

# Monitoring Maravista on the Mend: USGS and EPA study the effects of sewerage



Since 2016, the US Geological Survey (USGS) has partnered with EPA's Southeast New England Program (SNEP) and Office of Research and Development (ORD) to conduct a unique monitoring effort beneath the Maravista neighborhood, a densely populated coastal peninsula in Falmouth, MA on Cape Cod. The first of its kind in the SNEP region, the Maravista study seeks to track the before-and-after effects of sewerage on groundwater quality. Nitrogen loading to embayments and subsequent eutrophication pose one of the most pressing environmental challenges faced by SNEP communities, and septic systems and cesspools are the largest controllable sources of this nutrient pollution. As local communities consider making the leap to invest in municipal sewerage, it is increasingly important to develop an understanding of the transport and fate of wastewater constituents before and after such conversions.

Researchers in Falmouth are doing just that. The Little Pond Sewerage Project hopes to improve water quality in the Little and Great coastal saltwater ponds by providing new sewer connections for over 1400 local homes. The Maravista study area focuses on the highest housing density in the community, encompassing 225 homes spanning seven streets along Maravista Avenue. Sewer connections were made available in Spring 2017 and most of the 225 homes were connected by June 2019. The key objective of the study is to create a monitoring network to assess baseline groundwater quality prior to sewerage and evaluate the impacts of sewerage on the reduction of nutrient loading to coastal ponds.



Photo courtesy of USGS

What is the spatial and temporal distribution of groundwater below a typical coastal neighborhood? How long will it take after sewerage for decreases in nutrient loads to be evident? To answer these questions, the research team has characterized sediment core and installed 18 monitoring wells and 14 multilevel samplers to monitor concentrations of nitrogen and contaminants of emerging concern such as pharmaceuticals and artificial sweeteners. Additional field parameters monitored by the project include specific conductance, dissolved oxygen, pH, and temperature. Sampling at all sites occurs annually and two sites are sampled quarterly to monitor changes.

# Monitoring Maravista on the Mend: USGS and EPA study the effects of sewerage (continued)



Using groundwater-flow modeling to simulate the travel time of nutrients from the water table to the coastal ponds, researchers determined that homes near the peninsula center may see travel times of over 10 years, indicating that changes could be seen in around 10 years. Even so, after the full conversion to municipal sewerage in 2019, the study is beginning to see initial changes in geochemistry at certain sites.

Data transparency has been a crucial component to this research and sampling results are regularly updated on the [USGS Maravista study page \(https://www.usgs.gov/centers/new-england-water/science/assessment-hydrologic-and-water-quality-changes-shallow?qt-science\\_center\\_objects=4#qt-science\\_center\\_objects\)](https://www.usgs.gov/centers/new-england-water/science/assessment-hydrologic-and-water-quality-changes-shallow?qt-science_center_objects=4#qt-science_center_objects). In return, the Falmouth Water Quality Management Committee has maintained regular engagement with the study and has expressed interest in helping to advocate and maintain funding for continued monitoring in the years to come.

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