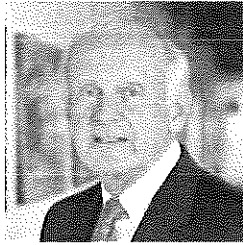


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# Michael D. Giggey, PE

SENIOR VICE PRESIDENT

Project Assignment: Nutrient Management Expert

LAND USE DEPARTMENT

## Role Description and Experience Summary

**Mike will serve as our Nitrate Loading Technical Expert for this project.** In that role Mike will be the lead reviewer of the developer's nitrogen loading calculations and the primary interface with the Town staff and Planning Commission. Mike's 46 years of engineering experience have covered virtually every aspect of environmental engineering, including planning, design, construction, operation and dispute resolution. His particular focus for the past 20 years has been in nutrient management:

- **Watershed Protection:** He has been involved in dozens of projects evaluating the magnitude of nutrient threats to groundwater and surface water quality, and in formulating mitigation plans.
- **Decentralized wastewater management:** He has conducted needs assessments and developed options for unsewered areas of over 20 municipalities.
- **Emerging technologies for nitrogen management:** He has analyzed or designed a wide range of new technologies, including constructed wetlands, fertigation, shellfish harvesting, PRBs and on-site denitrification.
- **Effluent disposal and reuse:** His expertise covers traditional subsurface disposal and rapid infiltration, as well as drip dispersal, wicks, and deep wells.
- **Costs for wastewater management:** He has been a leader in the field of fairly assessing life cycle costs for decentralized wastewater systems.

Mike frequently speaks at regional and national conferences, having prepared over 40 papers or presentations. He is often called upon for expert services in dispute resolution. He regularly volunteers his time to participate on industry task forces related to technology assessment and regulatory matters.

## Relevant Project Experience

### Boards of Health, Cape Cod

Developed nutrient loading regulations and ordinances for several communities and provided third-party review of dozens of developer proposals. Assessed proposed mitigation plans for controlling nitrate loading.

### Comprehensive Wastewater Management Plan, Orleans, MA

Served as principal-in-charge for the development of a comprehensive wastewater management plan for this town of 7,000 people. Conducted detailed needs assessment for 5,700 unsewered parcels. Evaluated 20 potential effluent disposal sites and all available treatment technologies, for decentralized systems. Prepared a cost model to compare centralized and decentralized wastewater management options and led an intensive public consultation process.

### Education

M.S., Environmental Engineering, Stanford University

BS, Civil Engineering, Tufts University

### Professional Registration

Maine  
Connecticut  
Massachusetts  
New Hampshire

### Experience

46 Years

### Joined Firm

1978

### Professional Affiliations

New England Water Environment Association  
Water Environment Federation  
National Groundwater Association  
American Water Resources Association

### Publications/Presentations

Giggey, M.D., Dudley, B., Ridley, C., "A Watershed Permit to Facilitate Nitrogen Management in Cape Cod's Pleasant Bay," New England Water Environment Association, January 2019

Giggey, M.D., Leonard, E., "A Better Mousetrap? Evaluating Non-Traditional Nitrogen Control Measures for Cape Cod and the Islands", New England Water Environment Association, January 2017

Giggey, M.D., "How Can Martha's Vineyard Towns Incorporate Non-Traditional Approaches into Their Nitrogen Management Plans?", MVC Innovation Conf, May 2016

Giggey, M.D., Hoyt, J., "Drip Dispersal of Wastewater Effluent Finds Uses in New England", *New England Water Environment Association Journal*, Fall 2014

Giggey, M.D., Ridley, C., "Managing Growth in Nitrogen-Sensitive Watersheds Can Reduce Cape Cod Wastewater Infrastructure Costs", *New England Water Environment Association*, January 2014

Giggey, M.D., "Managing Nitrogen Loads in Coastal Embayments: The Benefits and Hurdles of Watershed-Based Solutions", *New England Water Environment Association*, January 2011

Leonard, E., Giggey, M.D., "Managing the Cost of Future Growth to Ensure the Sustainability of Small Wastewater Systems", *New England Water Environment Association*, September 2010

Giggey, M.D., "Can Decentralized Systems Save Money? Comparing the Costs for Individual, Cluster, Satellite and Traditional Centralized Wastewater Management", *New England Water Environment Association*, January 2009

Giggey, M.D., "Cluster Systems: A Decentralized Approach to Enhanced Wastewater Management", presented at Wastewater Workshop Series, Waquoit Bay National Estuarine Research Reserve, Mashpee, Massachusetts

#### **Comprehensive Water Resources Management Plan, Sandwich, MA**

Served as principal-in-charge in the development of a management plan to protect coastal embayments and freshwater ponds, while allowing economic growth.

#### **Targeted Nitrogen Plan and Watershed Permit, Pleasant Bay, MA**

Served as technical advisor to the Pleasant Bay Alliance in the formulation of a composite wastewater plan for 7,300 unsewered parcels. Reviewed the wastewater plans prepared by four towns in the watershed to identify gaps and overlaps to ensure that nitrogen removal will address the 18 applicable TMDLs. Prepared a targeted plan and assisted the Alliance obtain the first-ever MassDEP watershed permit. Undertaking an analysis of options for nitrogen credit trading.

#### **Regional Wastewater Management Plan, Barnstable County, MA**

Provided technical input to the Cape Cod Commission for its regional wastewater management plan to cover 115,000 developed parcels, only 15% of which are sewerage. Prepared cost models to compare small-scale and large-scale wastewater systems and led a task force that issued the 2010 report *Comparison of Costs for Wastewater Management Systems Applicable to Cape Cod*. Advised in the updating of the Water Resources Technical Bulletin including nitrate loading formulas.

#### **Evaluation of Decentralized Wastewater Options, Old Saybrook, CT**

Serving as technical advisor in a study that compares a 240,000-gpd public satellite wastewater treatment plant with the upgrading of 1,960 existing septic systems along Long Island Sound. Developed detailed cost model for on-site denitrification systems considering premature replacement due to sea level rise. Identified and evaluated diverse sites for effluent disposal to the land.

#### **Regional Wastewater Management Plan, Martha's Vineyard, MA**

Led Wright-Pierce's work for the Martha's Vineyard Commission in support of a regional wastewater management plan. Prepared a cost model to compare centralized and decentralized options for 14,000 parcels. Identified and evaluated a large number of non-structural options to reduce the cost of wastewater and nutrient management in areas where conventional sewerage is not feasible.

#### **Wastewater Treatment System and Effluent Reuse, Plymouth, MA**

Served as principal-in-charge of Wright-Pierce's work for a developer related to a satellite wastewater treatment system at a residential community. Conceived and permitted a system of groundwater recovery downgradient from the effluent disposal basins to allow reuse of water and nutrients at the project's golf course.

#### **Watershed Protection Study, Raba River Watershed, Krakow, Poland**

Provided technical oversight for a watershed study that recommended low-pressure sewer systems and decentralized treatment facilities to eliminate hundreds of septic systems in the watershed of the regional water supply.

#### **Sanitation Study, Nyanza Province, Kenya**

Served as technical advisor for a sanitation study of three communities in the Lake Victoria watershed. Recommended new and improved wastewater and water facilities to serve thousands of un-served or poorly served homes and businesses.

Date: **December 28, 2022**

Project No.: **T17143**

To: **Groton Utilities**

From: **Mike Giggey, PE**

Subject: **Avery Brook Homes Subdivision, Ledyard CT  
Initial Review of Water Quality Impacts**

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### **Introduction**

Avery Brook Homes, LLC has proposed a 26-home subdivision to be located off Stoddards Wharf Road in Ledyard, within the watershed of Groton Utilities. This memorandum presents Wright-Pierce's initial comments on water quality concerns related to this project, in light of the need for a preliminary technical review before a planned January 3, 2023 meeting of the Inland Wetlands and Watercourses Commission. It is understood that Wright-Pierce's initial observations will be supported by more complete review, a site visit and more detailed analyses, all after that meeting.

### **Project Description**

The developer proposes to combine several previously established lots and then to re-subdivide the parcel to allow the construction of 26 three-bedroom homes on a paved access road. Each home is to be served by an individual private well and an individual septic tank and leaching system.

The project is located in the far northerly portion of the Groton Utilities watershed, just south of Billings Avery Reservoir and just north of Great Brook. Great Brook enters Rosemond Lake (the northern portion of Morgan Reservoir) about 2,000 feet south of the project. The developer has provided no information on water table contours across the site or the direction of groundwater flow, but it is likely that contamination from the proposed septic systems will quickly enter the surface waters in this area, all part of the drinking water supply system that serves Groton, Ledyard and adjacent communities.

From information submitted by the developer, we understand that soils in this area are predominately sandy loams whose high permeabilities allow relatively small leaching systems. The site is relatively flat at elevations between 150 and 160 feet above sea level. Billings Avery Reservoir, to the north of the site, has a typical water surface of about 132 feet, and Great Brook enters Rosemond Lake at approximate elevation 130.

The site vicinity is relatively rural. There are approximately 5 to 10 nearby homes along Stoddards Wharf Road, all served by private wells and individual septic systems. Stoddards Wharf Road is also State Route 214.

### **Water Quality Concerns**

We have several concerns related to the water quality impacts of the proposed project, as follows:

### **Nitrogen Loading to the Watershed**

It is a widely-used planning guideline that nitrogen loading in a water supply recharge area should be such as to create average recharge nitrogen concentrations no higher than 5 mg/l as nitrate nitrogen. We applied a standard nitrogen loading model to this project and determined that the development would add about 700 pounds of nitrogen to the groundwater annually. This is equivalent to an average recharge concentration of approximately 10 to 12 mg/l, about twice the industry standard. Note that the federal drinking water standard is 10 mg/l.

Nitrates are a concern in and of themselves, but septic-system-derived nitrates are a good indicator of other sewage-related contaminants. Nitrates and other sewage-related contaminants will have very short travel time to enter Billings Avery Reservoir.

### **Nitrogen Contamination in Private Wells**

When unsewered residential projects are to be served by individual on-site wells, it is appropriate to limit the housing density to less than one bedroom per 10,000 square feet of lot area. This project includes 78 bedrooms on about 8 acres, or about 2.2 bedrooms per 10,000 square feet. At this density, high nitrates, as well as other contaminants, would be expected in private wells over time. This concern extends to both the new wells for this project, and existing wells in the vicinity.

### **Persistent Organics Reaching Wells and Surface Waters**

Personal care products, pharmaceuticals and other persistent organic compounds can be expected to reach the groundwater from septic systems. These pose a long-term threat to water quality, both in the private wells and in the public drinking water supply.

### **Stormwater Contaminants Reaching the Regional Water Supply**

While a simple sedimentation basin is proposed to capture some sediments in site runoff, it should be expected that this project will contribute contaminants to the nearby surface waters, including pesticides and herbicides associated with lawn care, sodium from road salting, and pet wastes.

### **Conclusion**

There are three critical factors that influence the water quality impacts of this project:

1. Proximity to Groton's drinking water supply
2. Use of private septic systems, and
3. Use of private wells

While a dense 26-lot subdivision can be environmentally acceptable when public water is available and public sewers can remove sewage-related contaminants from the vicinity, such a project is not appropriate when on-site wells and septic systems are proposed and the project is in close proximity to a public water supply.