

Integrating Water Planning at Each Step of the Mine Planning Process

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Abstract

In a changing environmental and social climate, water management on mine sites has become a critical issue. Often water may only be seriously considered during closure planning, or after a rain event or incident as the process can often be difficult and time-consuming. This reactive, rather than proactive planning approach can have costly impacts both from an environmental and economic perspective.

For many operations, water planning, and management primarily occurs in the medium to long term planning space, executed offsite by either a central water planning team or outsourced to consultants. Offsite and external personnel often struggle to obtain the most up to date topographical data and may not have the in-depth site-specific knowledge that a site's short-term planning team will have. Due to this, the process of updating water catchment areas, and providing advice on recommended changes to water management structures can be a costly, and time-consuming process, with results that could quickly be out of date with any changes to a mining and dumping plan.

Mine planners are often in a situation where seemingly minor design changes are made without any consideration of water planning, leaving sites exposed to the potential of either regulatory infringements, or costly operational issues. By incorporating water catchment analysis into mine planning processes and workflows, scenario analysis can be performed to consider the merits of alternative water management structures and plans and the impact that they may have on water flow on a particular planned topography. This should ensure that an optimised mining plan, also features an optimised water management plan.

Areas that are important to successful planning and management :

- Key design elements from a mine plan required to evaluate water catchments.
- Evaluation of water catchment size, location, and connection to other catchment areas. These inputs can then be used to calculate sediment erosion loss, and rainfall-runoff volumes as well as provide inputs into water balance models.
- What kind of water catchment analysis can be run before a forecast rain event? What additional water management structures could be put in place and how will they impact the water catchment?
- Wet weather recovery planning including the quantification of the impacts of wet weather events on production. Will this rain event require equipment to be mobilised to higher ground? If a pit does end up flooded how long will dewatering take?
- Evaluation of possible solutions from both a water management and mine planning perspective. What impact does a change in the mining schedule have on dump and road formation and how does this in turn impact mine affected water runoff? If a pit expansion is undertaken will further water management structures be required for pit protection?



- Rapid assessment of the impacts of alternate mine plans and water management plans, through a scenario-based analysis of base case mine plan versus a water optimised mine plan.
- Interactively identifying and quantifying area requirements for sediment and erosion control. Mine planners should now be able to rapidly assess sediment and erosion control requirements for each mining scenario. This allows planners to analyse a range of sediment basin locations and footprints to find the optimised result prior to engaging consultants or other professionals to execute detailed design work.
- Auditing of water structures – are they correctly located to ensure water flows are directed to the desired end point? Is a drain or a bund the best way to redirect water from an active mining area?
- Stakeholder engagement – the impact on water catchments of each analysed scenario can be communicated visually to all stakeholders.

We envisage that water planning can be an additional step in the mine planning process. Simplifying and automating the processes for assessing the potential impact of a change in mine plan on a water catchment allows planners the ability to identify risks, examine what-if scenarios, and rectify potential water related issues in the plan before they occur.