Capability Mine Water Management

About WREMA

WREMA was formed in 2014 to provide consulting services in the fields of water resources and environmental management. Our services in mine water management include:

- Water supply options & security studies
- Site water balance studies
- Flood studies
- Design of flood protection works
- Dam safety investigations
- Dambreak studies
- Waterway diversion design
- Water quality management
- Sediment transport studies
- Scour Protection and Erosion control
- Drainage design
- Design of hydraulic structures
- Groundwater investigations
- Hydrology for haul roads and rail

Projects Undertaken by our Staff

The following is a selection of projects undertaken by our staff prior to the formation of WREMA:

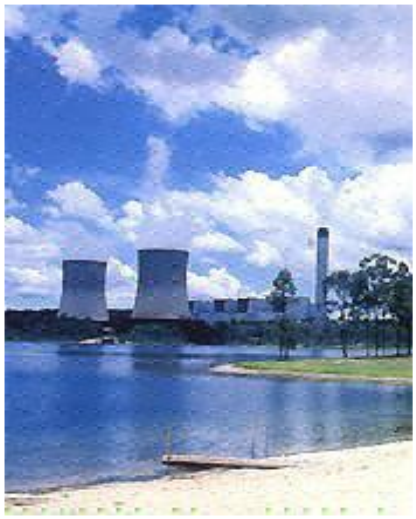
Boundary Hill Extension EIS – Anglo Callide

Involved with the Boundary Hill Extension EIS water management package for Anglo Callide. Responsible for managing all baseline and impact assessment studies, hydrological and hydraulic modelling, water balance modelling, waterway diversion design and levee design including regulator engagement activities and approvals through to granting of a Mining Lease.

Tomingley Gold Mine Water Management – Alkane Resources.

Hydrologic studies including flood assessment, design of sediment basins, site water balance study, assessment of water supply reliability, sizing of storage dams to manage water supply, flooding and saline groundwater inflows, development of water management strategies and plan.

Tarong Power Station and Meandu Mine Integrated Operational Water and Salt Balance Model



Water is critical to mining and power generation activities of Tarong Energy Corporation (TEC). TEC already has invested significant resources into water management and recycling infrastructure and water balances were completed independently for each of the facilities included in this study. It was recognised that large benefits may be realised by developing an integrated water balance covering all of TEC's facilities, some of these include: Demand reduction and recycling; Energy savings; Forward planning; Decision making and a holistic approach to water management. Undertook a thorough audit of TEC water usage and developed a sophisticated water balance model and 'dashboard' user interface for the site to actively manage its water demand and supply sources.

Rolleston Mine Expansion EIS – Xstrata Coal

Silver Yance (WREMA) was involved with the Rolleston Expansion EIS including mine water management and creek diversion strategy. In regards to creek diversions, two design approaches were considered, a reference reach approach and a design criteria approach. The reference reach approach aimed to replicate the existing features of creeks including channel dimensions, meanders, sinuosity, hydraulic criteria and geomorphological characteristics as assessed from the baseline assessment. The design criteria approach assessed hydraulic criteria limits for flow velocity, stream power and shear stresses. Key activities included stream morphology assessments, hydrological and hydraulic modelling of the watercourses, comprehensive water balance modelling using the GoldSim model and flood protection levee design.

Western Turner Syncline Mulga Hydrology Study - Rio Tinto.

Undertook a 2D modelling study which investigated the impact of a proposed 12 km conveyor on distributed channel flows in an area with extensive mulga communities. Development of design flows utilising regional methods and a rainfall runoff model and development of a 2D hydraulic model. The model was used to optimise the number and placement of environmental culverts to minimise impact on the mulga.

Kogan Creek Power Station and Mine Operational Water and Salt Balance Model

Similar to the work undertaken for the Tarong Power Station and Meandu Mine, we developed an integrated water and salt balance model to incorporate the power station and the nearby mine which was supplying coal. The sophisticated water balance model and 'dashboard' user interface for the site allows active management of the water demand and supply sources.

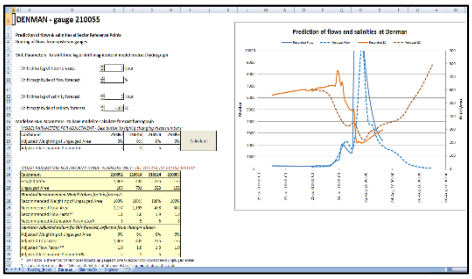
Mount Isa Mine Tailings Dam Operational Simulation - Xstrata

An operational simulation water balance was developed for the Mount Isa tailings dams located to the south of the mine to estimate the DSA on performance based containment. The model considered both climate and water generated by tailings and lost through decant return to the mine facilities and allowed the site to better understand the dam capacity and future wall raises in reference to the Manual for Assessing Hazard Categories and Hydraulic Performance of Dams.

Burton Coal Mine Integrated Operation Water and Salt Balance Model

Conceptualisation, preparation and calibration of water balance and salt balance model in GoldSIM for the mine site. A 'dashboard' user interface was prepared for the site personnel to assist in site water management and identify potential risks to the water supply (over/under). The WBM covers mining activity at Burton, Ellensfield, Wallanbah, Broadmeadow and Plumtree Mine areas. This WBM is an operational management tool and assists Peabody in

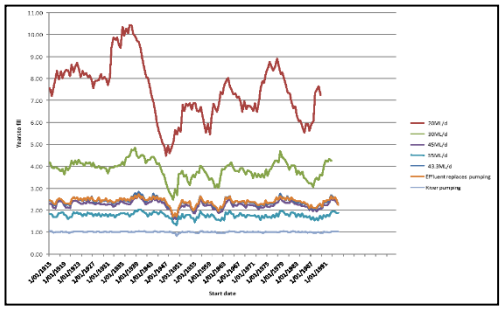
fulfilling their obligations as part of their Environmental Authority.



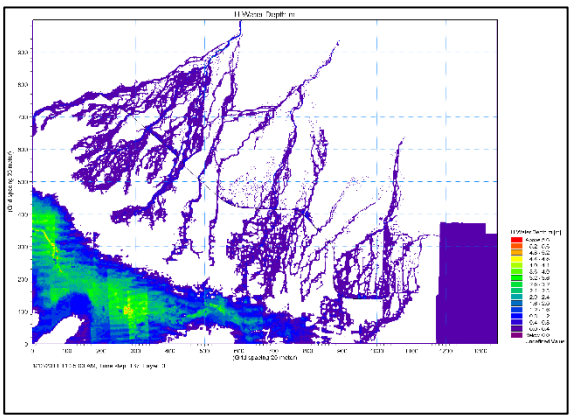
Hunter River Salinity Modelling – Office Water/State Water

Developed a real time forecasting model which provides estimates of flows and salinity loads to alert power generators and mining companies when they could release saline water under the Hunter River Salinity Trading Scheme.

Penrith Lakes Water Balance Study - Penrith Lakes Development Corporation (consortium of mining companies)



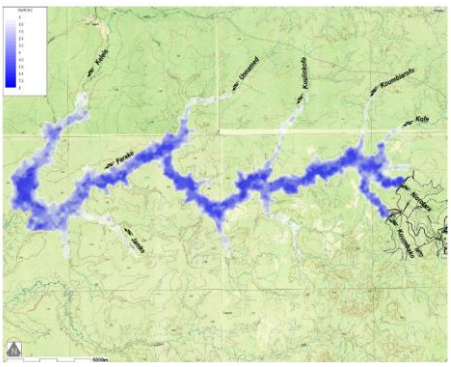
Developed a daily water balance model of Penrith Lakes which have been formed as part of a large sand mining operation embracing 11 large lakes with a surface area of 735 ha and storage volume of 40,000 ML. The model was used to determine the number of years to fill the lakes after mining ceases and the additional makeup water required to maintain suitable water level variations.



Haul Road P2P5 - Fortescue Metals Group

Assessment of catchment flows and design of waterway crossings for a 20+ km haul road associated with Christmas Creek mine. Development of a two dimensional hydrodynamic model to represent surface flows under natural and developed conditions to assess the impact of the road on sheet flow dependent Mulga. Design of waterway crossings to ensure minimal impact.

Sabodala Water Balance & Dam Break - Gold Corporation.



Updated the mine water balance to provide better estimates of inflows and to account for construction of additional raw water storages and tailings dams. Undertook dambreak investigations which assessed sunny day and PMF induced failures for 3 water supply dams and 2 tailings dams, some of which were in sequence. Hydraulic design of spillway for new tailings dam.

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