

MAHMOUD HUSSEIN, Ph.D.

GROUNDWATER MODELER/ HYDROGEOLOGIST



EDUCATION

Ph.D., Hydrogeology, University of Leeds, 2013
M.Sc., Groundwater, Zagazig University, 2007
B.Sc., Civil Engineering, Zagazig University, 2002

EXPERIENCE SUMMARY

Mahmoud Hussein has over 14 years of consultancy and research experience in groundwater flow and solute transport modelling; Aquifer storage and recovery testing; design, implementation, supervision and interpretation of hydrogeological investigations; Analysis of aquifer and well performance testing; Time series analysis applied to borehole water levels response to natural and anthropogenic influences.

Mahmoud Hussein has written 3 technical papers on groundwater flow & contaminant transport, time series analysis and groundwater vulnerability.

PROFESSIONAL HISTORY

2016 - Present: Hydrogeologist & Groundwater Modeler, Robertson GeoConsultants Inc., Canada.
2013 - 2016: Hydrogeologist & Groundwater modeler, AMEC Foster Wheeler, Qatar.
2009 - 2012: Marie Curie Research Fellow in Hydrogeology at University of Leeds, UK.
2003 - 2008: Hydrogeologist at the Research Institute for Groundwater, NWRC, Egypt.

PROJECT EXPERIENCE (SELECTED STUDIES)

The Rum Jungle Mine Site, (2019), Northern Territory, Australia.

- Work is ongoing to update the transient groundwater flow and transport model (developed by RGC in 2016) for the Rum Jungle Mine site. The updated model will be used to Simulate post-rehabilitation conditions, to predict concentrations of dissolved sulphate (SO₄) and copper (Cu) in groundwater and loads to the East Branch of the Finnis River (EBFR) and its tributaries.

Myra Falls Mine Site, (2018), Vancouver Island, BC, Canada.

- Updated the conceptual hydrogeological site model for the Myra Valley Aquifer.
- Developed a numerical groundwater flow and transport model, using MODFLOW NWT and MT3D-USGS, to simulate the movement of groundwater and the transport of Zn in the MVA.
- Calibrated the groundwater model to observed groundwater levels during high flow and low flow conditions, recent Zn concentrations in groundwater, and estimated Zn loads recovered by the system of under-drains beneath the Old Tailings Disposal Facility (TDF).
- Developed prediction runs to predict Zn loading to Myra Creek, assess and evaluate options to upgrade the current SIS and to assess the performance of mitigation and closure works in progress and/or proposed at Nyrstar Myra Falls.

Las Tortolas Mill Site, (2016-2017) for Anglo American Chile (AACH), Chile.

- Developed a conceptual site model for the East Dam sector.
- Developed and calibrated steady-state groundwater flow and transport (MODPATH) model for the East Dam sector to evaluate performance of existing Seepage Interception Systems (SIS) and to develop preliminary conceptual SIS design for future conditions.
- Updated the conceptual model for the Main Dam sector.
- Developed and calibrated transient groundwater flow and solute transport (MT3D) model to evaluate options to improve the current SIS for the Main Dam Sector.
- Contributed to model calibration and conceptual design of SIS for the West Dam sector.

Magino Gold Project, (2016) for Argonaut Gold Inc, Ontario, Canada.

- Updated a transient 3D numerical groundwater flow model to predict the effects of proposed open pit mining, operation of a Tailings Management Facility (TMF) and Mine Rock Management Facility (MRMF) on local groundwater and surface water bodies, at different stages of development of open pit excavation, TMF, MRMF and reflooding of the open pit for mine closure.

Aquifer Storage and Recovery (ASR) feasibility study, (2013-2016), with AMEC FW, Qatar

- Contributed to the design, implementation, supervision and contractor management of a wide range of site investigations including; borehole drilling and installations, surface and downhole geophysics, aquifer and well performance pumping and injection testing;
- Analyses, interpretation and reporting of step and constant rate discharge tests at ten sites;
- In charge of planning, management and coordination of modelling activities and reports;
- Developed a transient regional scale groundwater flow model for North of Qatar;
- Contributed to the development of three local scale, axisymmetric 2D, transient flow and solute transport models to simulate injection and re-abstraction trials;
- Completed the development, Calibration and reporting of a 3D transient flow and solute transport model to simulate a long duration ASR pilot test;
- Contributed to writing, reviewing and QA of weekly, monthly and technical reports;
- Liaison and coordination with Ministries and governmental entities in Qatar to acquire and renew permits required to conduct site activities.

Effect of Faults on Groundwater Flow, (2012) for TOTAL, UK

Mahmoud Hussein worked as project hydrogeologist for this feasibility study, funded by Total Petroleum, to explore anisotropy and presence of faults as flow barriers in the UK Sherwood Sandstone Aquifer using pumping tests:

- Site reconnaissance, data collection, borehole selection and automatic data logger's installation. liaising with YorkshireWater to arrange for conducting constant rate and cyclical pumping tests using one of their pumping stations;
- Application of time series and pumping tests analysis for the observed drawdown patterns to infer the presence of faults and characterize aquifer anisotropy.

PhD Study on Borehole water level response to barometric pressure as an indicator of aquifer vulnerability, (2009-2012). Research fellow at University of Leeds, UK

- Collection of time series data from selected monitoring boreholes in the East Yorkshire Chalk Aquifer using automatic pressure transducers;
- Design and application of various MATLAB codes to characterize and remove influences other than barometric pressure from borehole water levels, such as recharge, Earth tides and pumping;

- Estimation of barometric response functions and glacial sediments cover properties.
- Construction of groundwater flow model to simulate the impact of confining layer heterogeneity on the barometric response functions.

Implementation of Two Dewatering Systems in Ahnasia Monuments Area and El Ashmoneen Monuments Area, in Nile Valley, (2007-2008), NWRC, Egypt

- Responsible for supervision of dewatering solution construction, field investigation trips, progress report preparation, regular meetings with contractors and client to discuss project progress and conflict points;
- Assessing changes of engineering dewatering solution, using groundwater modelling, according to arisen site circumstances.

Study of Reusing the Treated Sewage Effluent (TSE) and its Environmental Impacts on Groundwater Aquifer Systems, (2006-2007), NWRC, Egypt

- Preparation of specifications notes for the artificial recharge experiment;
- Design, contractor management and supervision of experiment construction, monitoring wells surveying, water sampling and report writing.

Study of Groundwater Dewatering in Six Monumental Sites in Upper Egypt and Greater Cairo, (2004), NWRC, Egypt

- Construction of a groundwater flow model to simulate the hydrogeological context and assess proposed dewatering solutions;
- Data collection, drilling, installation and surveying of observation boreholes and report writing.

MSc Research on environmental impacts of new settlements on groundwater, Nile Delta, (2004-2007), NWRC and Zagazig University in Egypt and INRS, Quebec, Canada

- Construction, calibration, sensitivity analysis and reporting of a regional groundwater flow and solute transport model to explore the impact of pollution hazard on groundwater quality at an industrial area located in Nile delta region.

SELECTED PUBLICATIONS

N.E. Odling, R.P. Serrano, **M. E.A. Hussein**, M. Riva, A. Guadagnini (2014), Detecting the vulnerability of groundwater in semi-confined aquifers using barometric response functions, Journal of Hydrology, doi.org/10.1016/j.jhydrol.2014.11.016.

Hussein, M. E.A., Odling N. E., and Clark R. A. (2013), Borehole water level response to barometric pressure as an indicator of aquifer vulnerability, Water Resources Research, 49, 7102–7119, doi:10.1002/2013WR014134.

Hussein M. E.A., El Arabi, N., Lefebvre, R. and Mowafy, M. (2008), Modeling Potential Environmental Impact of New Settlements on Groundwater Quality, Quessna City, Nile Delta, Egypt. Groundwater and Development, GeoEdmonton, 61th Canadian Geotechnical Conference & 9th Joint CGS/IAH-CNC Groundwater Conference.