



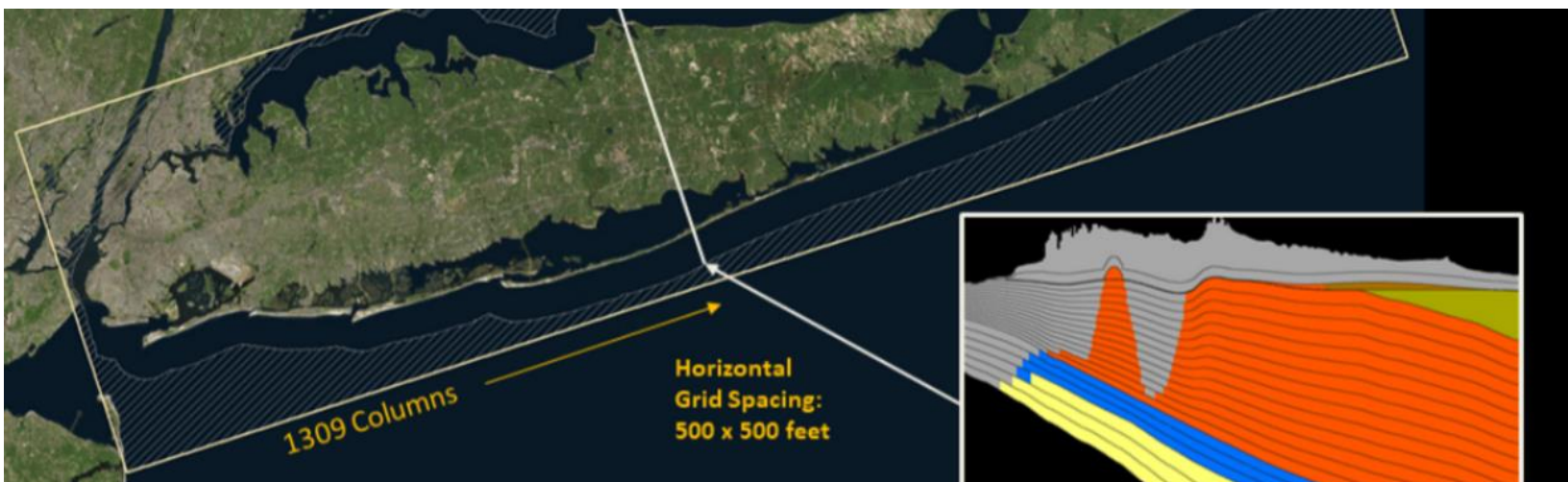
Department of
Environmental
Conservation



LONG ISLAND GROUNDWATER SUSTAINABILITY STUDY PROGRESS REPORT

Project Status for the Period of January – June, 2018

June 8, 2018



Executive Summary:

The USGS began a multi-year investigation in October of 2016 in cooperation with the NYSDEC to assess the groundwater sustainability of the Long Island aquifer system. This investigation consists of two primary components: hydrogeologic framework mapping and groundwater flow-modeling.

Hydrogeologic Framework Mapping:

The hydrogeologic framework component will provide updated hydrostratigraphic surfaces and unit extents, building upon the last regional framework update of the Long Island aquifer system performed by the USGS in 1990. As part of this update, a network of new groundwater wells will be installed at about 25 locations in the Lloyd and Magothy aquifers throughout the Island to fill in substantial data gaps.

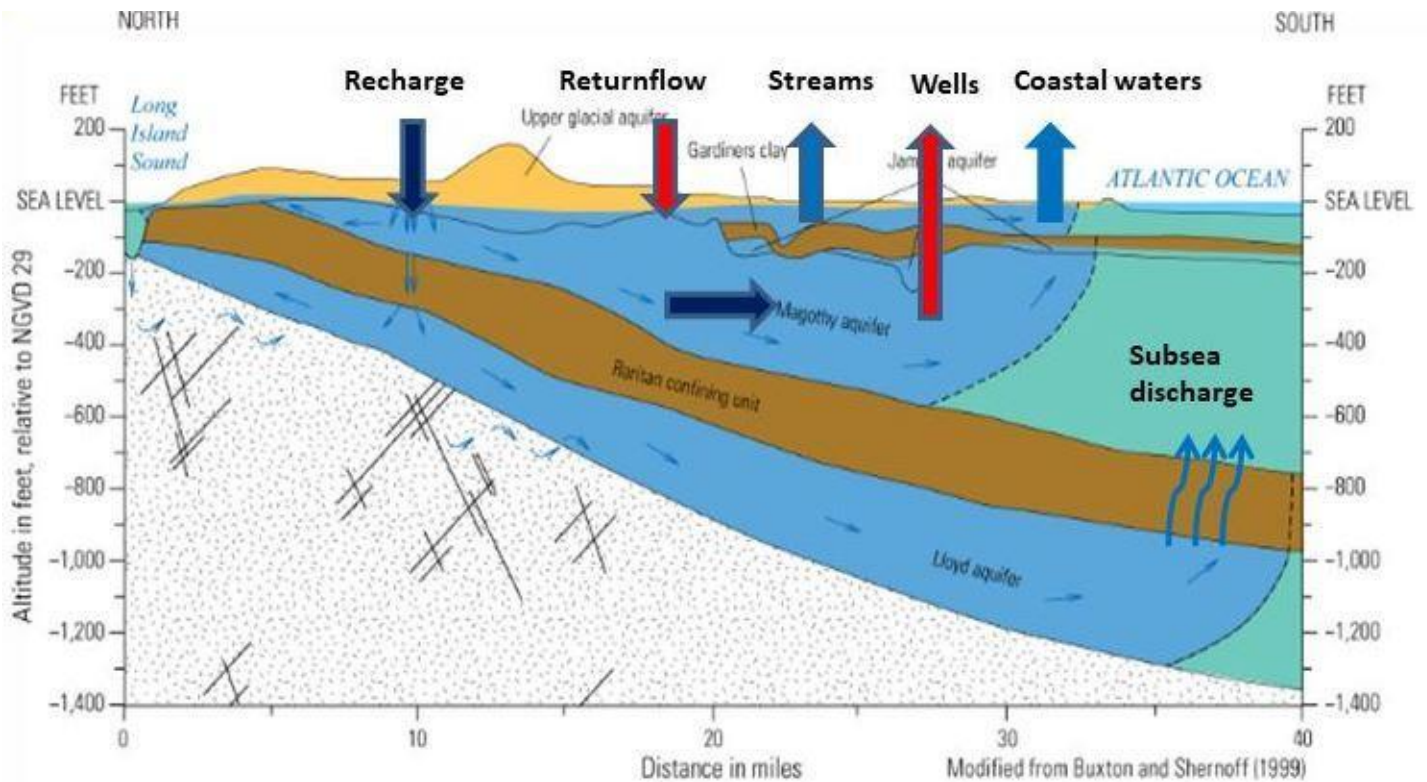
The locations of the proposed groundwater wells will be selected by reviewing geologic, hydrologic, and water-quality information from the existing observation network. During and after completion of the newly drilled wells, lithologic core samples will be collected and analyzed to improve the understanding of the hydrogeologic framework. Borehole-geophysical logging techniques will also be used to provide additional information on the geology as well as aquifer salinity as part of the saltwater-interface mapping component of the investigation.

As part of this component, borehole-geophysical logs will be collected at existing and newly installed wells and surface-geophysical soundings using Time-Domain Electromagnetic (TDEM) technology will be conducted at selected inland locations considered most susceptible to saltwater intrusion to delineate the seaward extent of freshwater throughout the Long Island aquifer system.



Progress:

- (1) Drilling: Drilling is anticipated to begin this fall.
- (2) Borehole Geophysics: Analysis of several decades of EM conductivity logs at outpost wells is underway. Estimation of the rates of saltwater intrusion has been completed for many of these wells in northern Nassau County. Geophysical logs collected in September and November, 2017 at a known upconing site in Jamesport were analyzed for any changes in the saltwater interface.
- (3) Surface Geophysics: A total of 11 TDEM sounding sites collected in Queens and Nassau Counties were processed and analyzed. Shallow, Intermediate, and Deep isochlors were mapped using these 11 sites along the southwestern part of Nassau County and eastern Queens County for use in the groundwater model. Four TDEM sites were collected in East Hampton and 3 TDEM sites were collected in Riverhead. A total of 14 TDEM sites collected in Riverhead and East Hampton were processed and analyzed. In addition, 22 TDEM sites collected on Shelter Island were also processed and analyzed. An elevation of the saltwater interface on Shelter Island was completed and contoured along with a 2D cross section.



Groundwater Modeling:

A three-phased modeling approach will be used to simulate groundwater-flow conditions throughout the Long Island aquifer system that will include (1) an initial model based on existing information for current (2005–2015) average conditions, (2) the addition of time-varying stresses to simulate changes in hydrologic conditions from (1900–2015), and (3) a final model that incorporates the new interpretation of the hydrogeologic framework and salinity distribution into the model simulations. The final model will be used to simulate various scenarios, including changes in groundwater withdrawals, aquifer-recharge management, and climate change. These scenarios will be developed in collaboration with the New York State Department of Environmental Conservation and the project steering committee.

Progress:

- (1) Hydrologic stresses: Groundwater pumping and aquifer recharge rates have been developed for the 1900 – 2015 period.
- (2) Isochlor delineation: The seaward extent of freshwater as defined by the 5,000 – 10,000 ppm contours have been incorporated into three-dimensional model space to assign the boundary between fresh and saline groundwater.
- (3) Hydraulic properties: Hydraulic conductivity values have been distributed throughout the 25 model layers based on the values determined by the texture model approach to relate lithologic borings to hydraulic properties for the deep lithologic borings throughout the island.
- (4) Model calibration: 25-layer model is being calibrated for the 2005–2015 average, steady-state conditions.



Another Deep TDEM sounding Wading River, NY (June, 2018)

Outreach:

- (1) **Meeting with the Town of Shelter Island:** April 16, 2018, Fred Stumm presented his analysis of 22 TDEM soundings used to determine the depth to the saltwater interface on Shelter Island.
- (2) **Seminar on the Application of Surface and Borehole Geophysical Methods SUNY New Paltz,** May 2, 2018, Fred Stumm gave a seminar to hydrogeology majors on the use of surface and borehole geophysical methods.
- (3) **Protect Our Aquifer Day Summits:** May 3-4, 2018 – Fred Stumm presented latest findings on saltwater intrusion.
- (4) **Meeting with the Suffolk County Soil and Water Conservation:** May 21, 2018, Fred Stumm presented preliminary results of TDEM to the Farm Bureau, and Cornell Cooperative Extension to discuss the TDEM saltwater mapping in Riverhead.

Products:

- (1) Project website has been updated:

[USGS-NYSDEC Long Island Groundwater Sustainability Study](#)

- (2) USGS Scientific Investigations Report (SIR) on the regional isochlor delineations for the Long Island aquifer system in preparation.

Plans for next period:

- (1) Begin drilling monitoring wells in Nassau and Queens Counties.
- (2) Continue to fill in gaps with TDEM soundings and develop a depth to bedrock relation using the Horizontal to Vertical Seismic Resonance method for Long Island.
- (3) Complete calibration of the 25-layer groundwater model
- (4) Develop list of potential scenarios to be explored for time varying pumping and recharge stresses for the 1900–2015 period.



Deep TDEM sounding Wading River, NY (June, 2018)