Managed Aquifer Recharge (MAR)

What is MAR

Australia has become a global leader in Managed Aquifer Recharge (MAR) development, principally on the improvements and efficiency associated with irrigation and management of waterways. MAR is a proven technology utilised in more than 50 locations in urban South Australia.

MAR is the intentional recharge of water to suitable aquifers for subsequent recovery or to benefit the environment.

MAR is used in mining to manage water from dewatering and to ameliorate environmental impacts of dewatering. Terramin operated a MAR scheme at the Angas Zinc mine near Strathalbyn.

The modelling for the Bird in Hand Gold Project indicates some groundwater will enter the underground workings. Terramin recognise that Managed Aquifer Recharge (MAR) is key to optimising the groundwater management system and ensuring the protection of groundwater users and the environment in the Inverbrackie sub-catchment

Terramin conducted a MAR trial during the 1st quarter of 2019, under the oversight of the Environment Protection Authority (EPA) and the Department for Environment and Water (DEW). The $1.1M trial was designed to investigate the water management system associated with the proposed reopening of the Bird in Hand gold mine at Woodside.

Local bore pump supply company at reinjection site

Checking MAR readings at a reinjection site

Trial Design

The trial involved investigation drilling at three sites to determine optimal location for Reinjection Wells. Two sites were chosen and included a Reinjection Well and a nearby Monitoring Piezometer (narrow 50mm bore).

The re-injection trial succeeded in demonstrating that groundwater could be extracted from Bore IB4, and re-injected into BHRIB01 and similarly from Bore BHRIB01 into BHRIB02. Both bores were tested stepping-up and stepping-down from the target 8.5 L/s per injection well. The highest rates were achieved at BHRIB01 which maintained reinjection at 13 L/s during the trial. The trial was conducted over an average of 8 days per bore.

Both injection trials were conducted below the safe injection pressures, which were calculated based on the site geology and depth to water prior to the injection trial, as per the National Managed Aquifer Recharge Guidelines.

Trial Outcomes

Based on groundwater modelling, Terramin expect that the peak re-injection requirement will be on average 5 L/s during the fourth year of mining (assuming pre-excavation grouting achieves 90% water efficiency). In the first year of operations it would average 2.2 L/s (70.8 ML/year). Under a scenario of 70% effectiveness this would equate to a peak average of 15 L/s. Bore BHRIB01 achieved 13 L/s alone and the BIH Mining Lease Proposal assumes up to 8 sites to provide redundant capacity and create a curtain effect around the operation.

Terramin in association with technical advisors and the community have undertaken extensive preparatory work as part of the development of the mining lease application. The recent trial has further demonstrated the ground water modelling, developed in the prior 5 years, is fit for purpose and further confirms the site's amenability to MAR as a water management solution.

The Bird in Hand Gold Project will also apply a number of mine design measures to limit or prevent groundwater level reduction as well as maintain groundwater quality, as a result of mining activities. These measures include;

- Mapping of water bearing zones and ongoing refinement of the geological model
- Design mine plan to avoid known water bearing zones
- Probe drilling to assess ground conditions ahead of excavation
- Pre excavation grouting
- Treatment and reinjection of mine inflows into the surrounding Aquifer through Managed Aquifer Recharge

All of the proposed mitigation methods are used worldwide and well proven techniques throughout the mining and civil industries in the management of groundwater.