

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
THE OFFICE OF APPEALS AND DISPUTE RESOLUTION

In re Easterly Wastewater Treatment Facility) Groundwater Discharge Permit No. 1018-0)	OADR No. 2026-013 DEP No. 25-WP79-0137-APP/1018-0
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Pre-filed Testimony of Scott Horsley

I, Scott Horsley, submit this pre-filed testimony on behalf of Petitioners:

1. I have been retained by Petitioners as an expert and submitted public comments on their behalf on the draft groundwater discharge permit at issue in this appeal. I have four decades of professional experience in the field of water resources management, including serving on MassDEP advisory committees to develop wastewater and water management policy. I have served as an expert witness in prior OADR hearings involving groundwater discharge permits. I also teach these topics as an Adjunct at Harvard University Extension School and Tufts University. A copy of my CV is attached.
2. I have over 30 years of professional experience in the field of water resources management working as a consultant to federal, state, and local government agencies, non-governmental organizations (NGOs), and private industry throughout the United States, Central America, the Caribbean, the Pacific Islands, Bulgaria, and China. I served as a consultant to the Cape Cod Commission for the development of the Cape Cod 208 Water Quality Plan Update and am currently serving as a consultant to the towns of Barnstable, Manchester-by-the-Sea, Truro, and Wellfleet in developing nutrient reduction strategies. I have served as an instructor for several nationwide series for the U.S. Environmental Protection Agency (USEPA) training workshops on water resources restoration and watershed management. I have also served on numerous advisory boards to the USEPA, the National Academy of Public Administration, Massachusetts Department of Environmental Protection (MADEP), Massachusetts Executive Office of Energy and Environmental Affairs (EEA), and the National Groundwater Association. I have received national (USEPA) and local (Mashpee Conservation Commission and Barnstable Land Trust) awards for my work in the water resources management fields. I currently serve as Adjunct Faculty at Harvard University Extension School and Tufts University, where I teach graduate courses in water resources policy, wetlands management, green infrastructure, and low impact development (LID).

A. Similar affordable housing developments on Cape Cod that discharge wastewater into impaired watersheds all have net zero nitrogen load.

3. In addition to my professional credentials and experience, I have also provided consulting services on several affordable housing projects, all of which achieved a net zero nitrogen load (and actually net reductions in both cases): Kingman Marine in Red Brook Harbor, Bourne, and Lawrence Hill in Wellfleet. Similar to this proposed project, those projects are all located in

nitrogen-sensitive watersheds. Net zero nitrogen loading was achieved by first minimizing the proposed new load by applying state-of-the-art wastewater treatment and low impact site design. Then the remaining nitrogen load was offset by connecting adjacent and neighboring properties which were utilizing on-site Title 5 systems to dispose of untreated wastewater to the new treatment plant.

4. The calculation for a net zero nitrogen load is determined by first determining the concentration of wastewater effluent and average flows discharging from a standard Title 5 septic system were estimated at 26.25 mg/liter and 151 gallons/day by MassDEP¹. Wastewater treatment plants are able to achieve average effluent concentrations of 3 – 5 mg/liter.
5. I served as a consultant to Kingman Marine in Bourne, MA in 2015. Kingman operated a marina with a restaurant and several shops using a Title 5 system with a design flow of 7500 gallons/day. The marina formed a partnership with Red Brook Harbor Club to develop 15 new townhouses on an adjacent parcel of land. This would increase the design flow of the two properties to 12,450 gallons/day requiring a Groundwater Discharge Permit. The project is within the Red Brook Harbor watershed. Red Brook was identified as an impaired water by the Buzzards Bay Coalition with excessive nitrogen. The Massachusetts Department of Environmental Protection (“MassDEP”) recognized the threat to Red Brook Harbor from nitrogen pollution and included the harbor as part of the Massachusetts Estuaries Project (“MEP”) for nutrient TMDL development.
6. I consulted with MassDEP to discuss the proposed project and its regulatory requirements and was informed that because the project was within a watershed to an impaired water that it would be required to be a net-zero nitrogen load (see attached email dated November 7, 2018 from Brian Dudley, longtime Wastewater Section Chief for the Cape and Islands at MassDEP). That email states, “Since TMDLs (or even an MEP report or other study documenting impairment) indicates a violation of the SWQSSs, MassDEP considers that the additional load will contribute to a further violation of the SWQSSs; therefore, the Department cannot issue a permit unless that additional load is mitigated to a net zero nitrogen discharge or a reduction in nitrogen loading to the impaired resource”. In accordance with Mr. Dudley’s position on behalf of DEP, the Red Brook Harbor project was designed to be a net-zero discharge.
7. The wastewater treatment plant designed and constructed in Red Brook Harbor processes the wastewater from both the marina and the townhouses (MassDEP Groundwater Discharge Permit Number 954-1). This project resulted in a net reduction of -191 kg/year of nitrogen load to Red Brook Harbor. The owner of Kingman Marine even offered to design the treatment plant with additional capacity (32,500 gallons/day) to provide an opportunity to connect up to 52 neighboring homes (also on Title 5 systems) within the Cedar Point neighborhood and expand the net reduction of nitrogen loading to -951 kg/year. To date, that expansion has not yet been constructed. Below is a graphic and table summarizing the net zero discharge for the Red Brook Harbor project in Bourne.

¹ Great, Green and Bournes Pond Embayment Systems TMDLs for Total Nitrogen (Report #96-TMDL-6 Control #181.0 (Apr. 6, 2006) (“TMDL Report”).



Figure 1 – Net Zero Nitrogen Neighborhood/Cluster Wastewater Plan for Kingman Marina, Red Brook Harbor Club, and Cedar Point Neighborhood, Bourne, MA

Table 1 – Summary of Net Zero Nitrogen Loading – MassDEP Groundwater Discharge Permit 954-1 (Red Brook Harbor Club, Bourne, MA)

Scenario	Wastewater flow/concentration	Load (kg/year)
existing conditions (marina)	7,500 gallons/day @ 35 mg/liter	363
proposed (marina + 15 townhouses)	12,450 gallons/day @ 10 mg/liter	172
Net Reduction		-191

8. In addition to the project in Bourne, other affordable housing developments in Wellfleet also have net zero nitrogen discharges. As a consultant to the town of Wellfleet, I developed a Targeted Watershed Management Plan (TWMP) for Wellfleet Harbor. During the preparation of the TWMP, I was advised that the town was developing an affordable housing project (known as Lawrence Hill) with 46 affordable dwellings within the Duck Creek subwatershed (the most impaired watershed within the Wellfleet Harbor complex). In response, I advised the town that this could not be done without a net zero nitrogen plan. I proposed that the project be connected to three adjacent properties (the elementary school, fire station, and police station) and an additional 36 neighborhood homes that were then served by Title 5 systems as offsets to the affordable housing project. Working with another consultant (On-Site Engineering, the Applicant's engineer for the Falmouth project) we designed a neighborhood cluster wastewater treatment system to achieve a net zero nitrogen load. This project has recently been constructed. The wastewater treatment design also included expansion capability to connect and treat an additional 36 single-family homes as a future phase to provide even generated nitrogen reduction. Below is a graphic and table summarizing the net zero discharge for the Lawrence Hill project in Wellfleet.



Figure 2 – Net Zero Nitrogen Neighborhood/Cluster Wastewater Plan for Lawrence Hill Affordable Housing Project, Wellfleet, MA

Table 2 – Summary of Net Zero Nitrogen Loading – MassDEP Groundwater Discharge Permit (Lawrence Hill Affordable Housing Project, Wellfleet, MA)

Scenario	Wastewater flow/concentration	Load (kg/year)
Existing conditions	25,100 gallons/day @ 26 mg/liter	902
Proposed affordable housing project (with cluster WWTF)	35,000 gallons/day @ 6 mg/liter	290
Net Reduction		-612

Note: Existing conditions includes police station, fire station, elementary school, and 36 single-family homes on Title 5 systems. Proposed project includes 46 new affordable dwellings and a neighborhood/cluster wastewater treatment facility (WWTF) connecting the aforementioned existing properties.

B. As in Bourne and Wellfleet, the Falmouth project must also achieve a net zero nitrogen discharge.

9. As I did in Bourne and Wellfleet, I have prepared a nitrogen loading analysis for this project at 375 Sandwich Road in Falmouth to determine the impacts and to estimate potential offsets. The project is located within the watershed of the impaired waters of the Coonamessett River and Great Pond in Falmouth². Surface water quality violations have been documented in these surface waters by the Massachusetts Estuaries Project (MEP).
10. MassDEP has declared Great Pond as an “impaired water” due to excessive nutrients (nitrogen) consistently throughout the 2008 – 2025 period, indicating that it does not meet the Massachusetts Surface Water Quality Regulations³. MassDEP commissioned the Massachusetts Estuaries Project (MEP) report for Great Pond to determine the causes and sources of impairment⁴. The MEP report is based upon a peer-reviewed, linked model which delineated the watershed (contributing area) to Great Pond and the Coonamessett River, determined the causes of impairment and watershed loads (including wastewater, stormwater, and fertilizers), modeled the assimilative capacity of Great Pond and the Coonamessett River (due to tidal flushing), and determined the critical (maximum) thresholds for nitrogen loading. Table IX-12 of the MEP report provides a summary of the nitrogen load reductions that are required to achieve compliance with the Clean Water Act and the Massachusetts Surface Water Quality Standards. It indicates that watershed-based nitrogen loads will need to be reduced by 81.1% for Great Pond and 33.2% for the Coonamessett River (MEP Final Report, page 171). The MEP model documents that excessive nitrogen causes eutrophication (and the associated loss of critical

² The watersheds to Great Pond and the Coonamessett River are based upon groundwater flow mapping and were delineated by the United States Geological Survey and incorporated into the Massachusetts Estuaries Project.

³ Massachusetts Department of Environmental Protection, Massachusetts Years 2008 – 2025, Integrated List of Waters Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 303(d) and 305(b) of the Clean Water Act.

⁴ Massachusetts Estuaries Project Linked Watershed-Embayment Model to Determine Critical Nitrogen Loading Thresholds for Great/Perch Pond, Green Pond and Bournes Pond, Falmouth, Massachusetts FINAL REPORT – APRIL 2005.

eelgrass resources of Great Pond and the Coonamessett River and that wastewater discharges are the principal cause of impairment or source of nitrogen (82%) within the watershed (Id. page 39).

11. According to the Hydrogeologic Report prepared by the Applicant's consultant, Geohydrocycle, the Project proposes to discharge 49,950 gallons/day of wastewater within the watershed to Great Pond and the Coonamessett River⁵. The water table mapping provided by Geohydrocycle indicates groundwater flow in a southeasterly direction from the project site directly towards Great Pond and the Coonamessett River. At a presumed treatment level and effluent concentration of 3 mg/liter this represents an additional, increased nitrogen load of 207 kg/yr within the Coonamessett/Great Pond watershed. Including stormwater infiltration and lawn fertilizers, the total project nitrogen load is estimated to be 247 kg/yr (See Table 3 below). The Fuss & O'Neill letter dated January 16, 2025, states a nitrogen load of 345 kg/yr at an average effluent of 5 mg/liter.

Table 3 – Nitrogen Loading Analysis – Proposed Project

wastewater (kg/yr)	207
fertilizer (kg/yr)	8
stormwater (kg/yr)	33
Total Load Addition (kg/yr)	247

12. To offset this nitrogen load, the Project will have to connect an estimated 57 existing homes in the neighborhood to the proposed wastewater treatment plant. This estimate is based on the MEP report, which indicates that each home generates 4.93 kg/year N⁶ from wastewater discharges using Title 5 septic systems. Connecting these homes to the wastewater treatment plant would lower their effluent nitrogen concentration from 26.25 mg/liter to 3 mg/liter resulting in a net reduction of 4.37 kg/year per home. To achieve the offset of 247 kg/year the Project would have to connect 57 homes to the wastewater treatment plant. See Table 4 below.
13. I have estimated the cost of connecting 57 homes based upon the 2020 cost study conducted for the town of Wellfleet in the Lawrence Hill project⁷. Both projects have similar sandy soils, with no shallow bedrock and have similar sized lots. The Lawrence Hill project includes a cluster system that was designed to include the connection of 36 single family homes as a nitrogen loading offset for that project. The cost of the associated collection system for those homes was

⁵ GHC, Hydrogeologic Evaluation Update, The Easterly 375 Sandwich Road, Falmouth, MA, October 9, 2024.

⁶ Massachusetts Estuaries Project, Linked Watershed-Embayment Model to Determine Critical Nitrogen Loading Thresholds for Great/Perch Pond, Green Pond and Bournes Pond, Falmouth, Massachusetts, 2005, Table IV-3.

⁷ Bohler Engineering and On-Site Engineering, "Residential Development Wastewater System Evaluation – 96 Lawrence Road, Wellfleet, MA", December, 2020.

estimated at \$1.5 million⁸. The expanded treatment plant to process the additional wastewater from the 36 homes was estimated at \$202,075, bringing the total capital cost associated with connecting the 36 neighborhood homes to \$1.72 million or \$47,780/home.

14. Considering inflation and operation and maintenance costs I have used a range of \$50,000 - \$75,000 per home as an estimated offset cost. Applying these costs for 57 homes yields a total estimated offset cost at \$2.85 – 4.275 million.

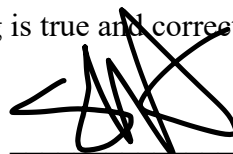
Table 4 – Nitrogen Loading Analysis – Offset Required

existing load/home (on septic)	4.93
load/home with wastewater treatment	0.56
load reduced/home (kg/yr)	4.37
number homes required to be sewerred	57
Total Load Reduced (kg/yr)	247

15. The Falmouth Zoning Board of Appeals conditionally-approved the Comprehensive Permit with the understanding (and presumption) that the Project would connect neighboring properties currently on septic systems to the Project’s wastewater treatment plant as an offset to achieve a “net zero” nitrogen loading. However, there is no requirement or funding provided to either construct the treatment plant with this capacity or for the collection system to connect the neighboring homes.

18. I incorporate by reference my prior testimony in this matter, including the Affidavit dated April 15, 2026.

I declare under penalty of perjury that the foregoing is true and correct.



Scott Horsley

Date July 24, 2026

⁸ Bohler Engineering and On-Site Engineering, “Residential Development Wastewater System Evaluation – 96 Lawrence Road, Wellfleet, MA”, December, 2020.

Areas of Expertise

- Targeted Watershed Planning
- Wastewater & Stormwater Management
- Water Quality Impacts & Restoration
- Green Infrastructure & Nature-Based Solutions
- Hydrologic Modeling & Assessment
- Integrated Water Management
- Smart Growth/ Low Impact Development
- Education & Training

Professional Affiliation

- Tufts University, Graduate Department of Urban and Environmental Planning and Policy
- Harvard University, Extension, Graduate Department of Sustainability
- Massachusetts Stormwater Advisory Committee
- Massachusetts Sustainable Water Management Initiative Advisory Committee
- Massachusetts Climate Change Adaptation Advisory Committee
- MADEP Title 5 Advisory Committee
- Charles River Watershed Association Advisory Board

Scott W. Horsley

Water Resources Consultant and University Lecturer
Curriculum Vitae

Scott Horsley has over 30 years of professional experience as a consultant to federal, state, and local government agencies, non-profit organizations, and private industry throughout the United States, Bulgaria, Nicaragua, the Caribbean, the Pacific Islands, and China. Scott has been an innovator in the environmental profession and thrives on bringing innovative and interdisciplinary approaches to challenging projects. Scott has a strong understanding of the full range of technical, planning, and policy issues associated with water resources and land use management projects. Scott has served as an expert witness in the field of hydrology in numerous state and federal court cases. He has served as an instructor for a nationwide series of U.S. Environmental Protection Agency (EPA) workshops on water resource management. He has also served on numerous advisory boards and committees to the EPA, the National Academy of Public Administration, Massachusetts Department of Environmental Protection (MADEP), Massachusetts Executive Office of Energy and Environmental Affairs (EEA), National Groundwater Association, and Massachusetts Audubon Society. Scott has received national (EPA) and local awards (Mashpee Conservation Commission) for his work in the wetlands and stormwater management fields. Scott Horsley serves as Adjunct Faculty at Tufts University in the Graduate Department of Urban & Environmental Policy & Planning and at the Harvard Extension School in the Graduate Department of Sustainability.

REPRESENTATIVE PROJECTS

Lake Tashmoo Targeted Watershed Plan – Town of Tisbury (Martha’s Vineyard), MA: Working with the Tisbury Water Resources Committee to develop a restoration plan for Lake Tashmoo. According to the Massachusetts Estuaries Project (MEP) Lake Tashmoo is receiving nitrogen loading from wastewater, stormwater and fertilizers and requires a 32% reduction to achieve compliance with the Clean Water Act. The plan will include a sewer collection system, advanced septic systems that use a woodchip bioreactor system, fertigation wells, and stormwater retrofits. A responsible management entity (RME) is being developed to manage the operation, maintenance, and monitoring of the plan.

Wellfleet Targeted Watershed Management Plan – Town of Wellfleet, MA: As a consultant to the Town of Wellfleet prepared a Targeted Watershed Plan including an adaptive management plan integrating non-traditional (nature-based) and traditional (wastewater treatment facilities) nutrient reduction technologies. The plan includes a permeable reactive barrier (PRB), shellfish and aquaculture, ecosystem restoration, stormwater remediation, fertilizer management, and the use of decentralized, on-site septic systems that utilize innovative and alternative technologies. The overall goal of the project is to provide the town guidance in obtaining a MADEP Watershed Permit and compliance with the Clean Water Act. The Targeted Watershed Plan was unanimously approved by the Wellfleet Select Board, was confirmed to be

Awards

- Harvard University, Petra Shattuck Excellence in Teaching Award (2023)
- Mashpee (MA) Conservation Commission Annual Environmental Achievement Award (2002)
- EPA Environmental Technology Innovator Award for Stormwater Treatment Design (1999)

Patent

United States Patent Number 5,549,817 for Stormwater Treatment System/Apparatus

Academic Background

Master of Arts, Marine Affairs - Environmental Protection, University of Rhode Island (1981)

Marine Ecosystems Research Laboratory, University of Rhode Island (1980)

Princeton Groundwater Pollution & Hydrology Course with David Miller, John Cherry, and Robert Cleary (1985)

Bachelor of Science, Biology, Southeastern Massachusetts University (1976)

consistent with the Cape Cod 208 Plan by the Cape Cod Commission. The advanced septic system program was approved by the Massachusetts Clean Water Trust for SRF funding and placed on the Intended Use Plan (IUP).

Water Resources Management - Manchester-by-the Sea, MA: Scott is serving as a consultant to the town of Manchester-by-the-Sea and their Water Resources Protection Task Force. He is advising on drinking water supply management issues including sustainable yield, source water protection, future water sources, and water rates. Scott has supervised a thermal survey to determine groundwater discharge areas to Gravelly Pond, the town's surface water reservoir and has prepared a hydrologic budget.

Watershed Restoration Research Project: Scott is currently working as a member of a research team that includes USEPA Office of Research & Development, United States Geological Survey (USGS), The Nature Conservancy, the Town of Barnstable and the Barnstable Clean Water Coalition. The project is designed to research, develop, and pilot-test multiple nature-based technologies to reduce nutrient loads to the coastal embayment known as Three Bays. Scott assisted in the design of a woodchip-based bioreactor/ permeable reactive barrier (PRB) and is now working with the research team to construct and monitor it as part of a wetland restoration project in a cranberry bog at the headwaters of the watershed. He is also advising on a project to evaluate the use of a new class of innovative and alternative septic systems that utilize a woodchip-based bioreactor. Preliminary data from these systems indicate nutrient reductions of 90%. The project includes the development of a Responsible Management Entity (RME) to oversee the operation, maintenance, and monitoring of the systems.

Expert Witness, Hydrologist - United States Environmental Protection Agency and United States Department of Justice – United States v.

Charles Johnson (437 F.3d 157, First Circuit Court, 2006): Expert Witness for U.S. Environmental Protection Agency (EPA) and U.S. Department of Justice (DOJ) in a federal Clean Waters Act enforcement case involving the filling of wetlands in Carver, MA by the construction and operation of cranberry bogs. Scott served as the Hydrology Expert Witness and provided testimony regarding the hydrologic interactions (or “nexus”) between the subject wetlands, groundwater, and the adjacent stream. He provided advice on the application of the guidance from the Rapanos U.S. Supreme Court decision relative to the jurisdiction of wetlands in the Weweantic River watershed. He also developed a nutrient-loading and attenuation model and has provided expert witness testimony regarding the nutrient attenuation capabilities of wetlands and their nexus to the Weweantic River. Scott has also prepared a wetland restoration plan for the cranberry bogs to enhance the nutrient attenuation capabilities of wetlands (abandoned cranberry bogs) in the watershed. The case resulted in two favorable decisions for the United States enforcing the Clean Water Act.

Cape Cod 208 Water Quality Management Plan: Consultant to the Cape Cod Commission for the preparation and implementation of the Cape Cod 208 Water Quality Plan. Fifty-three estuaries are impacted by excessive nutrient loading derived from wastewater, stormwater, fertilizers and natural sources. The Cape Cod 208 Plan presents an innovative alternative approach that

includes a broad range of traditional (sewage collection and treatment plants) and non-traditional (or nature-based) technologies including fertigation wells, shellfish restoration, permeable reactive barriers, fertilizer management, innovative & alternative septic system technologies, ecotoilets and other decentralized solutions. An adaptive management plan provides a practical framework to implement and optimize an integrated array of strategies to attain compliance with the Clean Water Act. Mr. Horsley led a team of scientists and engineers in the development of a non-traditional/nature-based approach and conducted dozens of public stakeholder workshops.

Expert Witness, Hydrologist - Massachusetts Supreme Judicial Court - Reynolds v. Stow Zoning Board of Appeals: Mr. Horsley served as an expert witness on wastewater impacts and groundwater hydrology. He conducted an assessment of water quality impacts associated with a proposed Chapter 40B high-density affordable housing project on neighboring private drinking water supplies. The case involved a proposed waiver of a local regulation governing wastewater impacts that the Court upheld the finding that the local board of health requirements were valid and the project was not permitted.

Massachusetts Department of Environmental Protection (MADEP) Title 5 (Septic System) and Groundwater Discharge Permitting Advisory Committee and Designation of Nitrogen Sensitive Areas: Mr. Horsley was invited by MADEP to participate in an advisory group tasked with updating and revising Title 5 Regulations and the associated Groundwater Discharge Permit program. This includes the designation of “Nitrogen Sensitive Areas”, the development of wastewater loading standards, the use of alternative septic system technologies, and the roles of local Boards of Health in regulating wastewater and septic systems.

Three Bays Watershed Implementation Plan – Cape Cod Commission and Barnstable Clean Water Coalition, Inc.: Consultant for the design and implementation of integrated watershed restoration plan designed to reduce excessive nutrient loads. Mr. Horsley prepared conceptual designs for wetland restoration, pond restoration, alternative septic system technologies, stormwater bioretention, woodchip bioreactors, and permeable reactive barriers. He designed a Watershed Calculator tool to track the incremental and cumulative nutrient reductions associated with these projects.

Massachusetts Sustainable Water Management Initiative (SWMI): Mr. Horsley was asked by MADEP and MAEEA to serve as an advisor to an interdisciplinary panel to develop guidelines to implement the Massachusetts Water Management Act for the restoration of stream flow in Massachusetts Rivers. The Massachusetts Water Management Act provides the regulatory structure for water withdrawals in the state. The guidance was developed to provide ecological criteria for the decision making related to water withdrawal permit issuance. The criteria were based upon scientific relationships between flow characteristics and two indicator fish species - trout and black dace. The guidance includes a series of possible mitigation measures and offset practices that are designed to either reduce consumptive withdrawals and/or provide return flows to balance the hydrologic budget.

River Restoration for the Atlantic Salmon – United States Army Corps of Engineers and State of Maine: Served as a consulting hydrologist to the U.S. Army Corps of Engineers and the State of Maine for a hydrologic study of river systems in northeastern Maine to assess the relative impacts of various

water users including irrigation pumping associated with the blueberry industry on the flow regime of the Narragausgus and Pleasant Rivers. The project included numerous meetings with a broad range of stakeholders including the U.S. Army Corps of Engineers, the State of Maine, blueberry industry representatives, and local government officials. The project resulted in a decision-making model and adaptive management plan to restore natural flows within the rivers for the purpose of providing an adequate habitat for the Atlantic Salmon.

California Water Code – Department of Water Resources: Served as Facilitator and Trainer for the implementation of Assembly Bill (AB) 3030. This project integrated groundwater and surface waters and provides the framework to develop local groundwater management plans to balance water withdrawals and recharge projects to mitigate impacts water resources. Mr. Horsley facilitated a series of workshops with stakeholders throughout the State of California.

Ipswich River Watershed Management Plan: Project Manager to develop a Management Plan for restoration of the Ipswich River. The Ipswich River is one of the most impacted rivers in the United States with significant flow alterations caused by excessive water withdrawals and inefficient land use practices. This Plan provides an analysis of the development patterns within the study area and the resulting hydrologic impacts of water supply withdrawals, sewerage systems, and stormwater management. The project included coordination with an interpretation of a USGS watershed modeling project. It also provides an “Integrated Water Management” approval to a series of recommendations designed to balance the hydrologic budget. These include water conservation, alternative water supplies, stormwater management, and land use planning. Mr. Horsley provided facilitation at a series of meetings with a broad range of stakeholders including federal and state agencies, water suppliers, local government officials and others.

Smart Growth and Smart Energy Toolkit, Massachusetts Executive Office of Environmental and Energy Affairs (EEA): Served as a consultant to the EEA to design an outreach tool for local governments and the development community. The Toolkit includes descriptions of twenty techniques, including transfer of development rights (TDR), transit-oriented development (TOD), village center zoning districts, open space residential design (OSRD), LID, agricultural preservation, integrated water, and wastewater management, brownfields redevelopment, and the newly-legislated Chapter 40R smart growth overlay districts. It also includes case studies and model bylaws on the twelve subject areas.

Massachusetts Climate Change Advisory Committee: Scott served as a member of the Coastal Zone and Oceans Subcommittee of the Climate Change Advisory Committee convened by the Secretary of Massachusetts Environmental and Energy Agency. The Committee was assembled to develop recommendations, strategies, and criteria to implement the *Global Warming Solutions Act* passed by the Massachusetts legislature last year. The main task of the subcommittee is to analyze strategies for adapting to the predicted impacts of climate change in the Commonwealth of Massachusetts. Among other recommendations, Scott proposed regulatory changes to accommodate the landward migration of wetland systems that will result from sea level rise.

Nicaragua Source Water Protection Project: As a consultant to U.S. Environmental Protection Agency (USEPA) and U.S. Agency for International Development (USAID), Scott conducted a two-year case study of three communities (Matagalpa, Esteli, and Ocotal) designed to strengthen the sustainability and resilience of local public drinking water supplies. The project included delineation of wellhead protection areas, identification of contaminant sources and the development of management strategies. It included numerous public hearings and the development of a comprehensive training manual.

PROFESSIONAL EXPERIENCE

2014 - Present	Scott Horsley, Water Resources Consultant
2014 - Present	Harvard University, Adjunct Faculty
1986 - Present	Tufts University, Adjunct Faculty
1988 - 2019	Horsley Witten Group, Inc., Founder and President
1984 - 1988	IEP, Inc., Senior Environmental Scientist
1981 - 1984	Cape Cod Commission, Water Resources Coordinator
1979 - 1981	Barnstable County Health Department, Environmental Research Director

PUBLICATIONS

- Erban, Laura, Wigginton, Sara, Baumgaertel, Brian, Horsley, Bryan, McCobb, Tim, Gleason, Tim, Crocker, Zenus, Horsley, Scott 2024, "Reducing wastewater nitrogen loading by >90% with carbon-amended (woodchip bioreactor) septic systems: a field demonstration in Barnstable, (Cape Cod) Massachusetts", Journal of Environmental Management.
- Horsley, S. 2023, "Colorado River Compact – Seven Western States Compete for Water", Harvard Gazette.
- Horsley, S. 2022, Wellfleet Harbor Targeted Watershed Plan, prepared for Town of Wellfleet, MA and approved unanimously by the Select Board, submitted to MADEP for a Watershed Permit.
- Twitchell JH., Mulvaney KK, Hubbell B, Erban LE, Berry W, Chintala MM, Crocker Z, Gleason TR, Horsley S, Munns, Jr. WR, Rea AW, Amith SN, Soto Reves S. 2019 "Solutions-Driven Research Pilot Problem Formulation Workshop: Report and Evaluation ", U.S. Environmental Protection Agency, Office of Research and Development, National Health and Environmental Effects Laboratory, Atlantic Ecology Division, Narragansett, RI, EPA 600-R-19/107.
- Liss, E., Harrigan, K., Horsley, S., 2018 "Marstons Mills Cranberry Bog Wetland Restoration Master Plan", prepared for the Barnstable Clean Water Coalition and the Town of Barnstable in collaboration with The Nature Conservancy.
- Horsley, S., Durant, J., Nugent, K., Goodman, J., Monahan, K., Zhong, Y., Hung, R, 2015 "Urine Diversion – An Opportunity for Nutrient Recycling on Cape Cod", Prepared with a grant from the Kelly Foundation.
- Horsley, S., Perry, E. and Counsell, L, 2016, "Three Bays Estuary Watershed Restoration Plan: A Green Infrastructure Approach, Green Building Journal, Volume 11, No. 2, pp. 22-38.
- Parece, T; Owen, M; Shreve-Bibb, Betsey; Niedzwiecki, Paul; Senatori, Kristy; Perry, Erin; and Horsley, Scott; 2015; Tools to Assist Cape Cod Communities Reach Sustainable Nitrogen Reduction Goals – Technology Matrix and Adaptive Management Practices, Journal of the New England Water Environment Association.
- Horsley, S., 2013, "Low Impact Development – A Climate Adaptation Strategy", Massachusetts Audubon Society Lecture Series.
- Horsley, S., 2011. "Balancing Water Supply Withdrawals, Wastewater Returns and Stormwater Recharge", New England Water Works Association.
- Horsley, S. November 17, 2010. "Building to Code – Protecting Homes in Coastal Floodplains," StormSmart Coasts Program, Massachusetts Coastal Zone Management, Plymouth Town Hall, MA.
- Horsley, S. 2009. "Low-Impact Development: A More Sustainable Approach to Site Design," Association of Massachusetts Wetlands Scientists (AMWS) Newsletter, January 2009.
- Horsley S. 2006. "Planning and Urban Design Standards" American Planning Association; Sections on Water, Hydrologic Cycle; Aquifers, Groundwater Movement and Recharge, Wiley Graphic Standards.
- Horsley, S. 2005. Smart Growth Toolkit, Massachusetts Executive Office of Environmental Affairs, Boston, MA.

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- Horsley, S. 2004. Low impact development strategies: approaches to smart growth, presented to the Annual Meeting of the Massachusetts Association of Land Surveyors and Engineers, Plymouth, MA, September 20, 2004.
- Horsley, S. 2004. Hydrology and groundwater management, in Planning and Urban Design Standards, prepared by the American Planning Association, John Wiley & Sons.
- Horsley, S. 2003. Integrated coastal zone management in the Bahamas, prepared for the Inter-American Development Bank (IDB), Washington, DC.
- Horsley, S. 2002. Groundwater, drinking water and stormwater protection: science and policy, in 2002 National CLE Conference, Environmental and Land Use Law, Law Education Institute, Steamboat, Colorado, January 4-9, 2002.
- Horsley, S. 2000. Stormwater Management, in Proceedings of the 19th Annual Pacific Islands Conference, Protecting Our Environmental Island Style: Success Stories, Continuing Challenges, Realistic Solutions, June 20-23, 2000, American Samoa.
- Horsley, S. 1997. Watershed '97 Conferences. The StormTreat System: An Innovative Stormwater Treatment Technology, Baltimore, MD.
- Horsley, S. and J. Witten. 1997. Tools for Watershed Protection, US Environmental Protection Agency.
- Horsley, S. and J. Witten. 1996. Coastal Watershed Protection: Tools for Local Governments, prepared under contract to U.S. EPA.
- Horsley, S. 1994. Septic Systems and Coastal Water Quality - Technical Assistance Document, U.S. Environmental Protection Agency.
- River Basin, prepared by CME Associates, Inc. for the New England River Basins Commission.
- Horsley, S. 1992. Buttermilk Bay – A Case Study: Nitrogen Loading Assessment, presented to U.S. EPA-sponsored Nitrogen Loading Workshop at the University of Rhode Island, Graduate School of Oceanography.
- Horsley, S. and J. Moser. 1990. Monitoring Ground Water for Pesticides at a Golf Course-A Case Study on Cape Cod, Massachusetts, National Water Well Association Ground Water Monitoring Review.
- Horsley, S. 1990. Nantucket Water Resources Management Plan—A Case Study, Key Note Paper, National Water Well Association, Eastern Regional Ground Water Conference.
- Horsley, S., S. Roy, and M. Nelson. 1990. Golf Courses and Water Quality. Seminars.
- Nelson, M., S. Horsley and S. Roy. 1990. Delineation of Aquifer vs. Wellhead Protection Areas, National Water Well Association—National Convention Association of Ground Water Scientists and Engineers.
- Horsley, S. and J. Witten. 1989. Aquifer Protection. Horsley & Witten, Inc. Seminars.
- Cambareri, T., M. Nelson, S. Horsley, M. Giggey and J. Pinette. 1989. Solute Transport - A Simulation of Non-Point Source Nitrogen Impacts to Ground Water and Calibration of A Predictive Analytical Model. Accepted for publication with National Water Well Association, Proceedings - Solving Ground Water Problems with Models, Indianapolis, Indiana.
- Nelson, M., S. Horsley, T. Cambareri and M. Giggey. 1988. Predicting Nitrogen Concentrations in Ground Water - An Analytical Model, in Proceedings of the FOCUS Conference on Eastern Regional Ground Water Issues, National Water Well Association, Stamford, Connecticut.
- Horsley, S. and J. Witten. 1988. Land Planning and Development in Massachusetts, Horsley & Witten, Inc. Seminars.
- Horsley, S. and J. Witten. 1988. Comprehensive Permits for Affordable Housing Development in Massachusetts. Horsley & Witten, Inc. Seminars.
- Horsley, S. and J. Witten. 1988. Small Sewage Treatment Plants (Package Plants). Horsley & Witten, Inc. Seminars.
- Horsley, S. and J. Witten. 1988. Land Development in the Coastal Zone: Impacts Upon Water Quality, Horsley & Witten, Inc. Seminars.
- Kerfoot, W. and S. Horsley. 1988. Private Well Protection, Informational Bulletin No. 10 Association for the Preservation of Cape Cod.

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- Horsley, S. and J. Witten. 1986. The Town of Duxbury, Massachusetts, Aquifer Protection Plan: A Case Study in Innovative Water Quality
- Blackmar, D., S. Horsley, L. Segal and Wolfe. 1984. Results of a Regional Household Hazardous Waste Collection Program, in Hazardous Waste Journal, Mary Anne Liebert Publishers, New York, Vol. I, Number 1.
- Horsley, S. 1983. Delineating Zones of Contribution for Public Supply Wells to Protect Groundwater, in Proceedings of the National Water Well Association Eastern Regional Conference of Groundwater Management, Orlando, Florida.
- Horsley, S. 1983. Regional Ground Water Management Needs for Cape Cod, Massachusetts. Prepared by Cape Cod Planning and Economic Development Commission for the United States Environmental Protection Agency.
- Horsley, S. 1982. Beyond Zoning, Municipal Ordinances to Protect Ground Water, in Proceedings of the Sixty National Groundwater Symposium, National Water Well Association, Atlanta, Georgia.
- Magnuson, P. and S. Horsley. 1981. Comprehensive Water Resources Monitoring Program for Cape Cod. Prepared by Cape Cod Planning and Economic Development Commission for the United States Environmental Protection Agency.
- Cheney, P. and S. Horsley. 1980. Nonstructural Flood Plain Management Planning in the Connecticut River Basin, New England River Basins Commission.

From: Dudley, Brian (DEP) brian.dudley@state.ma.us
Subject: FW: Groundwater Discharge Permit Regs in TMDL watersheds
Date: November 7, 2018 at 9:54 AM
To: Scott Horsley shorsley@horsleywitten.com
Cc: Chubb, Marybeth (DEP) marybeth.chubb@state.ma.us

BD

Hi Scott,

Marybeth asked me to get back to you on your question.

314 CMR 5.06(1): The Department will not issue a permit...if the discharge will cause or contribute to a violation of...Massachusetts Surface Water Quality Standards...

Since TMDLs (or even an MEP report or other study documenting impairment) indicates a violation of the SWQSs, MassDEP considers that the additional load will contribute to a further violation of the SWQSs; therefore, the Department cannot issue a permit unless that additional load is mitigated to a net zero nitrogen discharge or a reduction in nitrogen loading to the impaired resource.

I hope that addresses your inquiry. Please let me know if you need anything else.

Thanks,
Brian

From: Scott Horsley <shorsley@horsleywitten.com>
Sent: Wednesday, November 7, 2018 7:42 AM
To: Chubb, Marybeth (DEP)
Subject: Groundwater Discharge Permit Regs in TMDL watersheds

Marybeth: I am aware that MADEP requires net 0 impact (no net increase in nitrogen loading) for new wastewater treatment plant facilities within TMDL watersheds for impaired (Nitrogen) estuaries on Cape Cod. What/where is the regulatory requirement for this? Thanks. Scott

Scott Horsley
Principal
Horsley Witten Group, Inc.
www.horsleywitten.com

508-364-7818