



## PROJECTS

### HYDROGEOLOGY

FQM Australia Nickel

Groundwater & Surface Water Monitoring Rationalisation Study, Ravensthorpe Nickel Operations

HydroSOLUTIONS

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FQMAN reopened the former BHPB nickel and cobalt mining and hydrometallurgical processing operation in 2011; the site is located at Ravensthorpe, near the southern coast of Western Australia.

RNO mines nickel & cobalt lateritic saprolite deposits, which are processed on-site to produce a mixed nickel cobalt hydroxide product. Mineral processing includes crushing, slurring, beneficiation and metal recovery using both pressurised and atmospheric acid leaching using sulfuric acid. The leach is neutralised with lime and the metals separation is undertaken by decantation. Barren liquor is further neutralised and then pumped to an HDPE lined Tailings Storage Facility for fluid loss by evaporation. Process water is obtained from groundwater abstraction & seawater pipeline.

The ore/ mine and processing areas are located above outcropping fractured and weathered basement which is locally sheared. Tertiary sediments overlie basement locally as infill features, including the Jerdacuttup palaeochannel to the south. Groundwater occurs within the basement and overlying sediments, with the water table reflecting the subdued topography, flowing generally to the south and southwest, but locally modified by higher-permeability shear-zones and the palaeochannel. Groundwater is fresh to hypersaline, and discharges to surface water courses, including the Jerdacuttup River and tributaries to the south/ southwest.

Groundwater is monitored around the mine, processing and tailings storage areas, although bore locations have reflected exploration campaigns rather than focussing on process areas of concern (AECs). Available bores have been sampled & analysed for a range of determinands which has not reflected processes and potential contaminants of concern relevant to each area.

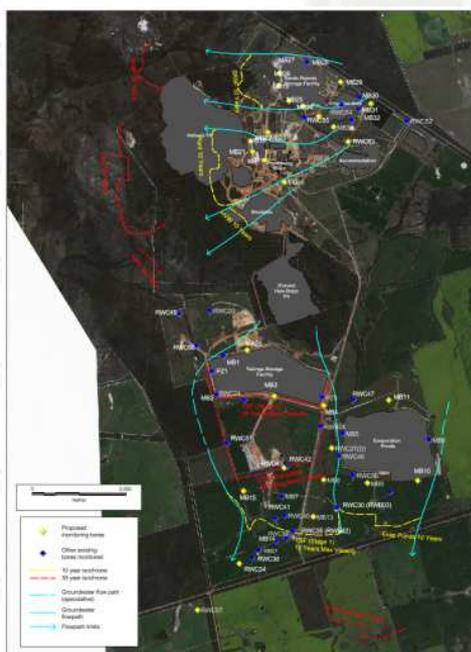
A more detailed water table has been constructed utilising all available bores. Isochrones or contours of groundwater time-of-travel have been constructed relevant to each AEC. This has identified optimal bores for monitoring purposes, and areas where additional monitoring should be provided.

Surface water has been monitored discontinuously, reflective of the site history and ephemeral nature of the water courses.

The site straddles a surface water divide between the Bandalup & Burlabup Creeks, both however tributaries of the Jerdacuttup river.

Monitoring points are proposed for both upstream and downstream locations to ensure that any impact from the site operations can be identified.

Recommendations are made for improvements to the monitoring network to better reflect potential sources of contaminants that may impact groundwater and surface water quality.



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