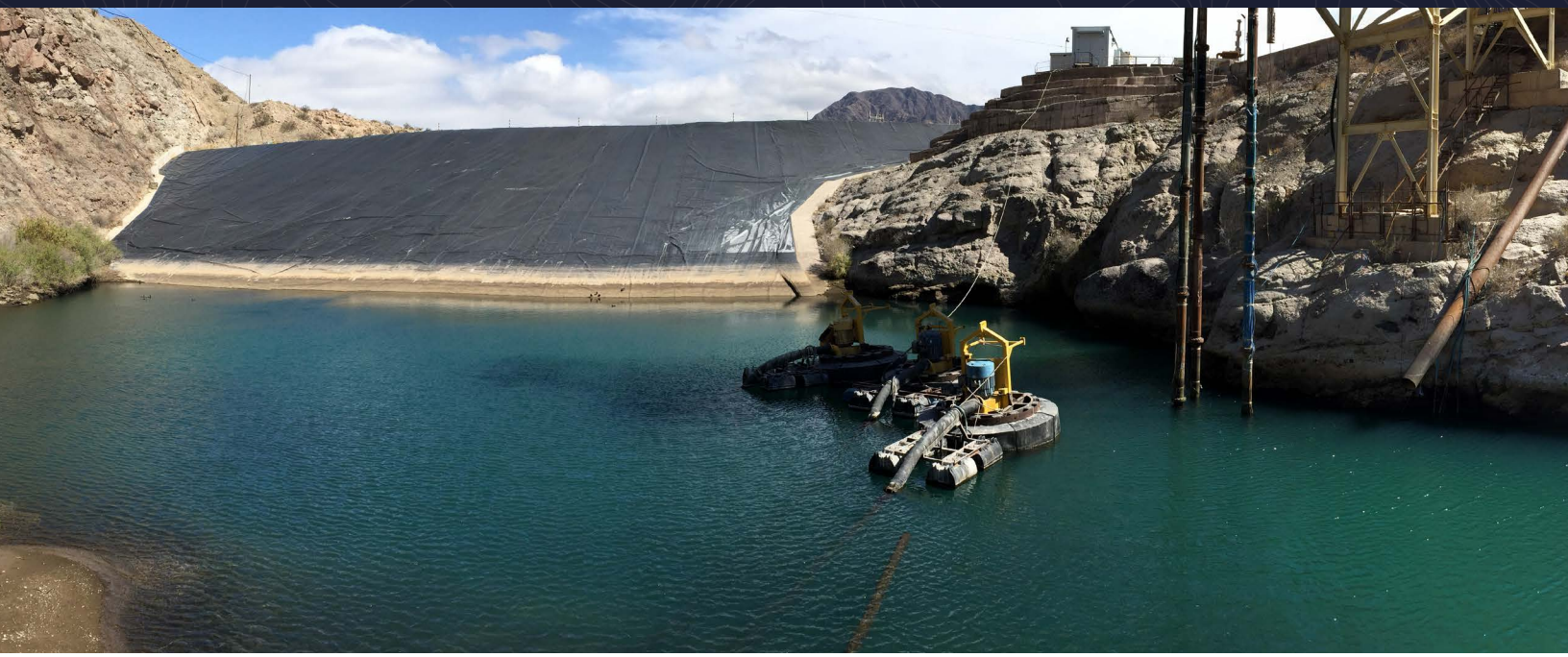
Knight Piésold CONSULTING

Going further together

Integrated Mine Water Management



Effective and efficient water management is a key aspect of all mining operations and is often the single most important consideration for developing an environmentally safe and sustainable mining project.

Our specialists have designed water management systems for mining projects all over the world, from rainforests to deserts to permafrost conditions.

Our site-specific water management plans combine a thorough understanding of site-specific hydrometeorology, surface water hydrology, groundwater hydrogeology, waste characterization, and the various aspects of overall mine development, including heap leach pads and tailings and waste rock management systems.

Hydrogeological Data Collection

Watershed Modelling

Baseline Studies

Water Quality Modelling

Engineering Designs

Water Balance Modelling

Geochemistry Assessments

Numerical Groundwater Modelling

Hydrogeological Data Collection

Our hydrogeological team has a proven track record in the design and implementation of effective hydrogeological data collection programs. Our field staff have considerable experience in the drilling and installation of groundwater wells, from deep multi-point vibrating wire and standpipe monitoring piezometers, to large-diameter water supply and mine dewatering wells. Hydrogeological testing is tailored to fit the requirements and scope of each project and may include rising/falling head (slug) tests, packer injection tests, aquifer pump tests, and borehole geophysical surveys.

Baseline Studies

Our multidisciplinary team uses an integrated approach to collect hydrological, hydrogeological, climate, and water quality baseline data to provide a sound basis for developing a comprehensive understanding of the water resources in a study area. All baseline data are stored and managed in FULCRUM, our in-house web-based data management system. This baseline information forms the foundation for numerous other project specific studies and assessments.

Engineering Designs

Our team works closely together to tailor water management plans and water management structure designs to meet the requirements of each client within the constraints of a project site, the mandate of the regulatory agencies, and best management practices. Areas of mine water management engineering expertise include: hydraulic modelling and hydraulic structure design; settling pond and spill containment works design; dam, pump station, pipeline, decant canal, and diversion structure design; and construction supervision and contract administration.

Geochemistry Assessments

Managing mine drainage water quality resulting from metal leaching and acid rock drainage (ML/ARD) from excavated materials is of critical importance during all phases of mining, from permitting to closure and reclamation. Knight Piésold performs geochemical characterization programs, develops geochemical models that accurately predict discharge water quality during operations, and designs mitigation measures to minimize water quality degradation for mining projects throughout the world. Our geochemists also provide input to closure designs and develop GoldSim based stochastic pit models to evaluate the effectiveness of alternative cover designs.

Watershed Modelling

Watershed models are an integral tool for assessing the relationship between climate and surface water and groundwater flow at a project site. Our team has developed an in-house watershed model that is transparent and simple, yet flexible enough to incorporate any level of detail required to represent key components of project water management. Knight Piésold routinely develops watershed models to understand baseline hydrologic flows, or assess impacts to streamflow, water quality, and fish habitat.

Water Quality Modelling

Information from our baseline data collection programs and hydrogeology and water balance models are used as inputs to water quality models, which are prepared in GoldSim or Excel. Results of predictive water quality modelling are used as feedback to the engineering design in an integrative approach to optimize water management plans for the economic and environmental viability of each project.

Water Balance Modelling

Water balance models are developed to simulate the supply and demand for water on a month-by-month basis, from the initiation of mine operations through mine closure and post-closure for a range of possible climatic conditions. Water balance models are developed using GoldSim or Excel, and can also provide the basis for the water quality model for a project.

Numerical Groundwater Modelling

Numerical groundwater models are used to understand baseline groundwater conditions and evaluate potential changes to hydrogeological conditions during project development. Our team has developed groundwater models to characterize groundwater flows to pits and underground workings, and assess the potential for groundwater related impacts arising from a proposed mine development. Groundwater modelling results can be integrated with watershed models for a holistic understanding of hydrologic flow at a site, used in the design of slope depressurization measures, and in support of environmental impact assessments.