined at that time to be not as a result of HML activities.

4.5 Annual Reporting

Annual reporting of general site groundwater quality monitoring in conjunction with groundwater abstraction and mine pond discharge management, is to be undertaken and provided to the Consent Authority by 30 June of each year. The annual groundwater report must be prepared by a suitably qualified and experienced expert, as per RM23.819.01 and include the following:

- A summary conceptual model for the site based on monitoring data. This is an assessment of groundwater level and flow, and water quality results at monitoring locations over time. The conceptual model should be compared to the data/information provided within the HML application.
- A specific assessment of any groundwater quality results in conjunction with groundwater levels and flow that indicates HML mining activities are adversely impacting on groundwater quality, including that of any sensitive receptors.
- Identification of any incidences where any measured or reported value of any determinants (from water quality monitoring at designated monitoring piezometers), exceed a NZ Drinking Water Standard MAV or Guideline value, that had not been previously exceeded (as identified) from the results of baseline monitoring. Additionally, any subsequent investigations and follow up reporting in relation to any above exceedances shall be summarised within the report. Any specific incidents where a significant adverse water quality effect was measured at a designated monitoring piezometer and/or any water supply well, should be documented along with any remedial measures undertaken and the resulting outcomes.
- The report shall also include the identification and expertise of person(s) undertaking groundwater quality monitoring in accordance with this management plan and resource consent RM23.819.03. Any complaints (recorded) in relation to groundwater quality should be appropriately identified along with any actions undertaken.

All environmental monitoring information/data collected in relation to the management plan, shall be stored in an appropriate database to enable annual and subsequent analysis and reporting as required by conditions of resource consent(s).

For additional detail and specific requirements in relation to any general HML groundwater quality monitoring and compliance, refer to conditions of resource consent RM23.819.03.

5 Groundwater Abstraction and Mine Pond Discharge Management

5.1 Summary

Groundwater abstraction is undertaken to lower the water level in a mine pond, allowing efficient mineral extraction. During mine operation, water is pumped from the pond using a floating or fixed surface pump. Standard metering techniques are used to ensure compliance with abstraction limits.

The abstracted water is treated in settling ponds before seeping into the land. Daily checks will be undertaken to ensure prevention of surface runoff or discharges into surface waterbodies, and to avoid flooding and erosion, and to consider addition of flocculants if necessary.

Additionally, quarterly monitoring of the discharge area and the Clutha Mata-au River will be undertaken for total suspended solids and turbidity at designated sites. Assessments also include visual checks for oil, clarity, odour, and effects on aquatic life and surface grab samples are taken and analysed according to established protocols. Results will be provided to the consent authority.

5.2 Groundwater Abstraction

5.2.1 Overview

Abstraction of groundwater for mine pond dewatering purposes shall be undertaken to effectively lower the pond level within the mine pit, to enable efficient excavation and extraction of mineral resource for the floating plant. During operation of the transient mine pit pond, water abstraction from the mine pond is undertaken by a floating or fixed surface pump, which abstracts the water and discharges to land at within the designated land discharge settling ponds area as shown on Figure 1.

5.2.2 Abstraction Limits

Abstraction (limits) of mine pond water shall not exceed:

- 124.8 litres per second
- 10,783 cubic metres per day
- 222, 394 cubic metres per month, and
- 1,967,846 cubic metres during any year ending on 30 June as a rolling average over three consecutive years.

5.2.3 Abstraction Monitoring

Note that the above rate and volumes must also account for any water taken for the purposes of Tima Burn flow augmentation. Refer to Section 2, Tima Burn Augmentation Management.

Metering of the dewatering abstraction is undertaken by standard metering techniques, and the location of the meter is post pumping abstraction and prior to discharge to land (refer to schematic diagram A). During dewatering abstraction, at least a daily check should be undertaken to:

- Ascertain if pond water levels are suitable for mine operational purposes
- Ensure the dewatering pump and delivery pipeline are functioning correctly
- Ensure the meter is functioning correctly (on the basis of expected abstraction flows)
- Determine and ensure that water abstraction is occurring within the limits provided above.

Dewatering flow metering records shall be logged to the specifications provided within conditions of consent RM23.819.03 and shall be provided to the Consent Authority annually by 31 July each year. Requirements for certification and maintenance/reporting of the water meter (and datalogger) shall be undertaken as identified within consent RM23.819.03.

Sampling of the discharge to land is to be undertaken quarterly from the dewatering pump outlet (to discharge to land) for the final operational discharge infiltration area. Monitoring and/or sampling methodology, parameters and reporting (for the surface grab sample) shall be consistent with the methodology required to undertake water quality sampling. The discharge to land shall be initially treated by settling/sediment ponds, and then discharged via ground seepage into land

5.3 Mine Pond Discharge

5.3.1 Discharge Overview

Discharge to land of mine pond dewatering water shall occur to the designated land discharge areas as identified in Figure 1. The discharge to land shall be initially treated by discharge settling (sediment) ponds, and then discharged via ground seepage into land. The land discharge to settling ponds and final discharge seepage area are identified in schematic diagram A. The maximum discharge rate to land is consistent with abstraction limits for the mine pond dewatering, and are as follows:

- 124.8 litres per second, and
- 10,783 cubic metres per day.

5.3.2 Monitoring

As above, the daily check on mine pond abstraction within the limits specified will ensure compliance with the limits for discharge to land.

During dewatering discharge to land, at least a daily check should be undertaken to:

- Ensure any discharge area is not within 50 metres of the Clutha Mata-au River
- Ensure there is no direct run off of sediment laden water or discharge to any surface watercourse
- Ensure there is no flooding, erosionor land instability as a result of the discharge
- Checking to confirm the land discharge area is suitably sized to allow appropriate treatment of sediment laden water prior to the discharge infiltration area. If the

discharge is visually dirty then additional sediment pond area and/or use of non-toxic and biodegradable flocculants can be employed.

- As above, to ensure that the discharge sediment ponds and final infiltration area is suitably sized to enable effective treatment, including adequate freeboard (300 mm as a sufficient guide), to ensure there is no overflow of sediment laden water from the settlement ponds or discharge area.

Discharge quality monitoring is to be undertaken quarterly from the dewatering pump outlet (to discharge to land) for the final operational discharge infiltration area. Monitoring/sampling methodology, parameters and reporting (for the surface grab sample) shall be consistent with that required by the general groundwater quality site monitoring and reporting management plan (refer to specific detail contained within the plan for periodic groundwater quality monitoring procedures and reporting that will also apply to the discharge).

5.3.3 Quarterly Clutha River Monitoring

In addition to discharge quality monitoring consistent with the periodic groundwater quality monitoring requirements, quarterly specific monitoring for total suspended solids and turbidity shall be undertaken at the following sites:

- The final operational discharge infiltration area
- True left bank of the Clutha Mata-au River adjacent to and 100 metres upstream of the final operational discharge infiltration area
- True left bank of the Clutha Mata-au River adjacent to and 500 metres downstream of the final operational discharge infiltration area.

During sampling and at each sampling occasion for the true left bank of the Clutha Mata-au River site adjacent to and 500 metres downstream of the final operational discharge infiltration area, the following visual or otherwise assessments shall be made and documented on the sample sheet:

- Any indication of conspicuous oil or grease, films, scums or floatable or suspended materials
- Indication of any conspicuous change in clarity or colour of water
- Any objectionable odour, and
- Any obvious adverse effects indicating on aquatic life or freshwater quality.

Surface grab samples shall be taken at each site on the same day and shall be appropriately stored and dispatched to the laboratory consistent with the requirements and methodology outlined in the general groundwater quality site monitoring and reporting management plan.

5.3.4 Recording and Reporting

Copies of results of the above monitoring are to be provided to the consent authority within 2 weeks of analyses being undertaken.

Compliance reporting in relation to effects of the dewatering discharge to land shall be undertaken consistent with that contained in the general groundwater quality site monitoring and reporting management plan (refer to specific detail contained within the plan for periodic

groundwater quality monitoring procedures and reporting that will also apply to the discharge to land).

Annual reporting in relation to dewatering abstraction and discharge management shall be undertaken consistent with that required within the general site groundwater quality monitoring and reporting management plan (refer to specific detail contained within the plan for annual reporting that will also apply to the discharge to land).

All environmental monitoring information/data collected in relation the management plan, shall be stored in an appropriate database to enable annual and subsequent analysis and reporting as required by conditions of resource consent(s).

For additional detail and specific requirements in relation to the HML groundwater take for dewatering and the discharge to land activities monitoring and compliance, refer to conditions of resource consents RM23.819.02 and RM23.819.03.

Appendix B: Spill Response Plan – HML

S T OP • THINK • A CT

Spill Response Plan

NewZealandGovernment

WORKSAFE
NEW ZEALANDI","t??/“”"

Spill response

- Your first consideration is the immediate safety of all people present.
- Call emergency services (dial 111) and ask for Fire.
- If safe to do so, contain the spill.
- If others are safely able to help, give them tasks to help manage the spill.

SPILL CHECKLIST

1. Raise the alarm.
2. Evacuate people, if necessary.
3. If the spill involves a flammable substance, move away from the spill before using a mobile or cordless phone.
4. Call emergency services (dial 111) and ask for Fire. Tell the 111 Operator that you have a chemical spill and if you can, tell them what the chemicals are and the quantities involved.
5. ONLY if it is safe to do so close the valve, plug the leak or turn the container upright.
6. Use safety equipment to contain the spill. Prevent the spill from entering drains or waterways.
7. Call on specialist advice.
8. Clean up the spill.
9. Recover the product or dispose of the waste safely.

PRECAUTIONS

- Do not endanger yourself.
- Wear personal protective equipment appropriate for the spilled substance (eg suitable gloves, protective eyewear, suitable protective clothing).
- Do not leave the area unattended if there is risk of a further spill.
- If the spill is likely to enter a waterway then notify the local council.
- Advise your supervisor of the incident. If the spill exposes workers or anyone else to a serious risk to their health and safety, notify WorkSafe.

Evacuation/assembly points:

Muster Point – at main entrance

Location of the nearest phones:

All staff have radios. Office & Supervisors have access to phones

Hazardous substance spills

Raise the alarm by (eg switching on the fire alarm, shouting) – enter response below:

"Emergency. Emergency, Emergency – Switch to Channel 4" over the radio comms

- Identify the nature of the spilled substance only if you can do so without putting your safety or anyone else's safety at risk.
- Evacuate and if necessary call emergency services (dial 111) and ask for Fire. Tell the 111 operator that you have a chemical spill and if you can, tell them what the chemicals are and the quantities involved.
- Put on personal protective equipment (eg overalls, boots, gloves, eye protection).
- Close off the source of the spill, if it is safe to do so.
- Remove sources of ignition if a flammable substance has been spilled.
- Identify the dangers posed by the spill – only respond if it is safe to do so.
- Refer to the safety data sheet or call a certified handler or other specialist for advice.

Where can safety data sheets be found?

In the office

- If necessary, advise the local council (if the spill is likely to enter a waterway) and WorkSafe (if the spill exposes workers or any other person to a serious risk to their health and safety).
- Use your spill kit if it is appropriate for the spill and safe to do so. Contain the spill by using a drip tray, oversized container or an absorbent to soak up a small spill.
- Dispose of waste safely according to the instructions on the safety data sheet and any district council rules for disposing of hazardous waste.

Oxidisers

- Apply the following measures to keep liquid/liquefied oxidisers or organic peroxides away from incompatible substances:

Not Available on this site

–

Fire and Emergency New Zealand Review

- Fire and Emergency New Zealand can review your plan to check that any roles proposed for them in it are achievable and consistent with their operational policies and identify anything that could affect operations in an emergency. They may ask for more details to clarify their involvement in the plan and the resources they will need.
- If Fire and Emergency New Zealand makes a written recommendation about the plan, the plan must be amended to give effect to the recommendation.

After the event

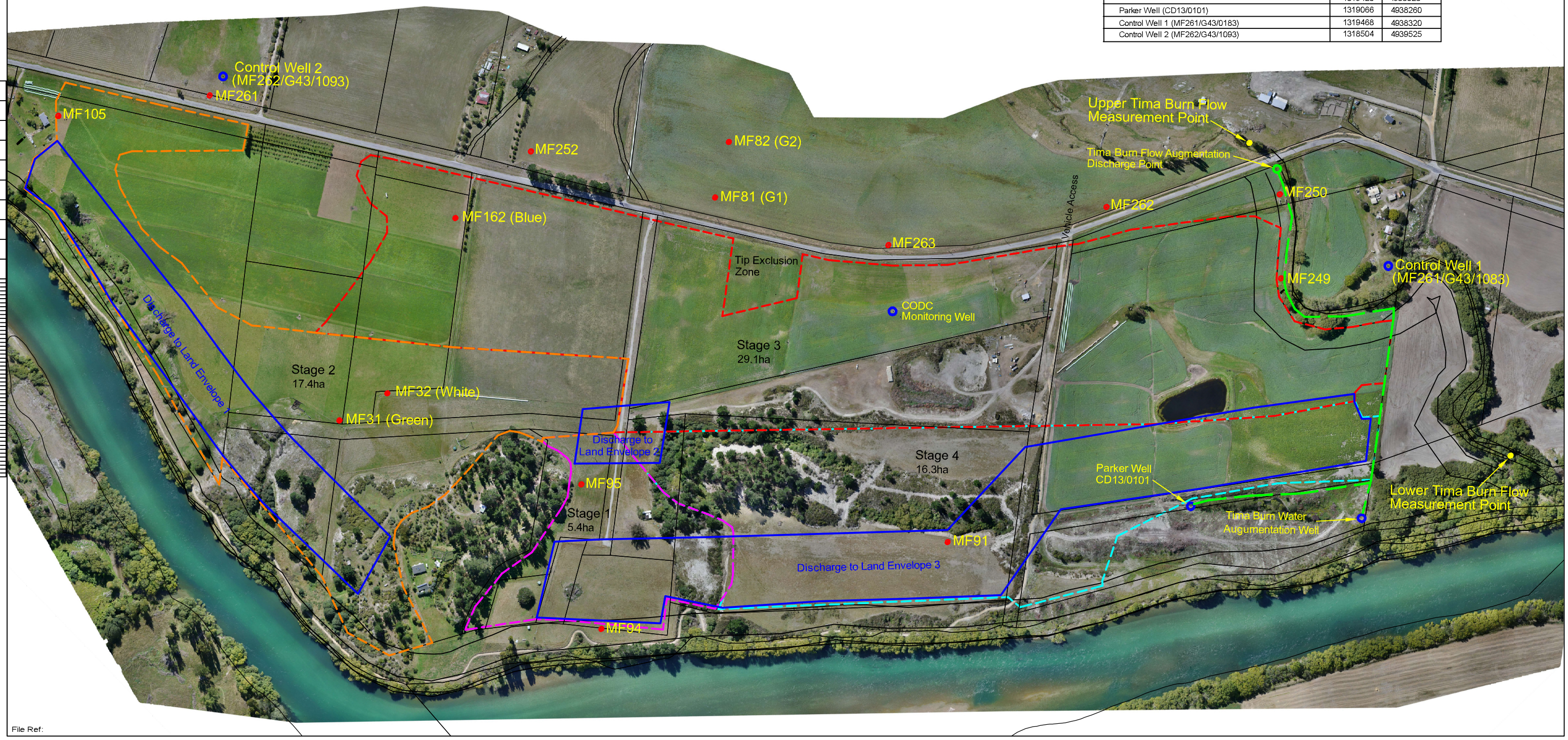
- Replenish your spill kit.
- Complete an incident report.
- Review the effectiveness of the emergency plan.

Appendix C: Water Management Plan Diagram – HML

Legend

- Pizometer Location
- Well Location
- Water Augumentation System Pipeline
- Stage Boundaries (various colours)
- Discharge to Land Envelope
- Flow Measurement Points

Point Name	Coordinates (NZTM)	
MF32 (White)	1318385	4939074
MF81 (G1)	1318875	4938976
MF82 (G2)	1318937	4939018
MF95	1318494	4938815
MF105	1318309	4939630
MF31 (Green)	1318313	4939090
MF162 (Blue)	1318605	4939184
MF91	1318798	4938438
MF94	1318386	4938657
MF261	1318474	4939519
MF252	1318738	4939184
MF263	1319002	4938778
MF262	1319246	4938624
MF250	1319428	4938485
MF249	1319354	4938401
CODC Landfill Groundwater Monitoring Well	1318948	4938710
Tima Burn Flow Augmentation Discharge Point	1319450	4938509
Tima Burn Water Augmentation Well	1319219	4938097
Upper Tima Burn Flow Measurement Point	1319441	4938561
Lower Tima Burn Flow Measurement Point	1319420	4938028
Parker Well (CD13/0101)	1319066	4938260
Control Well 1 (MF261/G43/0183)	1319468	4938320
Control Well 2 (MF262/G43/1093)	1318504	4939525



ORIGINAL SIZE A3

File Ref:

Prepared For:

HAWKESWOOD RESOURCES

No.	Amendments	Drawn	Date

Water Monitoring and Discharge to Land Plan

Millers Flat Alluvial Gold Mine

Project No.: .	Surveyed:
Scale: 1:5000	Designed:
Date: 24/06/2024	Drawn: JR
Sheet: 1f	Checked: JR

Overview SURVEYING

Appendix D: Draft Monitoring spreadsheets

Tima Burn Flow Analysis Draft

Tima Burn Flow Analysis								Month:	

Notes: Date, Reference Stage, Bridge Stage and Downstream Stage are the only values to enter on this form
Reference Stage = Measured water height upstream in the Tima Burn
Bridge Stage = measured water height at Tima Burn Bridge
Reference Flow, Downstream Flow and Tima Burn Bridge Flow are calculated from the respective rating curves
Natural Flow Loss (S) = Flow loss at nominal flow rate at Reference site between Reference Site and Tima Burn Bridge Site.
Apparent Difference = Apparent difference in flow losses between the bridge and the downstrem site
Augmentation Flow = Flow required to be augmented at the Tima Burn Bridge

$Q_1 = Q_{ref} - S - Q_2 + \Delta R$

	Reference Stage (m)	Bridge Stage (m)	Downstream Stage (m)	Reference Flow (l/s)	Natural Flow loss (l/s)	Tima Burn Bridge Flow (l/s)	Downstream Flow (l/s)	Apparent Difference (l/s)	Augmentation Flow (l/s)
Date				Q_{ref}	S	Q_2	$Q_{downstream}$	ΔR	Q_1
1/06/2024					0.0			0.0	**0.0**
2/06/2024					0.0			0.0	**0.0**
3/06/2024					0.0			0.0	**0.0**
4/06/2024					0.0			0.0	**0.0**
5/06/2024					0.0			0.0	**0.0**
6/06/2024					0.0			0.0	**0.0**
7/06/2024					0.0			0.0	**0.0**
8/06/2024					0.0			0.0	**0.0**
9/06/2024					0.0			0.0	**0.0**
10/06/2024					0.0			0.0	**0.0**
11/06/2024					0.0			0.0	**0.0**
12/06/2024					0.0			0.0	**0.0**
13/06/2024					0.0			0.0	**0.0**
14/06/2024					0.0			0.0	**0.0**
15/06/2024					0.0			0.0	**0.0**
16/06/2024					0.0			0.0	**0.0**
17/06/2024					0.0			0.0	**0.0**
18/06/2024					0.0			0.0	**0.0**
19/06/2024					0.0			0.0	**0.0**
20/06/2024					0.0			0.0	**0.0**
21/06/2024					0.0			0.0	**0.0**
22/06/2024					0.0			0.0	**0.0**
23/06/2024					0.0			0.0	**0.0**
24/06/2024					0.0			0.0	**0.0**
25/06/2024					0.0			0.0	**0.0**
26/06/2024					0.0			0.0	**0.0**
27/06/2024					0.0			0.0	**0.0**
28/06/2024					0.0			0.0	**0.0**
29/06/2024					0.0			0.0	**0.0**
30/06/2024					0.0			0.0	**0.0**
					0.0			0.0	**0.0**

Natural Flow Loss Draft

Flow Loss

Date	Bridge Site Flow (l/s)	Reference Site Flow (l/s)	Gain / Loss (l/s)
1/06/2024	2	1.5	-0.50
2/06/2024			
3/06/2024			
4/06/2024			
5/06/2024			
6/06/2024			
7/06/2024			
8/06/2024			
9/06/2024			
10/06/2024			
11/06/2024			
12/06/2024			
13/06/2024			
14/06/2024			
15/06/2024			
16/06/2024			
17/06/2024			
18/06/2024			
19/06/2024			
20/06/2024			
21/06/2024			
22/06/2024			
23/06/2024			
24/06/2024			
25/06/2024			
26/06/2024			
27/06/2024			
28/06/2024			
29/06/2024			
30/06/2024			

Tima Burn Bridge Site Draft

Hawkswood Mining Ltd

Tima Burn Flow Analysis — Tima Burn Bridge Site

Note: Flow calculated from the rating curve for the Tima Burn Bridge site

Date	Stage	Flow (l/s)
1/06/2024		
2/06/2024		
3/06/2024		
4/06/2024		
5/06/2024		
6/06/2024		
7/06/2024		
8/06/2024		
9/06/2024		
10/06/2024		
11/06/2024		
12/06/2024		
13/06/2024		
14/06/2024		
15/06/2024		
16/06/2024		
17/06/2024		
18/06/2024		
19/06/2024		
20/06/2024		
21/06/2024		
22/06/2024		
23/06/2024		
24/06/2024		
25/06/2024		
26/06/2024		
27/06/2024		
28/06/2024		
29/06/2024		
30/06/2024		

Reference Site Draft

Hawkswood Mining Ltd

Tima Burn Flow Analysis — Reference Site

Note: Flow calculated from the rating curve for the Tima Burn Bridge site

Date	Stage (m)	Flow (l/s)
1/06/2024		
2/06/2024		
3/06/2024		
4/06/2024		
5/06/2024		
6/06/2024		
7/06/2024		
8/06/2024		
9/06/2024		
10/06/2024		
11/06/2024		
12/06/2024		
13/06/2024		
14/06/2024		
15/06/2024		
16/06/2024		
17/06/2024		
18/06/2024		
19/06/2024		
20/06/2024		
21/06/2024		
22/06/2024		
23/06/2024		
24/06/2024		
25/06/2024		
26/06/2024		
27/06/2024		
28/06/2024		
29/06/2024		
30/06/2024		

Piezometer Readings Draft

Hawkeswood Mining Ltd

Piezometer Readings (weekly)

Water level measured below casing. Compare present level in HML249 and HML250 with previous levels and if the difference exceeds 0.2m lower than "normal" (seasonal variation allowed for by comparing the reference piezo levels), then augmentation may be required.

	Monitoring Piezos		Reference Piezos	
	WL below casing (m)		WL below casing (m)	
Date	HML249	HML250	HML???	HML???