

HILLSIDE MINE COMMUNITY VOICE

GROUNDWATER MANAGEMENT AND MONITORING PLANS



20 AUGUST 2017



- Objectives
- Conditions
- Background and baseline information
- Outcomes
- Management strategies
- Compliance criteria
- Monitoring program



The objective of this Plan is to provide the framework for:

- ensuring compliance with all relevant statutory requirements;
- ensuring compliance with Rex Minerals Policies and Standards;
- providing details on groundwater management responsibilities; and
- maintaining an effective response mechanism to deal with issues and complaints.



ML Conditions (groundwater) include:

- no adverse change to the environmental values of water within the basement fractured rock aquifer outside of the Land as a result of mining operations;
- no adverse change to the environmental values of the basement fractured rock aquifer within or outside of the Land as a result of mining operations after mine completion;
- no adverse change to the environmental values of the groundwater within the shallow Cainozoic age sediments outside of the Land as a result of site operations;
- no adverse change to the environmental values of the groundwater within the shallow Cainozoic age sediments within or outside of the Land after mine completion.



Criteria

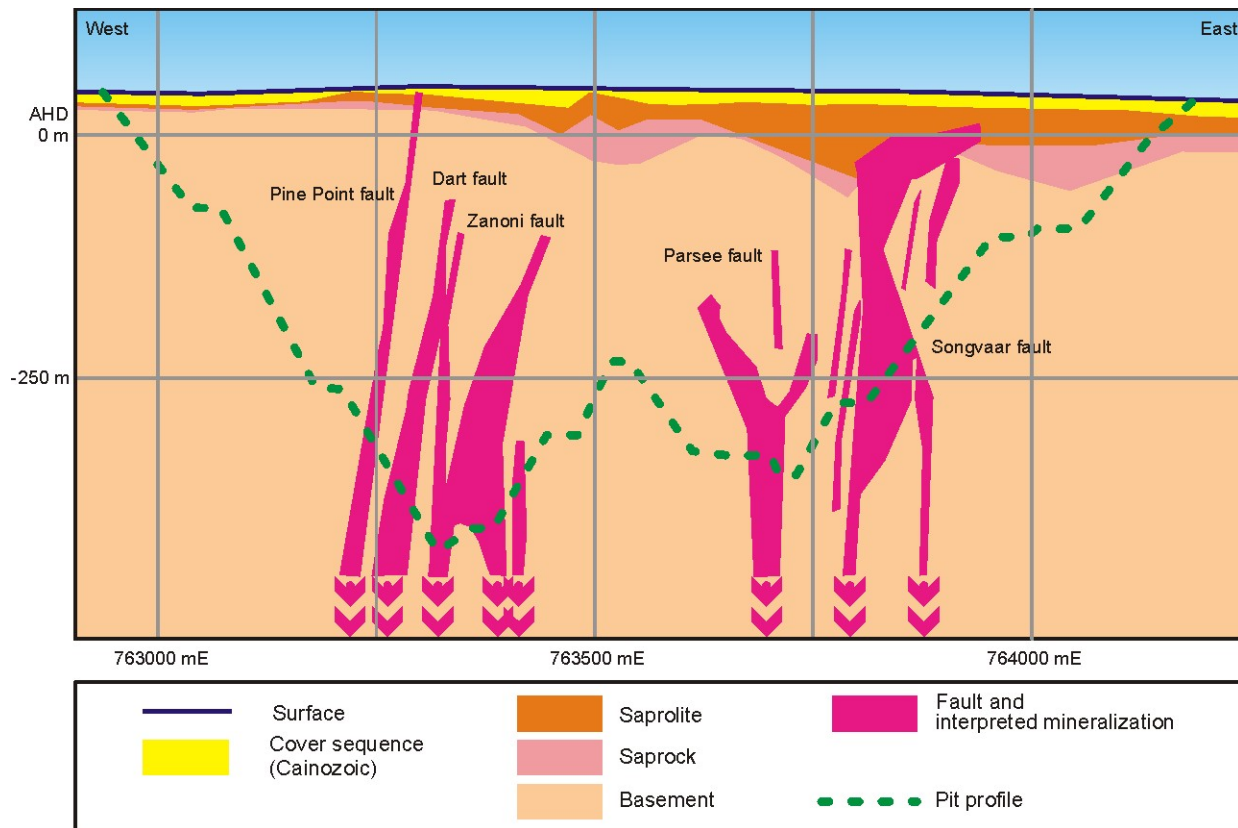
- representative baseline water quality data for the basement fractured rock aquifer underlying the Land;
- compliance groundwater monitoring bores adjacent to the lease boundaries that are of sufficient density and depth to detect movement of groundwater off the Land.



- Groundwater occurs in fractured basement rocks - basement rock aquifer.
- Basement rock aquifer fresh to partially weathered.
- Overlain by saprolitic (weathered) zone clays – confining layer.
- Overlain by Tertiary age sediments – unsaturated (no aquifer).
- Covered by topsoil.
- Rain falling on YP infiltrates through the soil and then down into the formations, eventually reaching the basement aquifer.
- Groundwater flows from high to low, from central YP toward the sea.
- West to east flow path across Hillside.

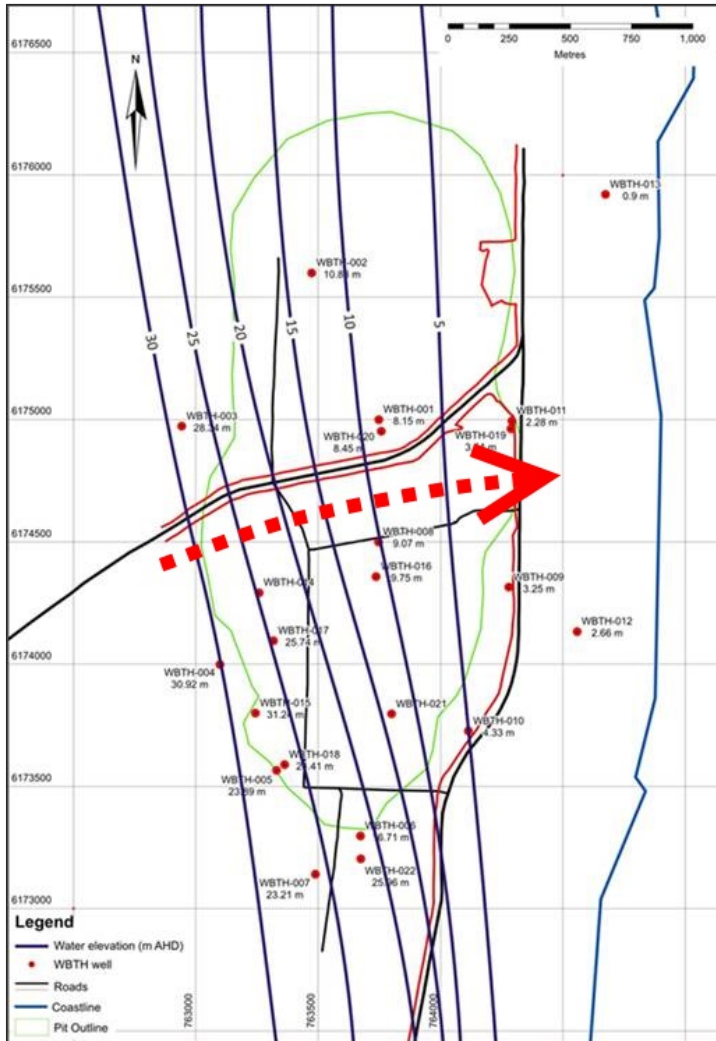
GROUNDWATER MANAGEMENT AND MONITORING PLAN

GEOLOGICAL CROSS SECTION



GROUNDWATER MANAGEMENT AND MONITORING PLAN

HYDROGEOLOGY – BASEMENT AQUIFER WATER ELEVATIONS PRE-MINING



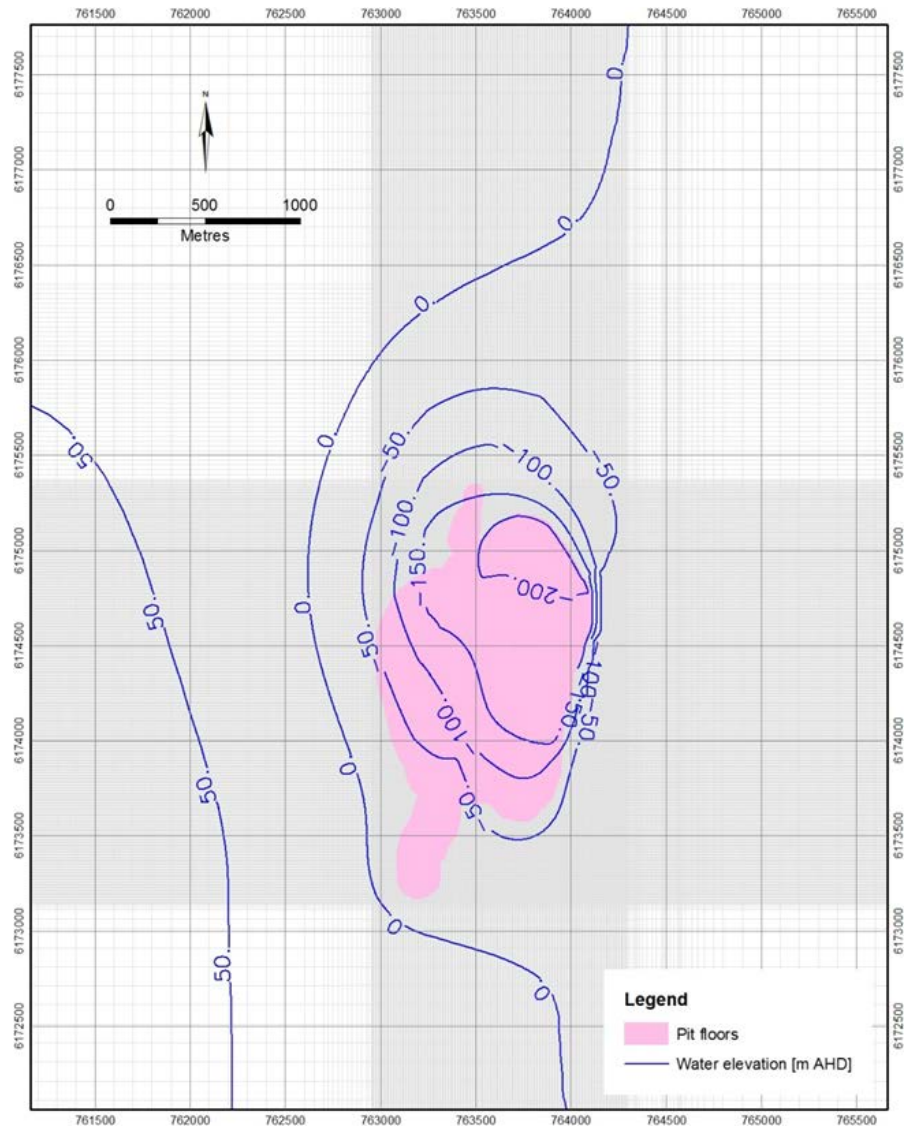


Strategies:

- calibrated ground water model;
- ongoing calibration of the transient ground water model using data obtained from groundwater monitoring;
- ongoing calibration of the pit lake geochemistry and hydrogeological models using data obtained from operational monitoring;
- pipeline leak detection;
- monitoring of pressures, flow rates and any other parameters for the prompt detection and resolution of abnormal operating conditions in any pipeline or processing plant equipment;
- monitoring of process plant functions, including tank levels, flow rates, pressures and fluid quantities.

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HYDROGEOLOGY – MODELLED BASEMENT AQUIFER WATER ELEVATIONS AFTER 5 YEARS OF OPERATION





Parameters to be monitored:

- **Depth to water or standing water level (SWL)** – in metres below ground or a reference point.
- **SWL converted to water elevations AHD (approximate sea level).**
- **Water quality** – Salinity, pH, Calcium, Magnesium, Potassium, Sodium, Sulphate, Chloride, Nitrate, Arsenic, Boron, Chromium, Cobalt, Copper, Iron, Manganese, Zinc, Antimony, Uranium, Total recoverable hydrocarbons (TRH) – 1 site only.

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LEADING GROUNDWATER CRITERIA



Baseline monitoring data – groundwater (to be updated prior to mining operations)

STATISTIC	Chloride (mg/L)	EC (µS/cm)	pH	Diss. Arsenic	Diss. Boron	Diss. Cadmium	Diss. Copper	Diss. Zinc
Min	9200	30000	6.2	0.001	1.7	0.0002	0.001	0.002
Max	58000	150000	7.8	0.05	5.5	0.0045	2.8	0.44
Average	21500	63000	7.11	0.01	3.82	0.001	0.244	0.24
AV+ 2SD	47469	127589	5.43*	0.034	6.05	0.002	1.453	0.182

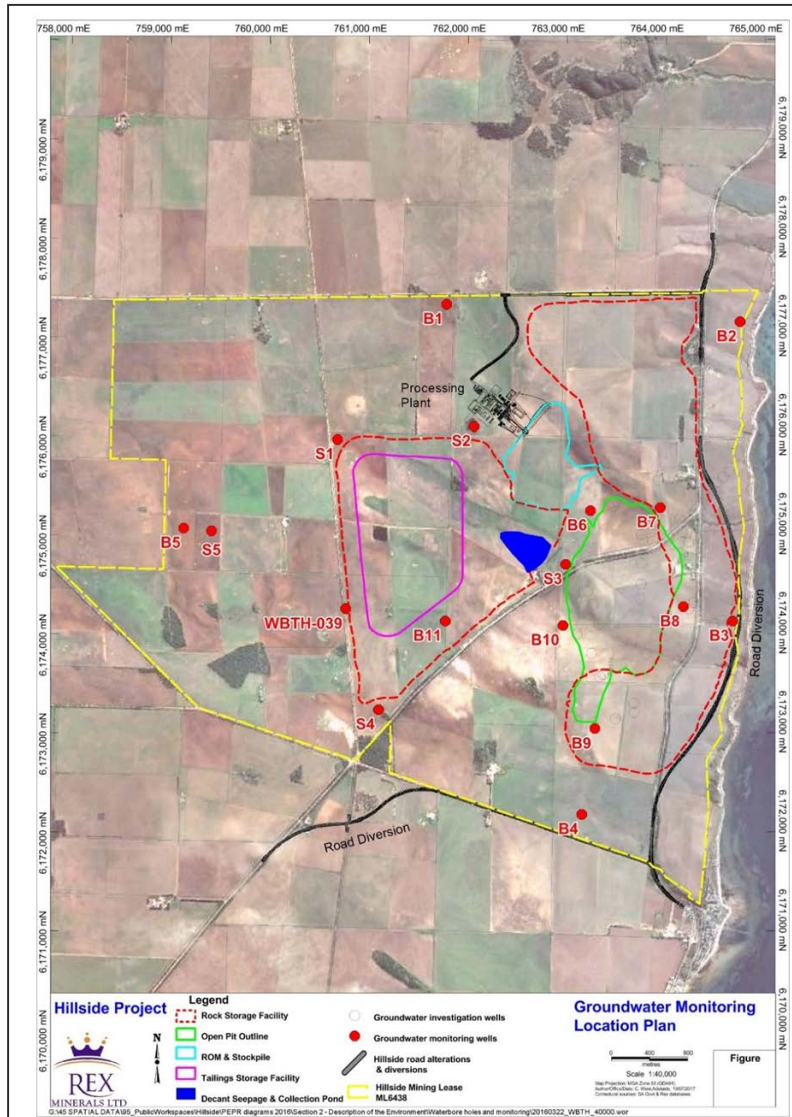


Monitoring frequency:

- Depth to water monitoring – monthly in basement aquifer, monthly in unsaturated zone.
- Basement aquifer water sampling - 6 monthly.
- Unsaturated zone / unconfined aquifer - twice yearly when depth to water measurements indicate the presence of a water column in a monitoring well sufficient for sample collection.

GROUNDWATER MANAGEMENT AND MONITORING PLAN

PROPOSED MONITORING LOCATIONS





- Reporting is designed to evaluate compliance with the Hillside Mine ML conditions, and to provide stakeholder access to relevant groundwater information and data.
- Key stakeholders requiring access to this information include Rex Minerals, state and local government agencies, and the local community.
- The Hillside Mine will report on the performance of the GMP in the Annual Compliance Report (ACR) and provide regular updates to members of the HMCV consultation group. The ACR will be provided to the HMCV and made available for public information on the Rex Minerals website.



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