

Education

M.Eng., Civil and Environmental
Engineering – 2008
Massachusetts Institute of
Technology (MIT)
S.M., Technology and Policy –
2007 Massachusetts Institute
of Technology (MIT)
B.S., Civil and Environmental
Engineering – 2004
University of South Carolina

Licenses and Registrations

- P.E., Professional Engineer,
Massachusetts License #49557

Professional Affiliations

Member, American Society of
Civil Engineers (ASCE)
Member, Boston Society of Civil
Engineers Section (BSCES)
Chair (2015-2016),
Environmental Water Resources
Institute (EWRI) Boston Chapter

Publications and Presentations

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Matt Hodge, P.E., M.ENG., S.M., B.S. Water Resources Engineer

Expertise

Conceptualizing and developing modeling studies and engineering solutions in support of various types of projects including, facility siting, facility permitting, restoration projects, remediation projects, and coastal and shoreline development. Providing objective third-party evaluation of data collection and modeling studies. Processing and presenting large datasets. Extensive experience in a range of software packages, modeling environments, and programming languages. Experienced in storm water design for commercial and industrial sites.

Qualification Summary

- More than 9 years of diverse professional experience in the fields of environmental science, environmental engineering, water resources engineering, and coastal engineering
- Excellent written and verbal communication skills
- Numerical model experience with HEC-RAS, HEC-HMS, SWMM, ADCIRC, EFDC, RMA2, RMA4, QUAL2K, STWAVE, CGWAVE, MODFLOW, HSPF, ICPR, CORMIX, WASP, DELFT3D, BASINS, and GNOME
- Developed various hydrodynamic and hydraulic models for water quality assessment, site selection studies, natural resource damage assessment (NRDA), National Pollutant Discharge Elimination System (NPDES) permitting,
- Experienced in deploying Acoustic Doppler Current Profilers (ADCP), thermistors, and water level gages

Work Experience

2014-Present	Water Resources Engineer, Woods Hole Group
2012-Present	Water Resources Engineer, Hodge Water Resources, LLC
2008-2012	Water Resources Engineer, ENSR/AECOM
2005	W.K. Dickson & Co. Inc.

Key Projects

Tidal Restoration Project, Winthrop, MA Town of Winthrop/Woodard & Curran.

Served as lead modeler to develop a model of Lewis Lake in order to assess the potential benefits of restoring a failed tide gate that separates Lewis Lake from the Boston Harbor. Developed model to simulate water level data and used model to provide preliminary design of tide gate operating procedures in order to maximize tidal range, but meet clients goals of flood safety. In addition to serving as lead modeler, participated in calls to address client concerns and improve client understanding of preliminary design.

Storm Surge and Climate Change Study, Boston, MA MassDOT

Was a key project member on a technically advanced, leading-edge pilot project for the Federal Highway Administration evaluating the vulnerability to sea level rise and extreme weather events for the Central Artery in Boston, MA. The project combines a vulnerability assessment by conducting a new systems-level assessment and evaluated adaptation options to reduce risk to specific assets. The project also is geared towards integrating climate change vulnerability into MassDOT and FHWA overall practices. A highly resolved, numerical processes model was developed to assess the combined impact of sea level rise, storm events (tropical and extra-tropical), winds, tides, and waves. Results from the model were used to assess risk for various assets throughout the City of Boston, and subsequently investigate adaption options to reduce the identified vulnerabilities and to establish an emergency response plan for tunnel protection and/or shutdown. The investigation also included a cost benefit analysis, which helped MassDOT select the most efficient method of protecting valuable existing assets against today's weather events and future climate impacts. Climate scenarios and combined storm surge and sea level rise were developed for current day, as well as 2070 and 2100.

Tidal Restoration Project, Dartmouth, MA DFG DER.

Served as lead modeler to develop a model of Georges Pond in order to assess the tidal impairment caused by a pair of culverts and a collapsed stone crossing. Calibrated model to water level data and used model to predict pond response to surge events and make recommendations regarding restoration alternatives including culvert sizing and channel dredging.

Storm Surge Analysis, Kingston, RI, RIDOT.

Served as lead modeler to develop complete model domain and conduct analysis of tidal storm surge and breach of protective dunes in order to characterize scour at in-land bridge embankments during various storm surge events.

Hydrodynamic Modeling for Proposed Storm Gates New Orleans, LA, USACE.

Assisted in development, calibration, validation, and analysis of model to determine maximum velocities during normal operation conditions for proposed gate structures in the Inner Harbor Navigation Channel. Used Surface Water Modeling System (SMS) and many other computational tools including complete tidal analysis with T-Tide.

Oil Spill Trajectory Study, Confidential Location, Confidential Industrial Client.

Developed two-dimensional model of tidal estuary in order to predict current field in vicinity of oil spill. Applied National Oceanic and Atmospheric Administration (NOAA) General NOAA Operation Modeling Environment (GNOME) model with current field from the two-dimensional model to predict oil trajectory and compared predicted oil transport to field records in order to evaluate model performance. Made preliminary assessments of water column and sediment concentrations based on transport of spilled oil in support of natural resource damage assessment (NRDA).

Modeling the Effects of Sea Level Rise on Coastal Wetlands, MA

Working for the Massachusetts Office of Coastal Zone Management modeled the effects of sea level rise on coastal wetlands statewide. Primary role was to serve as technical support in the development of processes and procedures to expand Sea Level Affecting Marshes Model (SLAMM) from pilot cases to cover the entire

Key Projects (continued)

Massachusetts coastline. Compiled data inputs required by SLAMM, such as topographic data, mapped wetlands, accretion and erosion rates, salinity, tide levels and ranges, percent imperviousness, and freshwater inputs and wrote automated procedures to process data. Executed final model simulations for both the sub-site and state-wide simulations, for three out-year scenarios and three projected sea level rise rates based on IPCC predictions. These results will aid CZM in identifying areas along the Massachusetts coast where wetlands can and cannot migrate and adapt to sea level rise, given current elevations and development.

Sumter County Waste Load Allocation Study, Sumter County, SC, HydroAnalysis Inc.

In support of study to evaluate assimilative capacity of receiving water, modeled 12 miles of river in QUAL2K. Used model to evaluate dissolved oxygen (DO), biochemical oxygen demand (BOD), and ammonia under low flow conditions. Provided technical expertise through project scoping and 3 month field program.

Waste Load Allocation Study, multiple municipalities in Catawba County, NC, HydroAnalysis Inc.

In support of study to evaluate assimilative capacity of receiving water, modeled multiple streams within watershed. Evaluated dissolved oxygen (DO), biochemical oxygen demand (BOD), and ammonia under a range of flow and operating conditions. Evaluated optimal performance options for multiple wastewater treatment plants within watershed incorporating historical evaluations and biological studies.

Water Quality Assessment, Jeddah, Saudi Arabia, EDAW.

Developed full hydrodynamic model of proposed channel system that connected to the Red Sea. Conducted analysis to predict flushing and residence time in channels. Used Surface Water Modeling System (SMS), RMA2, and Particle Tracking Model (PTM).

Water Quality Assessment, Englehard, NC, Far Creek, LLC.

Served as lead modeler in the development of a two-dimensional hydrodynamic model to predict flushing times for a proposed boating marina. Analyzed alternative designs in order to improve flushing, maintain water quality and enable proposed marina to be permitted. Provided preliminary design of mechanical system to maintain dissolved oxygen (DO) in boat basin.

Sediment Transport Study, Raritan Bay and New York Bight, NJ/NY, ESS Group.

In support of permitting for proposed cable laying operation with jet plow, developed a two-dimensional hydrodynamic model of coastal zone in Advanced Circulation Model (ADCIRC). Coupled model period to the New York New Jersey Operational Forecast System (NYOFS) model to provide appropriate simulation of the interaction of the New York Harbor System and the two-dimensional model. Used hydrodynamic model results as input to sediment transport model using Particle Tracking Model (PTM). Provided full report of findings including predicted suspended sediment concentrations, predicted deposition thicknesses, and vertical profiles of sediment plumes. Report submitted to State of New York.

Sediment Transport Study, New York Bight, NY, AECOM.

In support of permitting for proposed natural gas pipeline construction with mechanical plow, developed a two-dimensional hydrodynamic model of coastal zone using the Advanced Circulation Model (ADCIRC). Coupled model period to the New York New Jersey Operational Forecast System (NYOFS) model to provide appropriate simulation of the interaction of the New York Harbor System and the two-dimensional model. Used hydrodynamic as input to sediment transport model using Particle Tracking Model (PTM). Provided full report of findings including predicted suspended sediment concentrations, predicted deposition thicknesses, and vertical profiles of sediment plumes. Report submitted to the US Coast Guard.

Littoral Zone Study, Lake Tahoe, CA, US Coast Guard.

Developed two-dimensional hydrodynamic and wave model to evaluate shear stresses generated by lake circulation patterns and waves. Evaluated potential changes to littoral drift patterns based on potential installation of pilings and floating dock. Result of study was determination of changes to erosion/deposition

Key Projects (continued)

zones due to shoreline development. Evaluated previous studies of full lake littoral transport processes as well as application of littoral transport processes to local scale model.

Channel Construction Erosion Study Kelso, WA, Barron Capital.

Developed Hydrologic Engineering Centers River Analysis System (HEC-RAS) model of confluence of Cowlitz River and Columbia River to evaluate shear stresses during peak flows in support of a proposed pier design. Evaluated potential erosion and deposition due to in channel construction.

Thermal Discharge Study, Lake Erie, OH, Confidential Industrial Client.

Serving as lead modeler, developed three-dimensional hydrodynamic model in order to delineate extent of thermal plume in Lake Erie using the Environmental Fluid Dynamics Code (EFDC) model. Evaluated normal operation and maximum permitted operational effluent in response to range of ambient conditions. Provided technical expertise from project development, through extensive field program, modeling, and results presentation.

Thermal Discharge Study, Lake Michigan, IN, Confidential Industrial Client.

Serving as lead modeler for 316(a) Study, developed coupled three-dimensional hydrodynamic and water quality model in order to delineate extent of thermal plume in Lake Michigan using the Environmental Fluid Dynamics Code (EFDC). Evaluated normal operation and maximum permitted operational effluent in response to range of ambient conditions. Provided technical assistance during companion biological study.

Water Resources Thermal Study, Coletto Creek, TX, Confidential Industrial Client.

As modeler, developed a three-dimensional coupled hydrodynamic and water quality model in Environmental Fluid Dynamics Code (EFDC) to evaluate the impact of increased cooling water discharge from a power plant including the construction of a flume which would create a new circulation pattern and thermal regime within the cooling reservoir. Evaluated meteorological record in order to understand likely conditions that would impact the ability of the facility to meet water quality criteria.

Storm Water System Design, Astoria, NY, Consolidated Edison.

Designed complete retrofit of storm water system for active industrial site in order to provide appropriate passage during storms to prevent localized flooding. Conducted hydrologic modeling and hydraulic design. Developed construction plans and provided support for preliminary construction site investigations.

Dam Restoration and Removal Study, Franklin, MA, Town of Franklin.

Conducted hydraulic and hydrologic analysis of dam system to determine maximum ponding elevations during a range of storm events in order to inform decisions about potential dam removal and restoration of original stream.

Preliminary Storm Water Storage Design, Winchester, MA, Town of Winchester.

Modeled existing storm water management system in order to make recommendations for improvements to the system that would lead to reduced flooding during storm events. Provided assistance to project manager in designing upgrades and underground storage. Provided support for communicating recommended solutions to client.

Pump and Treat System Evaluation, Calgary, Alberta, Canada, City of Calgary.

As a part of performance evaluation for pump and treat system, developed a three-dimensional groundwater model of site using MODFLOW. Provided steady state predictions of radius of influence from wells and flow paths around impervious boundaries.

Key Projects (continued)

Hydrodynamic Data Collection Quality Assurance Project Plan, Passaic River, NJ, Confidential Industrial Clients.

Developed quality assurance project plan (QAPP) for data collection to support development of erosion model using Acoustic Doppler Current Profiler (ADCP). Oversaw data collection and conducted quality assurance checks of collected data.

Thermal Data Collection Quality Assurance Project Plan, Wachusett Reservoir, MA, APEX.

Developed Quality Assurance Project Plan (QAPP) for data collection on Wachusett Reservoir including plan for the use of thermistor strings and an acoustic Doppler current profiler (ADCP). Provided field oversight of sub-contractors.

Environmental Inspection Equipment Procurement, Lunenburg, MA, PJ Keating (now Old Castle).

Developed and set up field survey equipment for client use during internally conducted environmental inspections. This project included the development of a personal digital assistant (PDA) application for the client. The software provider for this project was Dyna-Q, Aries Technologies.

Mixing Zone Permitting Study, Enoree, SC, Celanese Ltd.

Developed Cornell Mixing Zone Expert System (CORMIX) model to predict contaminant mixing zone based on diffuser design and ambient conditions. Applied South Carolina Department of Health and Environmental Control (SCDHEC) National Pollutant Discharge Elimination System (NPDES) mixing zone guidelines and developed comprehensive discharge model in support of permitting process.

NPDES Permit Application, New York Bight, NY, Confidential Industrial Client.

Served as lead in developing the National Pollutant Discharge Elimination System (NPDES) application for a proposed off-shore liquefied natural gas (LNG) Facility. Work included working with large project team to understand potential discharges and impacts. Evaluated design alternatives and provided feedback for permitting purposes on mitigation and impact minimization strategies.

UBWPAD Application, Worcester, MA, Cargill Inc.

As Project Manager provided development and completion of a discharge permit application for the Upper Blackstone Watershed Pollution Abatement District (UBWPAD). Conducted review of facility permit history, site inspection, and application completion. Application approved by district.

Publications and Presentations

Hodge, M., M. Gerath. 2013. Thermal Mixing Zone Studies, BP Internal Workshop for Facility Environmental Managers. May 2013

Gerath, M., E. Heinen, and M. Hodge. 2012. Design of Critical Cases for the Application of Calibrated Thermal Models: A Key Part of the Modeling Process, Annual Meeting of the American Fisheries Society: Innovations in Thermal Research and Ecological Effect from Thermal Discharges. August, 2012.

Hodge, M., J. Ochsendorf, and J. Fernandez. 2010. Quantifying Potential Profit from Material Recycling: A Case Study in Brick Manufacturing, Journal of Cleaner Production, Volume 18, Issue 12, p. 1190-1199. August, 2010.

Mikelonis, A.M., M.M. Hodge, E.E. Adams, and A. Herrera. 2009. The Use of Chemically Enhanced Primary Treatment (CEPT) in Honduran Imhoff Tanks. Proceedings of the Water Environment Federation, WEFTEC 2009: Session 61 through Session 70, p. 3879-3891. January, 2009.

Publications and Presentations (continued)

Mikelonis, A.M., M.M. Hodge, E.E. Adams, and A. Herrera. 2009. Honduran Imhoff Tanks: Potentials and Pitfalls, Dynamic Modeling of Urban Water Systems, Monograph 18., p. 363-377. February, 2009.