

Mark E. Nelson, P.G., LSP
Principal and Senior Hydrogeologist



Areas of Expertise

- Site Assessment & Remediation
- Hydrogeology/ Water Supply Development
- Groundwater Quality
- Environmental Permitting & Compliance
- Coastal Resources
- Land Use Planning
- Smart Growth/ Low Impact Development
- Climate Change/ Energy
- Integrated Water Management
- Watershed Planning & Assessment
- Emergency Preparedness & Response
- Environmental Engineering
- Wastewater Management
- Stormwater Management
- Low Impact Design
- Training
- Meeting Facilitation
- Water Security

Professional Registrations

- Registered Professional Geologist, WI
- Licensed Site Professional, MA

FEMA Certifications

- IS-800 NRP
- IS-700 NIMS
- IS-100 ICS
- IS-200 ICS
- IS-300 ICS
- IS-400 ICS

Mark Nelson is a Senior Hydrologist and Principal with Horsley Witten Group, Inc. (HW), and is responsible for the firm's Water Resource, Wastewater Planning, and Site Assessment and Remediation projects. Mark has twenty-five years of experience in groundwater modeling, surface water modeling, hydrogeologic investigations, and fate and transport analysis of contaminants in soil, sediments, and groundwater. Mark has direct experience in the regulatory and permitting requirements associated with wastewater projects, and has been successful in securing numerous Groundwater Discharge Permits with the Massachusetts Department of Environmental Protection (DEP). He currently serves as the Program Manager for HW's \$17 million contract with U.S. Environmental Protection Agency (EPA) Office of Ground Water and Drinking Water, providing technical advice on source water protection, water security and the Underground Injection Control Program. Mark is a Licensed Site Professional (LSP), authorized by the Commonwealth of Massachusetts to direct the assessment and remediation of contaminated sites. Mark has also been an instructor for the EPA teaching workshops on wastewater planning, water security, ground water and surface water hydrology, Low Impact Design (LID) contaminant transport, estuarine and ground water modeling and wellhead and source water protection.

REPRESENTATIVE PROJECTS

Climate Change/ Energy

Support for the Development of the Strategic Plan for Climate Change and Water, US EPA's Office of Water: Project Manager for HW's work supporting the U.S. Environmental Protection Agency's Office of Water which is currently updating their strategic plan to address climate change impacts on water resources across the country. HW supported a two-day retreat of EPA, federal agency and state and tribal representatives who met to discuss current climate change adaptation activities and evaluate how current EPA programs are set up to address future impacts related to climate change, including changes in precipitation patterns and amounts that will impact water suppliers, changes in water temperature that will impact drinking water treatment facilities, sea level rise, loss of wetlands and flooding impacts on water and wastewater facilities. Since the retreat, HW has been assisting EPA staff in the development of a strategic plan outline and will provide continued support in the development of the overall strategic plan.

Cape Cod, Massachusetts, Energy Use Projections: Principal-in-Charge for the development of energy use projections for Cape Cod and the Islands in the year 2020. On behalf of the Electric Power Research Institute (EPRI), HW calculated several different scenarios incorporating smart growth and energy efficient building policies as well as expected future wastewater infrastructure needs. The calculations will assist the

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Academic Background

Master of Science,
Environmental Engineering,
Oregon Graduate Center

Bachelor of Science, Geology,
Brown University

Region in developing strategies to meet energy reduction goals.

Hydrogeology/ Water Supply Development

Hydrogeologic Investigation, Forest County Potawatomi Community, Crandon, WI: Principal-in-Charge for the review of hydrogeologic and contaminant transport issues associated with a proposed zinc and copper mine located near the Tribe's reservation. Mark's work involved the development of groundwater flow and solute transport models, and presentation of comments and concerns to the Wisconsin Department of Natural Resource and the U.S. Army Corps of Engineers. He also directed a series of projects to evaluate specific aspects of the proposed mine, including impacts to lakes, streams, and wells from water withdrawals associated with mining activities, and transport of contaminants from the proposed tailings landfill and the abandoned mine.

Evaluation of Hydraulic Fracturing of Coalbed Methane Wells, EPA Office of Ground Water and Drinking Water: Project Manager for a nationwide evaluation of the impacts of hydraulic fracturing of coalbed methane production wells on underground sources of drinking water (USDW). The work involved determining the "locations" of coalbed formations relative to USDWs, evaluating the impacts of fluids used in the fracturing process, and studying the effects of water withdrawal from methane production wells that is a byproduct of the methane production.

Hydrogeologic Evaluation, Maher Wellfield, Hyannis, MA: Project Manager of the hydrogeologic evaluation to trace potential sources of hydrocarbons and chlorinated solvents affecting three of Hyannis' public supply wells. Mark also directed installation of 25 well clusters, screened at varying depths, to map geologic stratigraphy and define the depth of elevated solvent concentrations, and worked with a dozen surrounding businesses to document solvent uses and determine if releases had occurred on their properties.

Devil's Lake, Forest County Potawatomi Tribe, Crandon, WI: Project Manager for this project involving quantifying trace level (ng/l) concentrations of total and methyl mercury in Devil's Lake and its tributary wetland. The wetland is hypothesized to facilitate methylation of mercury, making more of this toxic form available for uptake into the food chain in the lake. This work was done under a quality assurance plan reviewed by the EPA and will be combined with atmospheric mercury measurements to use as baseline data in support of federal redesignation of air quality over Tribal lands.

EPA Wellhead Demonstration Grant Projects, Bowie, MD, and Stanley, VA: As Project Manager and Hydrogeologist, in Bowie, MD, Mark mapped three confined aquifer systems and delineated wellhead protection areas (Zone IIs) to six production wells utilizing analytical modeling. In

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Stanley, VA, he mapped a limestone (karst) aquifer, determined groundwater flow directions using dye tracing, and delineated five wellhead protection areas.

Hydrogeologic Investigation for Septage Treatment Facility, Harwich, MA: Directed this hydrogeologic assessment to determine the impacts of existing sanitary landfill and proposed solar aquatic wastewater treatment facility on ground water and downgradient fresh and estuarine surface waters. This study included water quality analysis, modeling of solute transport, ground water mounding, and geochemistry and involved assessment of water quality impacts from a neighboring, unlined landfill.

Training

“Watershed Management Tools for Local Governments” Workshop, EPA Office of Wetlands, Oceans, and Watersheds: Co-instructor in a series of workshops on watershed management entitled, “Watershed Management Tools for Local Governments,” which were designed to assist local governments and others working at the watershed level. The two general goals forming the foundation of the training sessions are, first, to integrate technical and scientific issues with regulatory and land stewardship techniques to manage coastal and inland watershed systems, and, second, to train individuals with scientific background in the language and practice of watershed management while training watershed decision-makers in the language of watershed science. Over 40 of these workshops have been held in 14 States, U.S. Territories, and Indian reservations.

“Ground Water Hydrology, Contamination and Modeling” Workshop, EPA Office of Ground Water and Drinking Water: Instructor at a workshop entitled, “Ground Water Hydrology, Contamination and Modeling,” where he co-taught a series of three-day workshops for US EPA Superfund officials on the basics of ground water science, contaminant transport, and bio-remediation including one day of hands-on instruction on the use of the EPA WHPA groundwater modeling software. Mark was an author of a 150-page reference book used in the workshop.

Low Impact Design Workshops for the Hawaii Office of Planning: Led a series of workshops across Hawaii focusing on how Low Impact Design (LID) techniques could support rural planning efforts across the state while protecting drinking water supplies and coastal water quality. A 150 page workbook was developed to provide detailed information on better site design principals and engineering specifications for best management practices for stormwater and wastewater planning. Opportunities for advanced treatment of wastewater for on-site, clustered and centralized wastewater treatment facilities were also provided. Four workshops were held in the four counties that comprise Hawaii.

Groundwater Quality

Noman’s Land Island, Wampanoag Tribe of Gay Head (Aquinnah), MA: Provided technical review of a Phase II Comprehensive Site Assessment and associated documents for Noman's Land Island, located south of Martha's Vineyard, Massachusetts. Mark evaluated the impacts of the U.S. Navy's use, since the 1940s, of the island as a bombing range. The review focused on impacts to soil and groundwater quality from hydrocarbons, explosives, and metals, and the potential danger of exposure to Tribal members visiting the Island. Mark also assisted the Tribe in the development of a sampling and Quality Control plan to quantify the uptake of contaminants by shellfish and fin fish surrounding the island.

The Pinehills Community, Plymouth, MA: Principal-in-Charge of HW’s water supply and wastewater engineering projects associated with the development of The Pinehills Community, a 3,000-acre mixed use development. Mark managed the design and permitting of an innovative wastewater recovery system for golf course irrigation on the property, and evaluated the water quality impacts of the development on public water

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supplies and nitrogen sensitive coastal resources. In addition, he supervised the development of a three-dimensional MODFLOW groundwater model to map the Wellhead Protection Area to an on-site public water supply and evaluate water withdrawal impacts to nearby ponds and wetlands.

Nine-Hole Golf Course, Wellfleet, MA: Conducted detailed field investigations evaluating groundwater flow directions and soil and ground water quality at private golf course. Mark was admitted as expert witness in Barnstable Superior Court, and provided expert testimony supporting successful defense of golf course sued by abutter for alleged contamination of private well by pesticides and fertilizers applied to greens and tees.

Groundwater Resource Protection Plan, Nantucket, MA: Created a detailed water table map, using ground penetrating radar, for the Island of Nantucket, which was utilized to delineate groundwater recharge areas to freshwater and coastal ponds. Mark modeled the effects of saltwater intrusion on public and private water supplies and delineated existing and future nitrogen loading rates within critical resource areas.

Review and Evaluation of Fertilizer Leaching Rates for Mass DEP: Principal-in-Charge for the review of Dr. Petrovic's publication "Report to the Pleasant Bay Alliance on the Turfgrass Fertilizer Nitrogen Leaching Rate." After a thorough examination of literature sources cited by Dr. Petrovic and others, HW interviewed Dr. Petrovic and Dr. Brian Howes, the lead researcher for the MEP to verify their assumptions. HW then obtained and evaluated 20 years of water quality data from the Bayberry Hills Golf Course in Yarmouth, Massachusetts. Based on research data under experimental conditions similar to those expected on Cape Cod, the Bayberry Hills Golf Course data, and the MEP model's sensitivity to nitrogen leaching rate, HW concluded that the current leaching rate of 20% is appropriate.

Fecal Coliform TMDL Development for Rio Cibuco and Rio La Plata watersheds, Puerto Rico: Principal-in-Charge for the development of these two TMDL models to predict concentration of fecal coliform in the Rio Cibuco and Rio La Plata from urban and agricultural sources. The fecal coliform concentrations were modeled using a GIS-based model that used estimated loadings from land uses within the watershed to predict coliform concentrations in each river. The models were calibrated to available flow and water quality information, and then were used to predict the reduction in coliform loadings necessary to meet recreational standards in the surface waters.

Dissolved Oxygen TMDL Development for Brenner Bay, Vessup Bay and Mangrove Lagoon, St. Thomas, US Virgin Islands: Principal-in-Charge for the development of TMDL models for these three estuaries on St. Thomas. Each system was threatened by nutrient discharges that reduced the dissolved oxygen concentrations in the water column. In addition, organic matter within the bottom sediments also interacted with the overlying water, further reducing oxygen concentration below regulatory thresholds. Using existing data, the WASP6 model was selected to simulate the circulation of water within each embayment and calculate dissolved oxygen concentrations taking into account nutrient discharges from inlet streams, overland run-off and chemical interactions between the water column and underlying sediments.

Barnstable Fire Training Academy, Hyannis MA: Principal-in-Charge for the design of an ion exchange treatment facility to treat a groundwater plume impacted by perchlorate, an emerging contaminant toxic to pregnant mothers and infants at low concentrations in drinking water. The work was done on behalf of the Barnstable County Commissioners who oversee the operation of the Barnstable County Fire Training Academy in Hyannis, Massachusetts. In recent years, the Academy has used straw to ignite fires for fire training purposes. Outdated marine flares have been used to help ignite the straw. The perchlorate in the flares washed into the ground and created a contaminant plume impacting downgradient drinking water wells. Mr. Nelson supervised HW staff through the design and construction of an ion exchange system to remove the

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perchlorate from groundwater. Three extraction wells were installed within the contaminant plume and pump at a maximum rate of 120 gallons per minute. HW completed the project on an accelerated schedule to allow treatment to begin in order to protect the downgradient wells.

Site Assessment & Remediation

Barnstable Town Hall UST Release: LSP of record for the assessment and clean-up of a fuel oil release from an underground storage tank found in the Town Hall parking lot during the construction of a sewer line. Mr. Nelson led the process to remove and dispose of contaminated soil and free product and developed the Response Action Outcome Statement for submission to the Department of Environmental Protection upon remediation of the site.

Anniversary Park, Yarmouth, UST Release: LSP of record for the remediation of a hydrocarbon plume created by a leaking gasoline tank at a gasoline station formerly at the location of Anniversary Park in Yarmouth. The remediation has included air sparging, soil-venting and bio sparging. The site cleanup will be completed in 2008.

Integrated Water Management

Water Management Planning, North Kingstown, RI: Assisted the North Kingstown Planning Department and the Water Department in the development of a long range water management plan for the community. The purpose of this planning is two-fold: 1) to develop conservation measures to reduce the seasonal peak water use in July and August in order to preserve water for future economic growth within the town; and 2) to develop management strategies to bring water withdrawals in town into compliance with future streamflow-based standards for the Hunt, Annaquatucket and Pettaquamscutt aquifer systems that are currently being developed by the Rhode Island Department of Environmental Management. Management options under consideration include changes to the town's increasing block rates to discourage excessive outdoor watering, incentive programs to reduce day-to-day potable water use, aquifer storage of peak river flows and wastewater reuse.

Pleasant Bay Fertilizer Management, Chatham, MA: Project Manager for the development and evaluation of a broad range of innovative and alternative methods to manage fertilizer loadings in an effort to reduce nitrogen loading to Pleasant Bay. This includes regulatory and non-regulatory approaches and includes significant public outreach and education.

Wastewater Management

Smart Growth/Smart Energy Toolkit, Massachusetts Executive Office of Energy and Environmental Affairs: Developed a wastewater module of this twenty-two module toolkit for municipalities to use implementing local smart growth and renewable energy programs. The wastewater module focused on evaluating on-site versus cluster versus centralized wastewater treatment and highlighted the environmental and cost considerations for each approach.

Navajo Water and Wastewater Access Mapping, Indian Health Service (IHS), and EPA: Principal-In-Charge for this Project, involving the spatial geo-referencing of Navajo Reservation homes lacking access to safe drinking water and/or adequate wastewater facilities. More than 1,800 data files covering almost 300 IHS projects were analyzed, and Geographic Information System (GIS)-based process was developed for mapping over 8,000 homes. More than half of the homes have been mapped so far, and overlaid over existing water and wastewater service lines, drinking water wells, and other relevant data to help EPA, IHS, and other federal

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agencies determine the best approach to provide potable water and sanitation to these Navajo homes.

The Pinehills Community, Plymouth, MA: Principal-in-Charge of HW's wastewater engineering projects associated with the development of The Pinehills Community – a 3,000-acre mixed use development. Mark led the design and permitting of a 150,000-gpd expansion of the existing wastewater treatment plant. He also managed the design and permitting of an innovative wastewater recovery system for golf course irrigation on the property, and evaluated the water quality impacts of the development on public water supplies and nitrogen sensitive coastal resources. In addition, he supervised the development of a three-dimensional MODFLOW groundwater model to map the Source Water Protection Area to an on-site public water supply and evaluate water withdrawal impacts to nearby ponds and wetlands.

Wastewater Management and Design for Chepachet Village, Glocester, RI: Principal-In-Charge for the analysis and conceptual design of a wastewater management plan for historic Chepachet Village. The plan includes innovative wastewater solutions, using a decentralized community wastewater system approach to address the current wastewater problems. HW developed and presented several decentralized configuration, treatment, and disposal options with costs for the Village's wastewater. Designs to the 10% level were completed for each selected decentralized solution, as well as lists of all applicable permits. One of the proposed alternatives was selected and HW is currently developing a conceptual design plan for the project.

Wastewater Treatment Plant Permitting, Design and Construction, Division of Capital Asset Management, Plymouth, MA: Assisted with the permitting, design and planning of a 40,000 GPD wastewater facility and 60,000 GPD water supply well at this active Correctional Facility. Mark provided oversight for the following aspects/submittals; ENF for MEPA, NOI for Plymouth Concom, Project Notification for NHESP (rare species), Groundwater Discharge Permit for MADEP, New Source Approval Report for MADEP, Bid and Specification process through DCAM. Completed Bid Specifications and Plans in compliance with M.G.L. Chapter 149. The facility is now constructed and operating successfully.

Wastewater Treatment Plant Permitting, Design and Construction, Division of Capital Asset Management, Norfolk, MA: Assisted with the permitting, design and planning of a 500,000 GPD wastewater facility at this active Correctional Facility. Mark provided oversight for the following aspects/submittals; NOI for Norfolk Concom, Groundwater Discharge Permit for MADEP, Design Plans and Bid and Specification process through DCAM. Completed Bid Specifications and Plans in compliance with M.G.L. Chapter 149. The project is currently under construction (50% complete).

Relative Risk Assessment for Wastewater Disposal, South Florida, EPA: Working for the Environmental Protection Agency, Mark led the development of a risk assessment comparison for four wastewater disposal options in South Florida. These include ocean discharge, deep well injection, aquifer recharge, and surface water discharge. A majority of the work focused on modeling the transport of wastewater effluent discharged through deep well injection and predicting impacts to potable groundwater resources as well as estuarine waters as the effluent moved upward based on buoyancy and injection pressure. The risk assessment was presented in a series of public meetings in Florida, and forms the basis for consideration of new federal wastewater disposal rules in South Florida.

Environmental Engineering

Herring River Estuarine Flushing Model, Harwich, MA: Supervised the collection of tidal fluctuation and river discharge data in the Herring River. This information was then used in a series of estuarine flushing models to evaluate the residence time for water within the system and the ability of the river to assimilate nitrogen before water quality impacts became significant. A tidal prism model was used along with a series of

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mass balance calculations to arrive at the residence time for the system.

National Park Service, Wellfleet, MA: Project Manager for this project involving the development of a computer simulation of aquifer/kettle pond interactions. This was a two-year research project evaluating ground water and stormwater interactions in Gull and Duck Ponds in Wellfleet. He supervised the collection of detailed ground water levels, the determination of aquifer permeability, lakebed permeability, streamflow, and pond evaporation data over one year. Data was then incorporated into a three-dimensional MODFLOW model to evaluate sensitivity of input data and to predict lake response to changing climatic conditions.

Estuarine Flushing and Water Quality Model, Essex, MA: Principal-in- Charge for the development of a depth-averaged, finite element circulation model for Essex Bay in Massachusetts. The purpose of the model was to evaluate the water quality impacts associated with a proposed treated effluent disposal into the bay. Mr. Nelson supervised the collection of tidal fluctuation and river discharge data over a lunar cycle that was used to calibrate the model to local water level changes. The calibrated model was designed to predict changes in nitrogen and oxygen concentrations throughout the estuary resulting from the proposed sewage discharge.

Environmental Permitting & Compliance

Barnstable Municipal Airport, Hyannis, MA: Since 1995, Mark has been the Principal-in-Charge for HW's ongoing remediation permitting and design projects at the airport. They include:

- Completion of a Phase II comprehensive site assessment characterizing multiple releases of chlorinated solvents and petroleum hydrocarbons. Mark directed installation and sampling of 45 wells to determine three-dimensional location of ground water plume from each release and the influence of low permeability silt layers on solvent transport deep in the aquifer, and conducted a health risk assessment and determined the extent of remediation to protect downgradient public supply wells.
- Design, implementation, and operation of an air sparging and venting remediation system to treat contaminated soil and groundwater associated with three separate hazardous material releases identified during the Phase II site assessment.
- Implementation of a field-sampling program to support a Stage II ecological risk assessment to evaluate the impact of hydrocarbon contamination in the sediments below Upper Gate and Lewis Ponds.
- Leadership in the permitting of the proposed new airport terminal, access road, parking facilities and associated improvements through the Cape Cod Commission Development of Regional Impact (DRI) process. Mark was the spokesman for the airport throughout the public hearing process.
- Provision of on-call LSP emergency response services supporting airport personnel in the assessment and remediation of unexpected releases of hazardous materials.
- Quality Control review of the Spill Prevention, Control, and Counter measures (SPCC) plan and Stormwater Pollution Prevention Plan (SWPP) for the airport, developed by colleagues.

Provincetown Airport Improvement Projects: Principal-in-Charge for a two-year project to design and permit a series of airfield and landside improvements, including a perimeter fence, taxiway realignments and terminal and parking lot improvements. The design and permitting is complicated by significant wetland and rare and endangered species habitat at the airport. Currently a Draft Environmental Impact Report under MEPA is being prepared along with a DRI application for the Cape Cod Commission.

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Low Impact Affordable Housing Design Projects - Housing Assistance Corporation

Mark Nelson has led Horsley Witten Group, Inc. (HW)'s work with the Housing Assistance Corporation (HAC), a non-profit housing agency that has developed 16 units of affordable housing since 2005. HAC is committed to using a variety of sustainable design and energy efficient practices for their developments, including the following examples:

Route 134 Community, Dennis, MA: Mark is the Principal-in-Charge for HW's engineering support for the permitting and development of a 27-unit, 52-bedroom affordable housing complex on the now-vacant Route 134 property and site of historic Melpet Farm in Dennis, Massachusetts. Design elements include bioretention and infiltration facilities for stormwater treatment and a nitrogen-reducing onsite septic system.

Sachem's Path Community, Nantucket, MA: Mark is the Principal-in-Charge for HW's permitting and design work for a 50-unit housing community on Surfside Road in Nantucket. The project is currently entering the permitting stage and it is anticipated to be constructed in three phases over the next 3-5 years.

Community Green Affordable Housing Development, Sandwich, MA: Mark is the Principal-in-Charge for this environmentally and economically sustainable affordable housing community. The development will consist of 5 energy efficient single family homes, 57 affordable rental housing units, and a community building. The site design uses LID strategies to minimize the impact on the surrounding environment and endangered species habitat. Advanced wastewater treatment will be provided by an innovative alternative denitrification shared community system; and the site design will replicate existing drainage patterns by incorporating grassed swales and vegetated bioretention systems, and infiltration basins into the storm water management system.

Breezy Acres Affordable Housing Expansion, Mashpee, MA: Mark is the Principal-in-Charge for this environmentally sustainable affordable housing expansion. The development consists of five new energy efficient single-family dwellings, a shared driveway, paved parking areas, sidewalks, and a low impact stormwater management system, as well as installation of site utilities. A partnership with the Town of Mashpee is currently being finalized to allow for treatment of sewage from the community at the adjacent Mashpee High School.

YMCA/ Kimber Woods Community, West Barnstable, MA: Mark is the Principal-in-Charge for this affordable housing development located in the Old Kings Highway historic district of Barnstable, Cape Cod. The project consists of 28 housing units located on a 7 acre parcel and uses LID strategies to minimize the impact on the surrounding environment. Advanced wastewater treatment was provided by an innovative alternative denitrification community system; and the site design incorporates grassed swales, vegetated bioretention systems, rain gardens and infiltration basins into the stormwater management system.

Lombard Farm Community, West Barnstable, MA: Mark is the Principal-in-Charge for this age-restricted development. The project consists of 12 units located on a 7.5 acre parcel and uses "low impact development" strategies to minimize the impact on the surrounding environment. Advanced wastewater treatment was provided by an innovative alternative denitrification community system; and the site design incorporates grassed swales, vegetated bioretention systems, rain gardens and subsurface infiltration chambers into the storm water management system.

The Residences at Canal Bluffs, Bourne, MA: Mark was the principal-in-Charge for the planning, design and permitting of a 117-unit affordable housing community based on Low Impact Design (LID) principles. The project involved the reuse of an existing previously planned for an office complex. The site layout was

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developed to minimize the footprint of the community, preserving open space. A secondary access was developed with a neighboring commercial property to minimize traffic impacts. Stormwater management was designed with pre-treatment using vegetated swales and bioretention facilities. In addition, a 32,000 gallon per day wastewater treatment plant was designed to protect drinking water quality as the site lies within a Zone II wellhead protection area. The design was recognized by the Cape Cod Commission for its use of LID techniques and the protections it provides for drinking water quality.

Water Security

Program Manager, Mission Contract for EPA Office of Ground Water and Drinking Water: Program Manager for HW's seven-year, \$17,000,000 contract with the US Environmental Protection Agency's Office of Ground Water and Drinking Water. This work focuses on implementation of the Safe Drinking Water Act for the Drinking Water Prevention Division and the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 for the newly formed Water Security Division. Individual water security projects include:

- Development of a series of twelve simple and enhanced water security table-top exercises that was distributed nationally via compact disc in January 2005.
- Development of two national level water security conferences in Baltimore and Atlanta in January 2004 focusing on the need for water systems to coordinate response actions with public health, law enforcement, and EMS officials.
- Training workshops for state, local and federal officials on how to conduct water security exercises, including information on EPA's Response Protocol Toolbox, the Incident Command System (ICS) and the National Incident Management System (NIMS).
- Development of a series of water security exercises for the water supplies serving the Washington, D.C. National Capital Region. Both on a tabletop and functional exercise were conducted to support training in the region's Water Security Emergency Plan.

State Wide Drinking Water Security Strategic Plan, North Carolina: Principal-in-Charge for the development of a Water Security Strategic Plan designed to support the efforts of the North Carolina Public Water Supply Section in protecting drinking water supplies across the state. The strategic plan included development of an emergency response plan with tiered actions to respond to an event based on its severity and complexity. In addition, HW also assisted in the development and implementation of a series of table-top and functional exercise to test the emergency response procedures developed by HW.

Water Sector ICS/NIMS Training: Lead Instructor for this U.S. EPA-sponsored training presented over 50 cities across the United States. Through a combination of presentations and group learning activities, Mr. Nelson ensured that over 600 water sector workers received their Federal Emergency Management Agency (FEMA) IS-100 (Introduction to the Incident Command System), and IS-700 (Introduction to National Incident Management System) certification, a necessary step in NIMS compliance.

Water Security Exercise Development and Training for the Pennsylvania Department of Environmental Protection: Principal in Charge for a project to support water security training for Pennsylvania DEP staff. The work involved the development of six water security exercises, and training of DEP staff through seven two-day workshops including training DEP education staff on how to conduct exercises in the future.

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Maryland Counter Terrorism/Water Security Services: Principal-in-Charge for this project with the Maryland Department of Environment (MDE), Water Supply Program. In this effort, the firm created standard water security emergency operating procedures for Maryland from the state's current policies, procedures and practices. These current policies, procedures and practices were compared to new national guidance (e.g., NIMS, NRP, Response Protocol Toolbox, etc.) and other guidance examples to ensure that a sound Security Strategic Plan was developed. HW also conducted training on the Security Strategic Plan consisting of six workshops throughout the state, as well as tabletop exercises.

Meeting Facilitation

Development of a Strategic Plan for Providence Water, RI: Principal-in-Charge for the development of a Strategic Plan for Providence Water. Providence Water supplies drinking water to the City of Providence and 16 other Rhode Island Communities. HW worked with the 250 employees of Providence Water to develop a Strategic Plan, with a focus on improving the internal operations of the utility. HW developed twelve strategic planning goals with input from a majority of the Providence Water employees; administered an anonymous survey of all Providence Water employees, management, and Board members; analyzed the performance of Providence Water relative to a peer group of other utilities; performed individual employee interviews; facilitated six focus groups to discuss the prioritization of goals and the realistic implementation of the proposed strategies; and conducted an organizational retreat. HW is also continuing to monitor the implementation of the Plan through a two-year review process.

PROFESSIONAL EXPERIENCE

Horsley Witten Group, Inc., Principal/Senior Hydrogeologist, March 1989 to Present

Cape Cod Planning and Economic Development Commission, Contaminant Hydrogeologist, June 1989 to February 1990

IEP, Inc., Hydrogeologist, 1985 to 1988

PRESENTATIONS AND PUBLICATIONS

Nelson, M. 2007 Southern New England Planning Conference, Affordable Housing Implementation: October 2007.

Nelson, M. 2007 Southern New England Planning Conference, Village Center and Corridor Revitalization: October 2007.

Nelson, M. 2006. "Planning and Urban Design Standards" American Planning Association; Section on Land, Soils Classification and Mechanics.

Nelson, M., T. Noble. 2004. Integrated water management techniques for protecting groundwater and public health, in Proceedings of the Groundwater Foundation Annual Conference and Groundwater Guardian Designation, November 4-5, 2004.

Noble, Tom, M. E. Nelson. 2004. Interrelationships between water suppliers, public health officials and emergency response personnel in water security planning, in Proceedings of the Groundwater Foundation Annual Conference and Groundwater Guardian Designation, November 4-5, 2004.

Nelson, M., R. Hughto and J. Witten. 2000. Environmental science and engineering for lawyers, Massachusetts

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Environmental Law, Massachusetts Continuing Legal Education.

Thibodeau, P., M. Nelson and S. Woods. 2000. Nitrogen loading to coastal embayments: implications for land use planning in the Delaware Inland Bays Watersheds. *Water Resources Impact*, 2(2):12-18.

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Thibodeau, P. and M. Nelson. 1999. Water resources modeling of the Coachella Valley, California, aquifer system: long-term impacts of groundwater withdrawals, in *Proceedings of the 1999 AGU spring meeting, Eos Supplement*.

Nelson, M. and J. Witten. 1999. Environmental science for lawyers, In McGregor, G. (ed), *Massachusetts Environmental Law, III(III)*, Massachusetts Continuing Legal Education, Inc.

Nelson, Mark E. and S. Horsley. February 1998. Stormtreat™ technology for stormwater treatment, in *Proceedings of the Northeastern Illinois Planning Commission's National Conference: Retrofit Opportunities for Water Resource Protection in Urban Environments*, February 10-12, 1998, Chicago, IL.

Nelson, Mark E., and H.J. Frank. July 1996. Nitrogen loading modeling software and user-friendly, interactive manual, developed for the Commonwealth of Massachusetts Department of Environmental Protection.

Cambareri, Thomas, E. Eichnor, and M. Nelson. 1992. Benzene transport through a mature hydrocarbon plume in a sand and gravel aquifer. in *Proceedings of the FOCUS Conference on Eastern Regional Ground Water Issues*, National Water Well Assoc., Newton, MA. October 1992.

Nelson, Mark E., S. Horsley, and S. Roy. 1990. Delineation of aquifer vs. wellhead protection areas, in *Proceedings of Annual Meeting of the Assoc. of Ground Water Scientists and Engineers*, September 1990.

Nelson, Mark E. and J. Witten. 1990. Delineation of wellhead protection area in a semi-confined aquifer, in *FOCUS on Eastern Regional Ground Water Issues*, NWWA Conference, October 1990.

Cambareri, T., M. Nelson, S. Horsley, M. Giggey, and J. Pinette. 1989. Solute transport - a simulation of nonpoint source nitrogen impacts to ground water and calibration of a predictive analytical model. Accepted for publication with National Water Well Association in *Proceedings - Solving Ground Water Problems in Models*, Indianapolis, IN.

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PROFESSIONAL EXPERIENCE

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