

KELLY SMITH, PE

Water Resources Engineer



EDUCATION

Tufts University (2011), B.S.

Environmental Engineering
summa cum laude

REGISTRATIONS/MEMBERSHIPS

Professional Engineer (MA)

Tau Beta Pi

American Society of Civil Engineers
(ASCE)

New England Women in Energy and
the Environment (NEWIEE),
Website Committee Chair

Hodge.WaterResources, LLC

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QUALIFICATIONS

Kelly Smith is a Professional Engineer (PE) with seven years of experience in water resources engineering. Kelly has worked for private and public-sector clients on a diverse range of projects utilizing her skills in coastal hydrodynamics, hydrology and hydraulics, riverine modeling, water quality, and stormwater management. Kelly is well versed in an array of industry-standard modeling programs. She is also adept at managing large spatial datasets in ArcGIS, developing specialized data management and user interface solutions in Excel, and preparing permitting and regulatory documents. Kelly works with a range of numerical models such as ADCIRC, CORMIX, EFDC, HEC-HMS, HEC-RAS, HY-8, HydroCAD, PTM, RUNUP, SMS, SWAN, SWMM, and WHAFIS.

PROJECT EXPERIENCE

Sediment Transport

Sediment Transport Study: ESS Group*

Hudson River, NY/NJ

In order to assess impacts of proposed cable laying operation, developed hydrodynamic model using ADCIRC and sediment transport model using PTM to predict transport of sediment suspended during proposed cable laying operations. Coupled hydrodynamic model to data accessed from the New York and New Jersey Operational Forecast System (NYOFS). Developed Python functions to post-process sediment transport results into spatial datasets compatible with ArcGIS.

Sediment Transport Study: ESS Group*

Delaware River, DE/NJ

In order to assess impacts of proposed cable laying operation, developed hydrodynamic model using ADCIRC and sediment transport model using PTM to predict transport of sediment suspended during proposed cable laying operations. Coupled hydrodynamic model to data accessed from the Delaware Bay Operational Forecast System (DBOFS). Used model to provide predictions of suspended sediment concentrations and deposition depths throughout model domain.

Coastal Hydrodynamics and Waves

Outfall Relocation Study: HydroAnalysis Inc.*

Confidential Location

In support of an outfall relocation study, developed three-dimensional hydrodynamic harbor model using EFDC. Calibrated model to reflect complex circulation patterns apparent in field datasets for water depth and velocity. Applied model to predict effluent concentration in order to understand which potential outfall location would provide the most naturally-occurring dilution. Created informative visuals to better understand and rank potential locations throughout the study harbor.

Over-Land Wave Modeling: EA EST*

Middletown, RI

Assessed the current and future vulnerability of an existing coastal landfill to storm flooding and wave impacts. Obtained hydrodynamic predictions for the 100-year storm from an Army Corp study completed after Hurricane Sandy. Estimated sea level rise using NOAA prediction curve selected by RI state guidance. Modeled 1-dimensional cross-shore transect of site using the FEMA programs WHAFIS and RUNUP to predict controlling wave crest elevations and the vertical extent of wave runup at the landfill.

* denotes Hodge.WaterResources, LLC project

Coastal Hydrodynamic and Wave Force Study: Private Energy Client

Confidential Location

Developed wind-wave model of tidal river and harbor using SWAN. Accessed, processed, and scaled available wind, stillwater elevations, and sea level rise data to simulate site-specific extreme weather conditions (i.e., the 100-year and 500-year storms). Extracted model results for predicted flood depths, significant wave heights, and average wave period and direction. Calculated corresponding wave forces on piles and mapped predicted water depths and wave forces across the site.

Bridge Hydraulic Report and Storm Surge Impact Assessment: MassDOT

Dennis and Yarmouth, MA

In support of MassDOT's Cape Cod Rail Trail extension project, developed an unsteady-state HEC-RAS model of the Bass River estuary. Simulated tidal flows and storm surge through the system and helped identify hydraulically viable abutment alternatives for the new bridge crossing over the Bass River. Calculated potential scour at the abutments and evaluated changes to the base flood elevation (BFE) predicted by the model. Authored the Hydraulic Report and various supporting memorandums to summarize findings from the model.

Water Quality

Discharge Model and Salinity Analysis: Environmental Consulting & Technology, Inc.*

Virginia

In support of Virginia Pollutant Discharge Elimination System (VPDES) permit application, evaluated mixing zone of proposed 2 mgd cooling water discharge to a tidally-influenced river using CORMIX. Extracted and systematically averaged data from the Chesapeake Bay Operational Forecast System (CBOFS) to obtain water levels and velocities for a representative tidal cycle in the river. Modeled the plume from the proposed staged diffuser at nine positions along the representative tidal cycle. Collated the results to illustrate the dynamic extent of the requested mixing zone.

Studied the influence of the proposed 10-mgd cooling water intake on the upstream extent of brackish water. Compared average daily freshwater flows recorded by an upstream USGS river gage to CBOFS model results for salinity along the length of the river. Presented an in-depth analysis and charted the relationships between the datasets to demonstrate the minimal impact likely to occur from the withdrawal.

Mixing Zone Modeling Analysis: HydroAnalysis Inc.*

Aleutian Islands, AK

Supported the mixing zone application for a proposed industrial discharge by modeling its dilution using CORMIX. Evaluated average and peak ambient currents in combination with a range of effluent flow rates to find the minimum predicted dilution factor at the limit of the regulatory mixing zone. Concluded that strong oceanic currents would provide rapid transport and mixing of the effluent.

Thermal Discharge Study: Epsilon Associates*

Schuylkill River, PA

Determined mixing zone extents for an existing 80-mgd surface discharge of cooling water into a tidal river. Used CORMIX to model plume behavior consistent with the Delaware River Basin Commission (DRBC) water quality standards and approaches. Tested alternate discharge structure configurations and flow rates to reduce size of mixing zone and achieve regulatory compliance.

Thermal Discharge Study: Private Energy Company

British Columbia, Canada

Modeled thermal plume generated by proposed 400-mgd offshore discharge of once-through cooling water for purposes of screening potential design configuration. Assessed plume behavior under ebb and flood tidal conditions using CORMIX, and reported limit of near-field mixing, limit of plume, and lateral spread at plume limit.

NPDES Mixing Zone Application: Private Industrial Company

Anderson County, SC

Applied CORMIX to model the mixing zone of an existing industrial discharge to maintain compliance with National Pollutant Discharge Elimination System (NPDES) permitting. Prepared calculations for the zone of initial dilution (ZID) in accordance with regulatory guidance and presented model results for anticipated whole effluent toxicity at the boundary of the ZID.

Hydrology and Hydraulics

Dam Breach Analysis: Private Utility Client

Rhode Island

Analyzed flood profiles corresponding to dam breach scenarios for a "significant hazard" earthen dam on property upgrade of an electrical substation. Modeled hydrology and hydraulics of the relevant waterways and crossing structures using HEC-HMS and HEC-RAS. Mapped inundation areas under existing conditions and proposed alternative culvert configurations under the substation driveway.

Dam Release Auditing Tool: Private Hydroelectric Client

Connecticut

Developed a spreadsheet auditing tool to check compliance with a flow release agreement between two hydropower dam owners on the same river. Used Excel and VBA to integrate flow data from the USGS with water level and turbine data from upstream dam owner to automatically detect violations based on the criteria in the agreement. Documented thorough instructions for the client, allowing future use of the tool without consultant involvement.

Access Road Culvert Sizing Studies: Private Utility Client

Multiple Sites, CT

Visited 18 sites with proposed access road crossings over wetlands and/or streams and performed hydrology calculations to predict peak runoff rates. Recommended culvert size and location for each site.

Wetland Replication Area and Culvert Design: National Grid

Dracut and Tewksbury, MA

Designed access road crossing over wetland in support of a multi-state utility reliability improvement project. Configured the access road to accommodate an approximately 4-ft (rise) by 20-ft (span) open-bottom culvert and sited a wetland replication area adjacent to the road to offset fill required for the culvert. Graded an additional wetland replication area to compensate for offsite impacts and created a drawing plan set in AutoCAD for construction of the above work.

Wetland Replication Area: Municipal Light Department

Massachusetts

Graded small wetland replication area within utility corridor to compensate for offsite impacts. Developed drawing plan set in AutoCAD for construction of the replication area.

Stormwater and Treatment Plants

Stormwater Modeling for BMP Retrofits: Dalton, Olmstead, and Fuglevand*

Tacoma, WA

Supported the retrofit design of stormwater BMPs at an existing industrial site. Modeled site hydrology and water quality using the Western Washington Hydrology Model (WWHM) to identify improvements necessary to comply with state and local stormwater regulations. Provided recommendations for sizing proposed oil separators and treatment swales.

Campus Redevelopment Feasibility Study: Dalton, Olmstead, and Fuglevand*

Puget Sound, WA

Assessed the feasibility of redeveloping a corporate campus with respect to state and local stormwater regulations. Modeled pre-development conditions using WWHM and performed sensitivity analysis of post-development conditions to provide client with an understanding of likely constraints arising from site layout and regulatory requirements.

Impaired Waters Program: MassDOT

Massachusetts

Over the course of four years, maintained significant involvement with the Massachusetts Department of Transportation (MassDOT) Impaired Waters Program, which is focused on improving the quality of MassDOT stormwater discharging to impaired waterbodies statewide. Assessed the impact of MassDOT stormwater on individual impaired waterbodies by delineating MassDOT's contributing drainage area, determining the amount of mitigation needed to meet Total Maximum Daily Load (TMDL) and/or effective impervious cover reduction targets, and identifying locations where MassDOT could implement stormwater BMPs. Collated annual statistics and project updates from multiple consultants and MassDOT district offices to report to the EPA as part of MassDOT's NPDES Phase II compliance.

Spearheaded the reorganization and subsequent maintenance of the MassDOT Impaired Waters Database in ArcGIS, which is used to aid in tracking the progress of the program. Redeveloped MassDOT's Water Quality Data Form using Excel and VBA to improve the user interface and enable MassDOT to better track stormwater issues at the 25% and 75% design stages of planned projects.

Stormwater BMP Retrofit Design along Interstate: MassDOT

Franklin, Wrentham, and Foxborough, MA

Designed 56 stormwater BMP retrofits (54 infiltration swales and 2 infiltration basins) along the I-495 right-of-way as part of MassDOT's Impaired Waters Program. Sized each BMP to maximize reductions in phosphorus and effective impervious cover by iteratively modeling with a version of SWMM customized for the water quality goals of the client. Coordinated environmental permitting efforts and filing of the Notice of Intent (NOI) and drafted the 100% design level plan set with AutoCAD.

River Walk Low Impact Development Design: City of Amesbury

Amesbury, MA

Part of multi-disciplinary team of engineers, planners, landscape architects, and city officials that designed a new local road corridor and public park space incorporating an extension of the city’s pedestrian river walk. Responsible for designing a new bioretention area within the park that balanced the desire for aesthetic space, stormwater water quality improvements, and flood control. Modeled the hydraulics through the proposed stormwater system using HydroCAD.

Stormwater System Capacity Analysis: TPA Design Group

Oxford, CT

Evaluated gutter, inlet, and pipe hydraulics using AutoCAD Hydraflow to support stormwater system design associated with new residential development. Re-graded stormwater detention ponds to accommodate runoff from additional impervious area introduced by changes to site layout.

Grit Separator Design: Private Industrial Client

Louisiana

Designed a grit separator pre-treatment unit for construction along an industrial stormwater and process water waste line. Sized the four-chamber grit separator to maximize available space on the highly constrained site and capture the largest 20% of particles.

Oil/Grit Separator Design: Private Industrial Client

Massachusetts

Designed an oil/grit separator to divert potentially contaminated groundwater flows from the stormwater system to an on-site treatment facility. Assembled relevant bid specifications and drawings, reviewed contractor shop drawings, and provided construction oversight of installation.

Water Treatment Plant Pump Station Capacity Analysis: Municipal Water Treatment Plant

Pennsylvania

Determined the combinations of factors necessary for a raw water pump station to send set flows (between 100 and 220 mgd) to the water treatment plant based on demand. Modeled headlosses through three tidally-influenced river intakes feeding the pump station and assessed variations in the hydraulic grade line based on water surface elevations in the rivers and the equipment in service (i.e., which intakes and pumps). Provided pump operation recommendations to maximize the capacity.

WWTP System-Wide Capacity Analysis: Regional Sanitary Commission

Maryland

Identified hydraulic bottlenecks in a wastewater treatment plant (WWTP) with a design capacity of 30 mgd. Modeled the hydraulic grade line and headloss throughout the plant under different flow scenarios to determine the maximum hydraulic capacity for each process unit with parallel treatment unit(s) out of service.

Regulatory Policy

State Hydraulics Manual Revisions: VTrans

Vermont

Revised the Vermont Agency of Transportation (VTrans) Hydraulics Manual, last updated more than 25 years prior, to be true to the current state of science, policy, and technology. Manual provides state guidance and resources for designing bridges and culverts with appropriate consideration to hydrology, hydraulics, scour, and environmental factors. Thoroughly reviewed each chapter and rewrote text to improve clarity and conciseness of the presentation. Generated new figures or revised those already present to better support the text and enhance the understanding of the user. Coordinated with the other writers to unify the document and deliver a consistent and high-quality final product.

PUBLICATIONS AND PRESENTATIONS

Updates to the MassDOT Water Quality Data Form, Smith, K.; Cordeiro, B., Webinar hosted by the Massachusetts Department of Transportation (MassDOT) Environmental Services and the American Council of Engineering Companies (ACEC) of Massachusetts. August 2014. <https://www.youtube.com/watch?v=S7zqrZ-BxhM>.

Vermont Agency of Transportation (VTrans) Hydraulics Manual, Wark, N.; Smith, K.; Kennedy, M.; Widing, S.; San Antonio, J.; Wildey, R., May 2015. <http://vtrans.vermont.gov/sites/aot/files/highway/documents/structures/VTrans%20Hydraulics%20Manual.pdf>.

PREVIOUS EMPLOYMENT

Vanasse Hangen Brustlin, Inc. (VHB)		2013 – 2016		Watertown, MA
AECOM		2011 – 2013		Chelmsford, MA