

Open pit dewatering for complex copper mines in DR Congo

Developing a 3D groundwater model in FEFLOW to understand mine inflow levels



Successfully forecasted the inflows needed to lower water level in the main aquifer



Calculated the projected inflows required to lower pore pressure



Provided meaningful observations to support future water management decisions

Challenge

To support mine dewatering for two copper mines in Democratic Republic of the Congo (DR Congo), Hydrogeek Consulting needed to provide forecasts of the calculated inflows required to lower water levels in the main aquifer to a target preferably one bench below each mining level as mining progresses.

They also needed to provide the level of projected inflows required to lower pore pressure in less permeable formations, which do not drain as freely from the borehole abstraction system.

Solution

The mines are located in a complex geological environment. To tackle these challenges in the demanding locations, Hydrogeek Consulting used FEFLOW, the all-in-one groundwater modelling solution, to develop a robust and easy-to-understand 3D groundwater model to estimate transient mine inflow for the open pit mines.

The model capitalises on FEFLOW's flexible meshing options and refinement to handle complex geology (three aquifers and four aquicludes) and dewatering wells. The model heads were calibrated based on historical abstraction from 13 dewatering wells over ten years with daily abstraction rates.

The project relied on the ability of the model to predict future groundwater and residual inflows. A combination of planned dewatering wells and horizontal drain wells were used, targeting the major aquifer outside the pit and lower conductive units. The aim of the model was to lower heads below mining levels.

'FEFLOW handled the complex geology and dewatering design with ease. The confidence the software gives makes it worth the effort, and yields trustworthy results. The fact that model can be revisited offers value to clients as a management tool.'

Nico van Zyl
Director, Hydrogeek Consulting



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