DHI SOLUTION

MINE DEWATERING

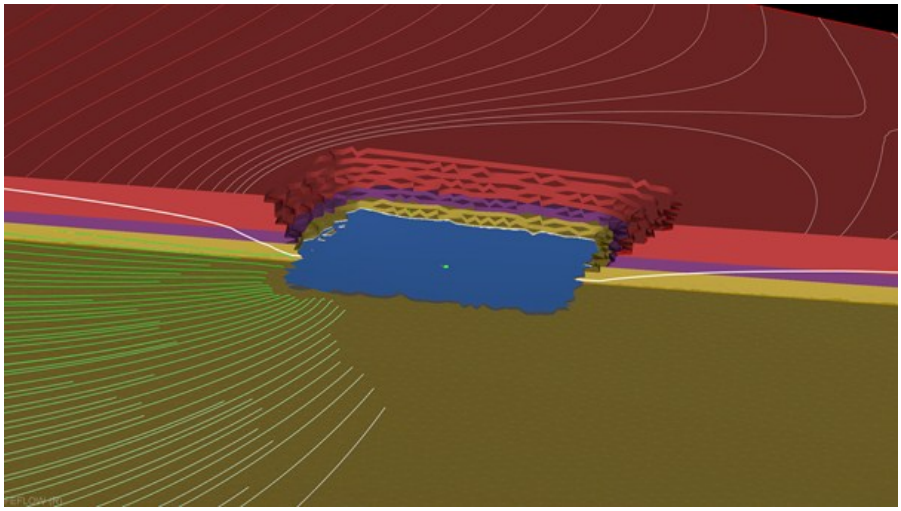
Minimizing volumes, time and cost

Dewatering is critical to most mining operations. Yet it is not simply about pumping groundwater. The mine manager needs to extract the lowest volume of water, at minimum cost. Once extracted, water must be transported, stored, treated and disposed of – all the while minimizing the environmental impacts of each activity. The operational costs of these secondary activities is much greater than the original cost of extraction. Accurately planning groundwater extraction for dewatering is critical to mine profitability.

DEWATERING

Seepage into a pit or underground workings can seriously impact mine productivity. Groundwater extraction will reduce ingress, but can adversely impact groundwater-dependent ecosystems. The mine manager needs to minimize not only the cost of extraction, but also the secondary cost of transport, storage, treatment and disposal. Variable quality – both spatially and temporally – can constrain re-use, disposal and treatment, thereby increasing cost. Mine infrastructure to support water management (for example pipelines, pumps and lagoons) is expensive to build, operate and maintain.

GROUNDWATER MODELLING



Simulation of mine dewatering and groundwater flow paths.

SUMMARY

CLIENT

- Mine operators
- Mining consultants

CHALLENGE

- Need to develop an effective dewatering time schedule
- Inaccurate predictions of dewatering volumes
- High capital and operational costs
- Need to set quality threshold for process water
- Need to establish mine post-closure flooding process

SOLUTION

- Simulation & water depression mapping
- Simulation of flow paths, water re-injection and density dependent salinity mixing
- Development of uncertainty mapping
- Planning of field data acquisition and monitoring systems

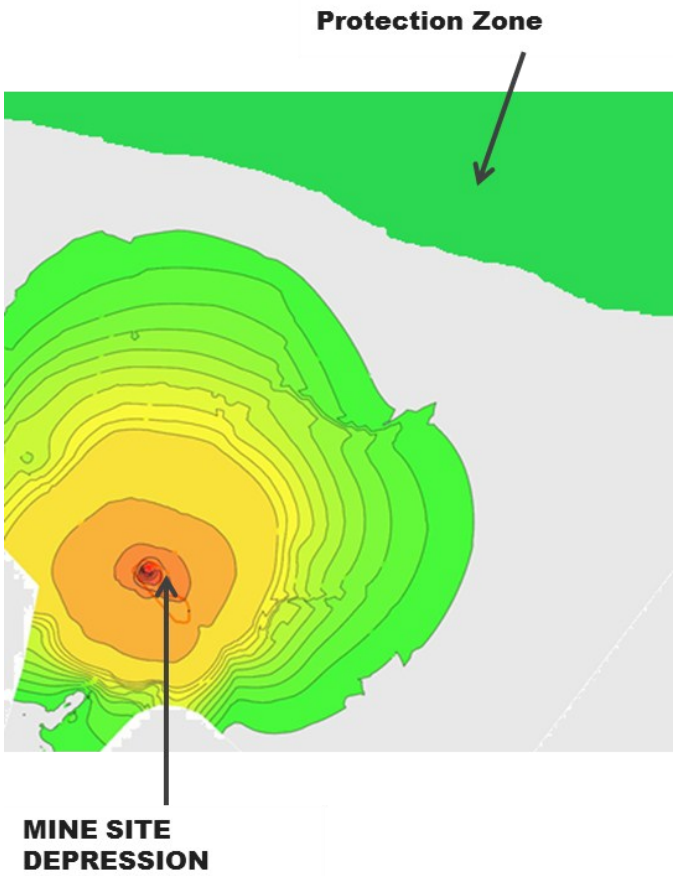
VALUE

- Minimized operational costs
- Process water quality targets met
- Reliable forecast of environmental impact in groundwater-dependent ecosystems.

Groundwater modeling can be used to define the expected drawdown efficiency, including rate of groundwater decline and shape of the drawdown cone. Groundwater modeling can facilitate decisions related to drilling and construction of abstraction and monitoring bores, as well as the required pumping rates and pumping distribution. Uncertainty analysis of the results will enhance confidence in the decision making process.

Appropriate groundwater modeling is key and must consider the:

- complex geometry and geology of the mine site including faulting and fractures
- presence of surface water bodies and wetlands
- spatial and temporal distribution of recharge
- groundwater salinity and density-dependent flow
- water quality



Simulation of mine dewatering and assessment of environmental impacts

FEFLOW

FEFLOW is our state-of-the-art groundwater modeling software. FEFLOW is widely used around the world for the simulation of mine dewatering, geothermal energy and underground structures.

FEFLOW uses a finite-element solution to handle a broad variety of physical processes for subsurface flow and transport modeling. The finite element method allows:

- flexible meshing strategies for detailed models of complex geologic structures
- precise spatial representation of features such as rivers, fractures, drifts and wells
- accurate representation of sloping layers and anisotropy

FEFLOW supports a wide range of physical processes including:

- variably saturated flow
- fracture flow
- coupled stream flow and groundwater
- density-dependent flow based on salinity and temperature gradients
- flexible, reactive transport of multiple solutes

FEFLOW includes a modern, Graphical User Interface (GUI) with advanced three dimensional (3D) graphics for accurate visualization. FEFLOW also supports an open programming interface to extend the functionality beyond traditional groundwater modeling.

MIKE SHE

MIKE SHE is the most widely used software for simulating groundwater at the catchment scale. MIKE SHE simulates surface water, groundwater and groundwater-surface water interaction at the catchment scale. It is the global leader for modeling the impacts of dewatering on wetlands, streams, and the ecology.

MIKE SHE uses a finite difference solution to partition rainfall into runoff, infiltration and evapotranspiration, thereby allowing the simulation of:

- surface runoff and flooding
- stream flow, including operational control structures
- unsaturated infiltration and recharge
- spatially distributed actual evapotranspiration
- groundwater flow
- fully integrated, multi-species reactive solute transport

MIKE SHE includes a sophisticated, conceptual model-based, GUI. MIKE SHE is Open-MI-compliantallowing it to be linked to external applications as well.

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