Case Story – Highlights

Integrated mine water balance

Physics-based groundwater and surface water balance in South Africa

Provide useful insights for future operational planning

Provide precise predictions for planning of infrastructure upgrades

Support planning for mine water treatment and rehabilitation

Challenge

The Mpumalanga province in South Africa boasts some of the largest coal reserves in Southern Africa. Water is both a by-product of, and necessary for, mine operations. Striking the right balance is a challenge in a hot, dry region, where most of the limited rainfall occurs in a three-month period.

The challenge was to develop an understanding of the integrated dynamics of water movement at the mine site. Of particular interest was the spatial-temporal distribution of the water balance, with respect to recharge and evapotranspiration.

Solution

Fully integrated, coupled groundwater-surface water modelling can provide a sound basis for operations and infrastructure planning related to water storage, treatment and discharge. Ultimately, accurate assessments can enhance mine profitability and reduce the risk of unintended environmental impacts.

Numerical models were developed using MIKE SHE - a fully integrated, coupled groundwater-surface water modelling framework. To save computational time, separate models were developed for each of the key areas - based on the same data set. The models provided clear insight into the dynamic, spatial water balance across the mine site.

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