

Analysis of Groundwater Quality of Shelter Island, Suffolk County, New York

Shirley Chen^{1,2}, Irene J. Fisher¹, Pengfei Zhang²

1 USGS New York Water Science Center, Coram, NY

2 The City College of New York, New York, NY

The sole source of freshwater for Shelter Island is a shallow water-table aquifer, which provides for about 2,500 residents yearlong and a summer population of over 8,000. There is concern that this aquifer is being affected by onsite-wastewater disposal systems, similar to other shallow-water supplies on Long Island. Since 2016, the aquifer has been monitored for nutrients and contaminants of emerging concern (CEC) (pharmaceutical and waste-water compounds) to improve management of this water resource. This monitoring is essential to aid the Shelter Island Water Advisory Committee to understand the effects of current onsite wastewater disposal systems and evaluate future improvements to these systems.

Water samples collected from monitoring wells (n=8) during the fall of 2018 were analyzed for CECs to provide information on current contamination levels and possible new areas of concern. Sampling locations were selected based on available hydrologic data, land use, population size, areas targeted for water-quality improvement programs, areas lacking water-quality data, and input from the Shelter Island Water Advisory Committee. These data, along with CEC data available from three wells in 2016 and three additional wells in 2017 were also used to evaluate the current groundwater quality conditions in Shelter Island.

Results of samples collected from 2016-2018 show that the water quality can be divided into three groups based on total nitrogen levels that correspond to differences in CEC detections: 1) the Low Nitrogen group includes samples with less than 1 milligram per liter of total nitrogen and few to no CECs detected; 2) the Medium Nitrogen group includes samples with total nitrogen concentrations between 1 and 13 milligrams per liter and some CECs detections; 3) the High Nitrogen group includes samples with a total nitrogen concentration greater than 13 milligrams per liter and many CEC detections. The total number of CEC detections per well ranged from 0 to 29. Low Nitrogen samples were collected from areas with residential land use, Medium Nitrogen samples are generally collected in more densely populated areas, and High Nitrogen samples were collected downgradient of multiple commercial properties. These findings indicate that higher nutrient levels correlate with a greater number of detections of CECs and a growing population may further degrade water quality.