Groundwater Solutions

Numerical Groundwater Modelling Specialists

Company Capability Statement

Groundwater Solutions specializes in producing numerical groundwater models and model uncertainty analysis to provide clients with risk-based solutions to groundwater problems. Our clients span diverse fields including infrastructure, government, environmental, resource extraction and remediation management. Our technical expertise has been built over 20 years of working in environmental consulting and academia, and we are proud to deliver innovative, cost effective and practical solutions using state-of-the-art software and methodologies.

Services

Numerical Modelling

Due to the inability of models to replicate complex natural systems, groundwater model predictions are uncertain. As such, predictions can only be referred to in terms of *"likelihood"*. The quantification and reduction of model predictive uncertainty determines the *likelihood* of various predictions and allows decision-making under uncertainty. Uncertainty analysis is a rapidly evolving and developing field and Groundwater Solutions has been a pioneer in widely applying these methods in a consulting environment to maximize value to clients.

We are experienced in constructing numerical models for various purposes using industry standard modelling codes including FEFLOW and the MODFLOW software suite. When required, custom python scripts are used to manipulate and interrogate models quickly and accurately. Model calibration and uncertainty is conducted using automated software such as PEST, PEST++, PyEMU and IES. Cloud computing resources are utilized when required to expediate the modelling process. Both linear and non-linear uncertainty methods are employed when appropriate.

General Hydrogeology and Geophysical Interpretation and Technical Review Services

We provide general hydrogeology services including water resource assessments, regulatory compliance reports, pump test analysis and groundwater monitoring. We provide site specific advice for the application of geophysical methods, geophysical data processing and integrated interpretations. Geophysical interpretations can be directly used in groundwater system conceptualization and guide numerical model construction. We can work with external geophysical contractors to organize field data collection, and review publicly available regional geophysical data for existing resources.

Groundwater Solutions has completed numerous technical model reviews and is proficient at evaluating model suitability and technical rigor. We are also available for expert witness services.

Projects

We have completed numerous projects in diverse sectors including infrastructure, mining, environmental and contaminant remediation. The breadth of our experience provides our clients with technical excellence in a timely and efficient manner. Recent projects include:

- *Numerical Modelling of Pumped Hydro Scheme at Rehabilitated Mine Site. A technical paper describing this work can be found here* https://www.researchgate.net/publication/335078571_Application_of_the_Iterative_Ensemble_Smoother_Method_and_Cloud_Computing_A_Groundwater_Modeling_Case_Study
- *Contaminant transport of metal species in an urban environment. A technical paper describing enhanced recharge due to urban water distribution network is currently in preparation.*
- *Numerical modelling of urban infrastructure tunnel – evaluating the impact of tunnels to aid design and development.*

Dr Kevin Hayley
Principal Hydrogeologist/Geophysicist
Phone: +61 03 5237 7395
Email: khayley@groundwater-solutions.com.au
Mobile: 0455 219 299
Apollo Bay, Victoria, Australia, 3051