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Overview of the Hydrogeologic Framework Activities

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Delineation of the Hydrogeologic Framework and Saltwater-Freshwater Interface and Determination of Water-Supply Sustainability of Long Island, NY

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In cooperation with
New York State Department of Environmental Conservation

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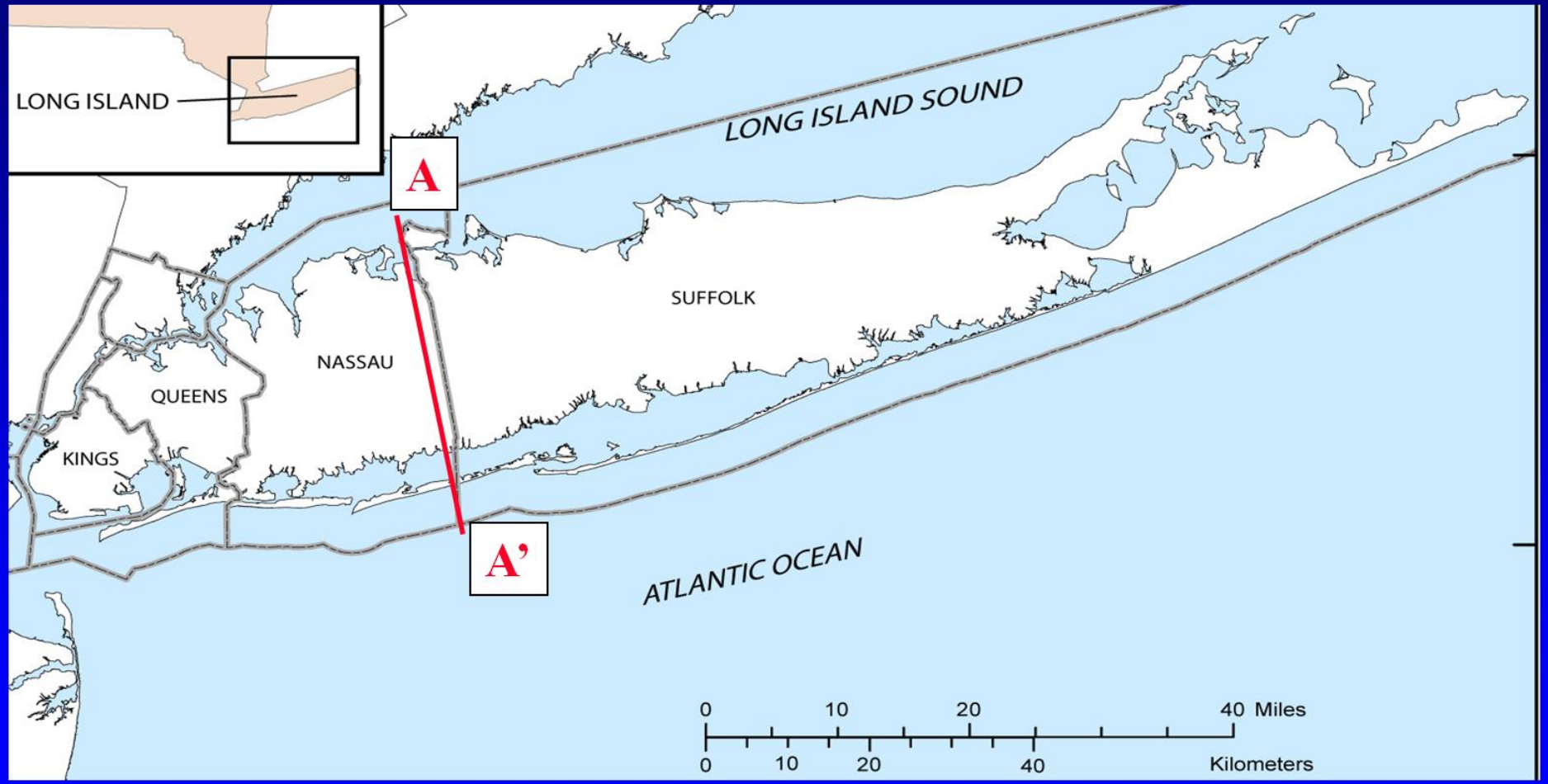
Objectives

- Drill a network of saltwater intrusion outpost wells throughout Long Island. No island-wide well network currently exists.

- Map the hydrogeologic framework of the major aquifers and confining units underlying Long Island.

- Determine the current location, thickness, and chloride concentration of the saltwater-freshwater interface.

- The new hydrogeologic framework and location of the saltwater interface is critical to constraining the new groundwater flow model. Without the new wells less confidence in model predictions.


LONG ISLAND
LONG ISLAND SOUND
A
A'
SUFFOLK
NASSAU
QUEENS
KINGS
ATLANTIC OCEAN
0 10 20 40 Miles
0 10 20 40 Kilometers

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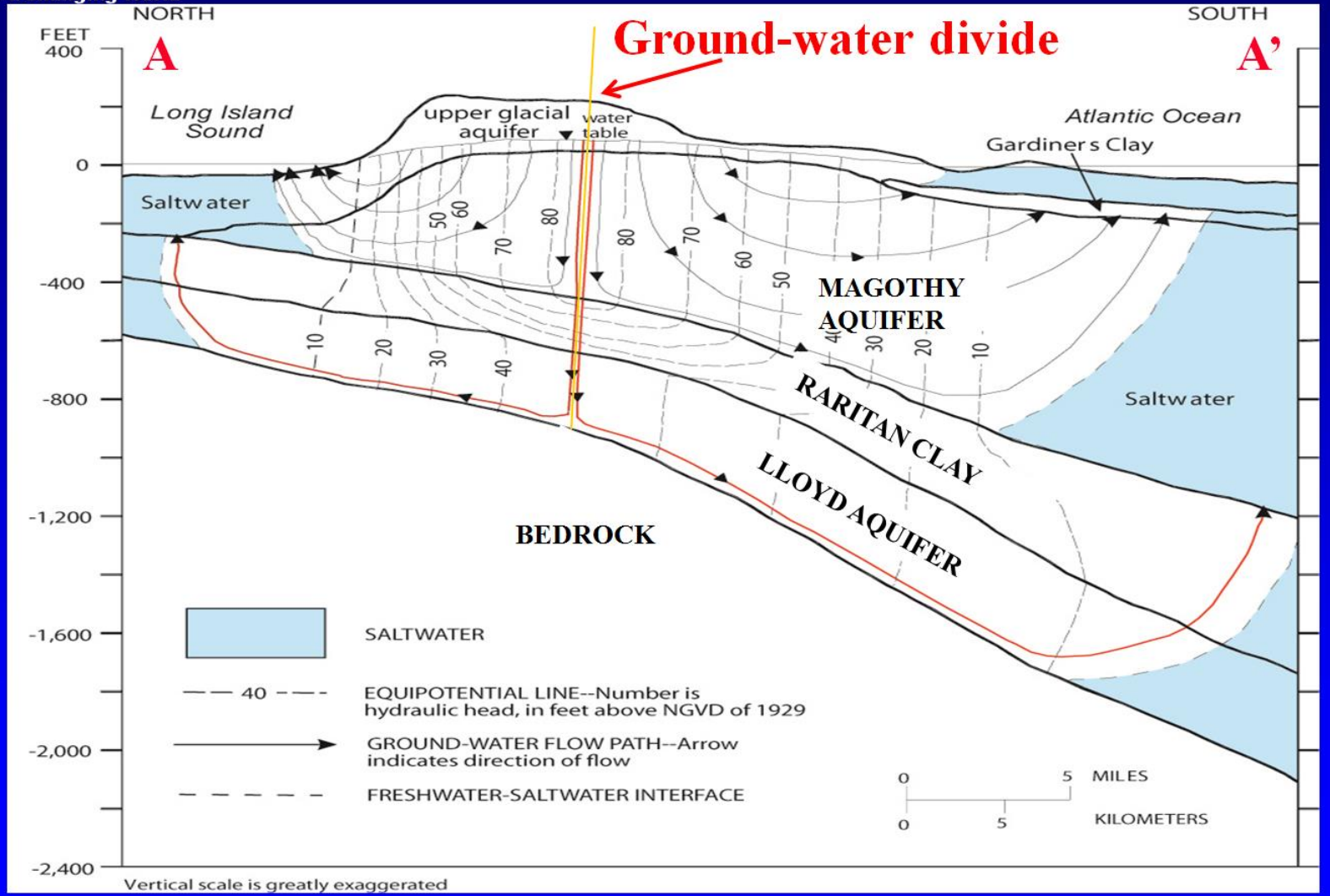
Long Island's Aquifers



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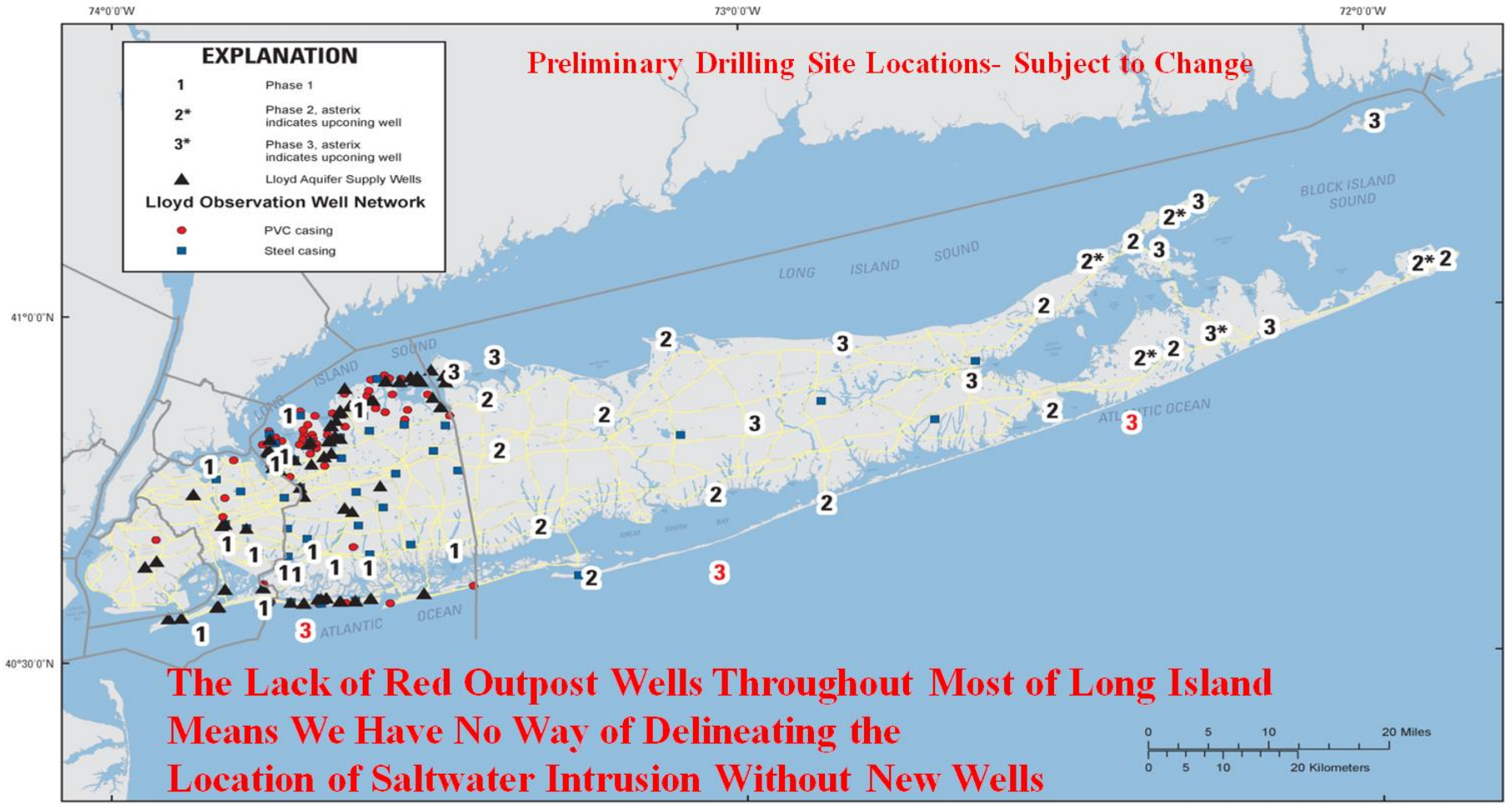
Proposed Well Drilling Locations



The Lack of Red Outpost Wells Throughout Most of Long Island Means We Have No Way of Delineating the Location of Saltwater Intrusion Without New Wells

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USGS First Outpost Well Drilling

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Borehole Geophysical Logging

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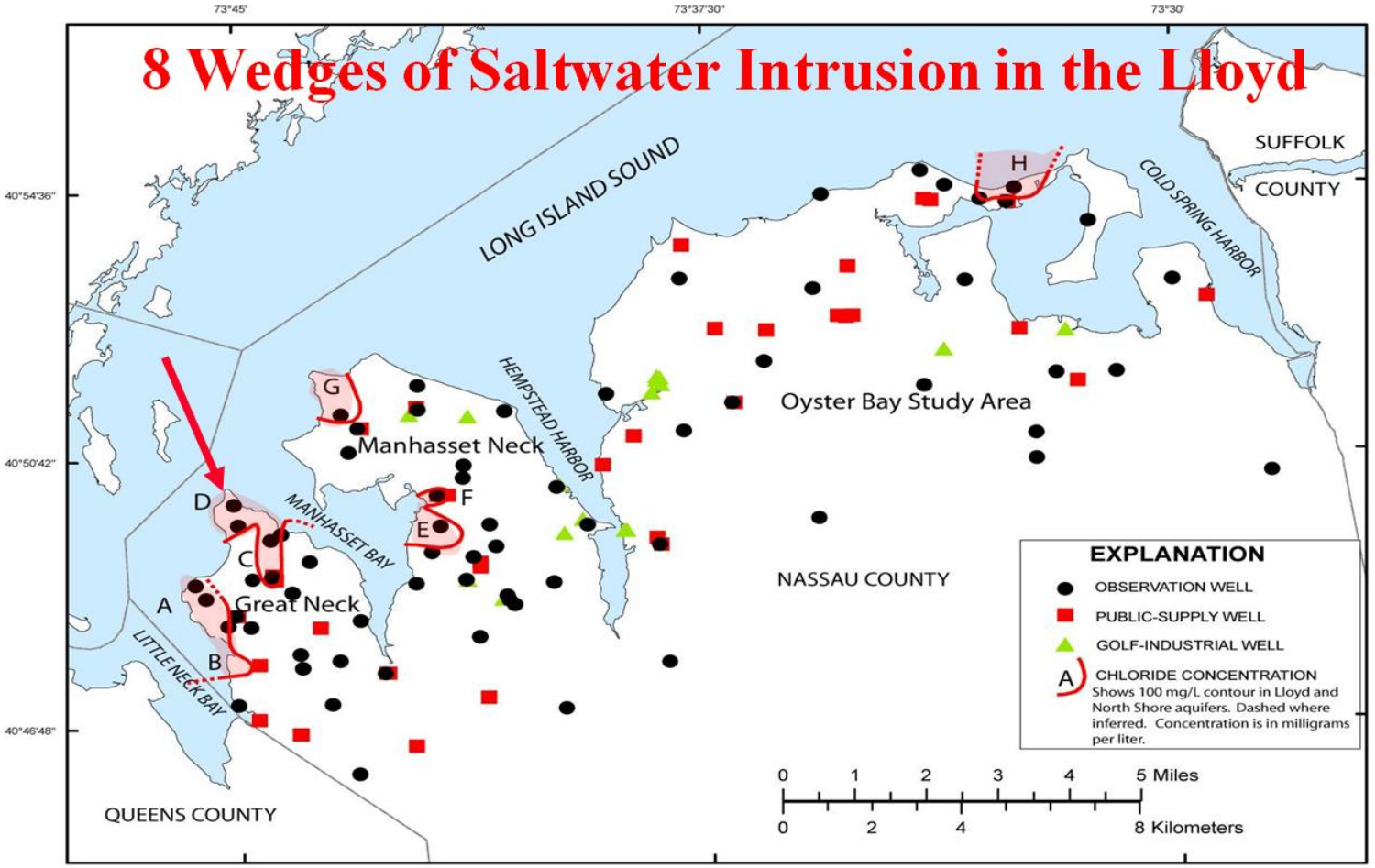
1991-97 56 Boreholes Drilled by NCDPW



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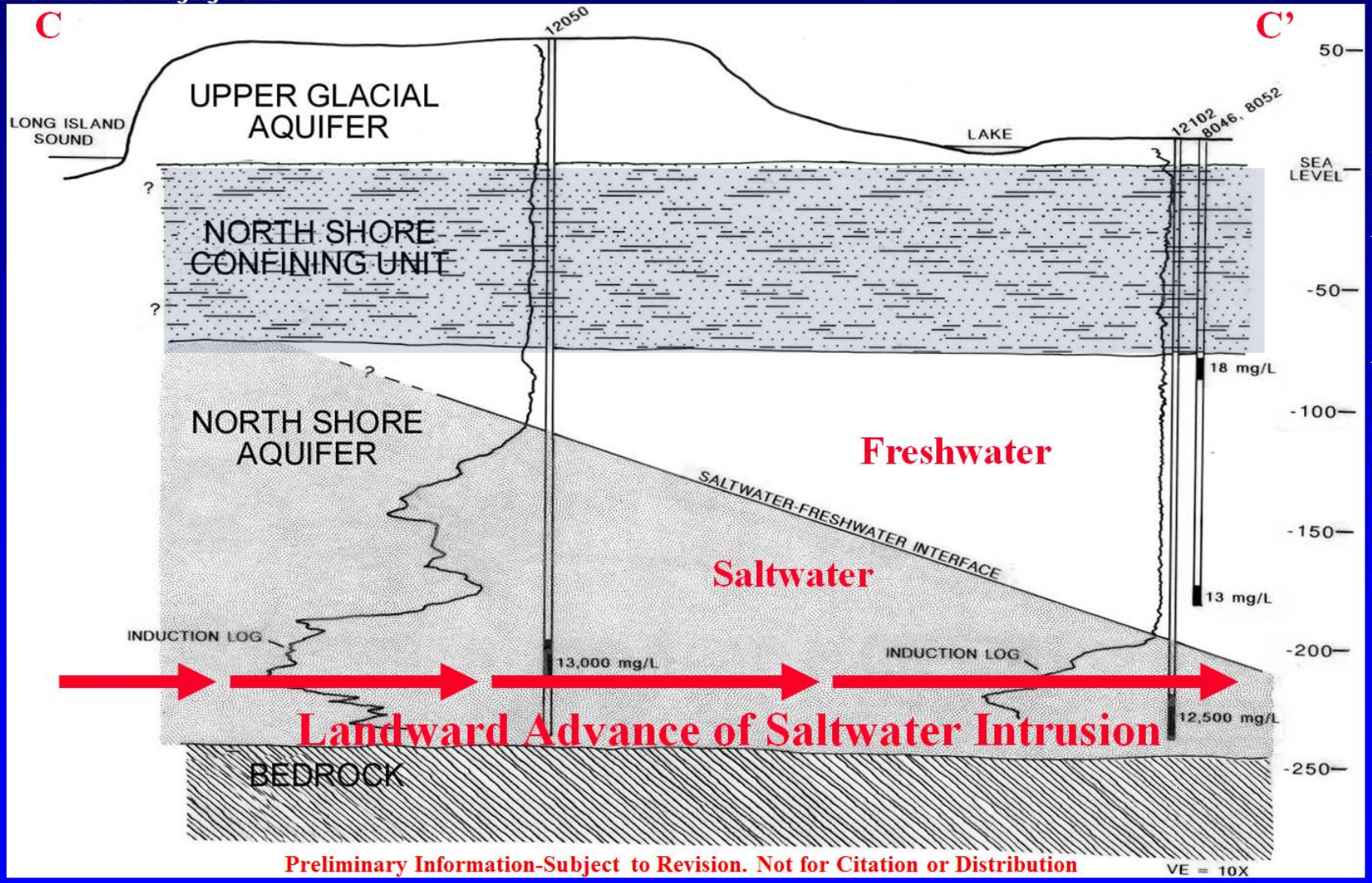
Active Saltwater Wedge in Great Neck



Public Supply Wells Inland Lower Water Levels Below Sea-Level Causing Intrusion

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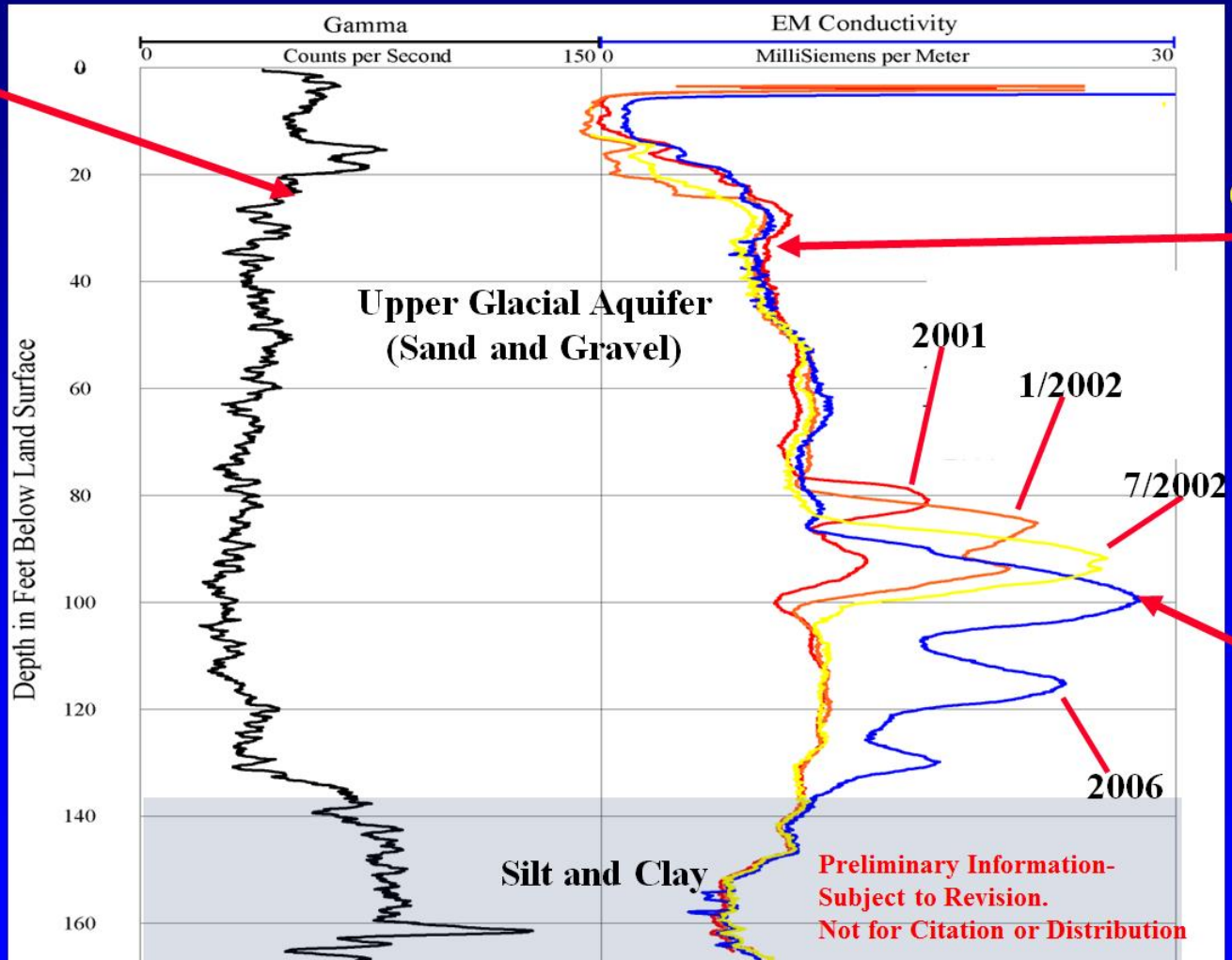
Monitoring Changes in a Road Salt Plume Over Time Using EM Conductivity Logs



Gamma Log

Conductivity Log

Roadsalt Plume Migration

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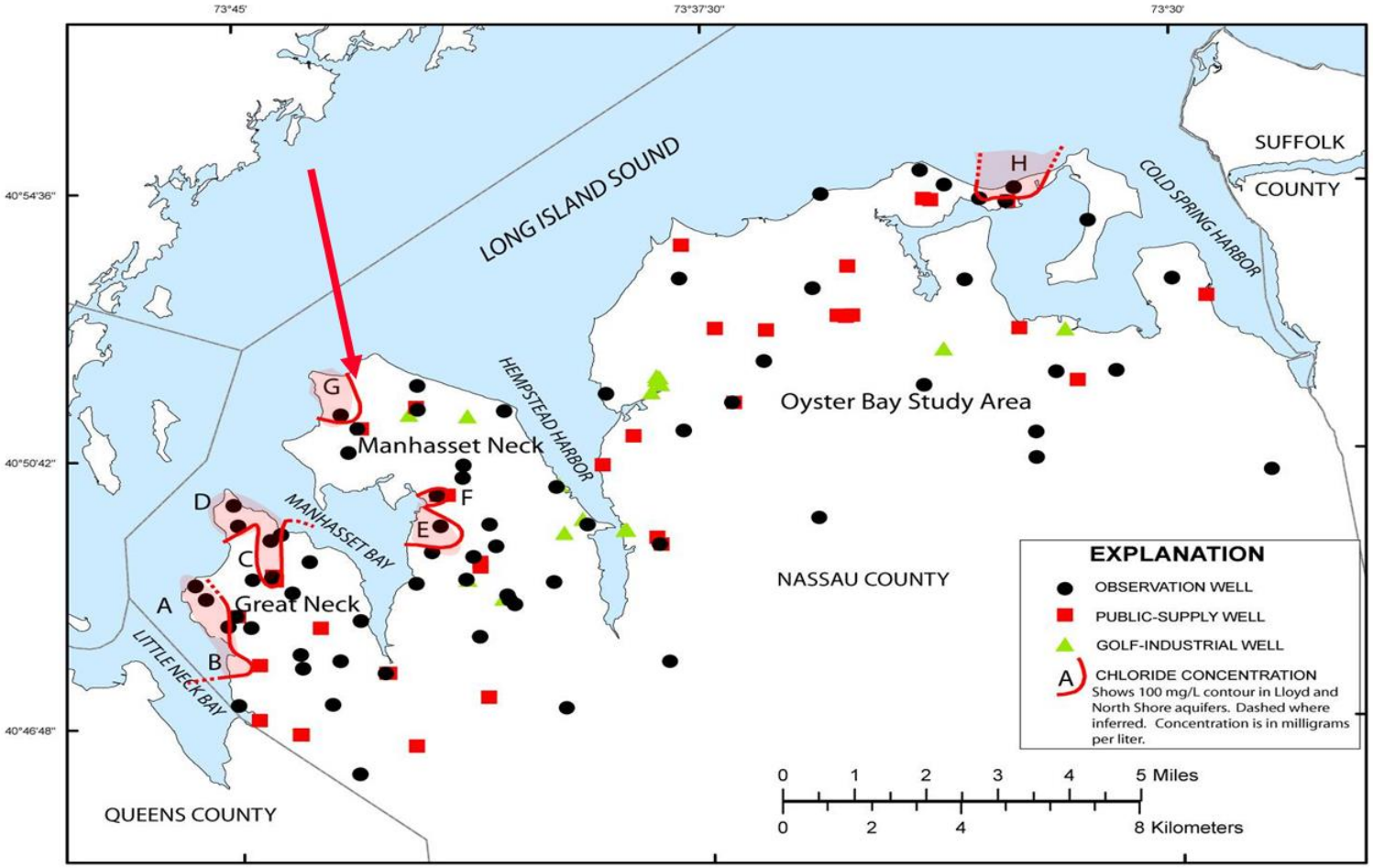
First USGS Outpost Well



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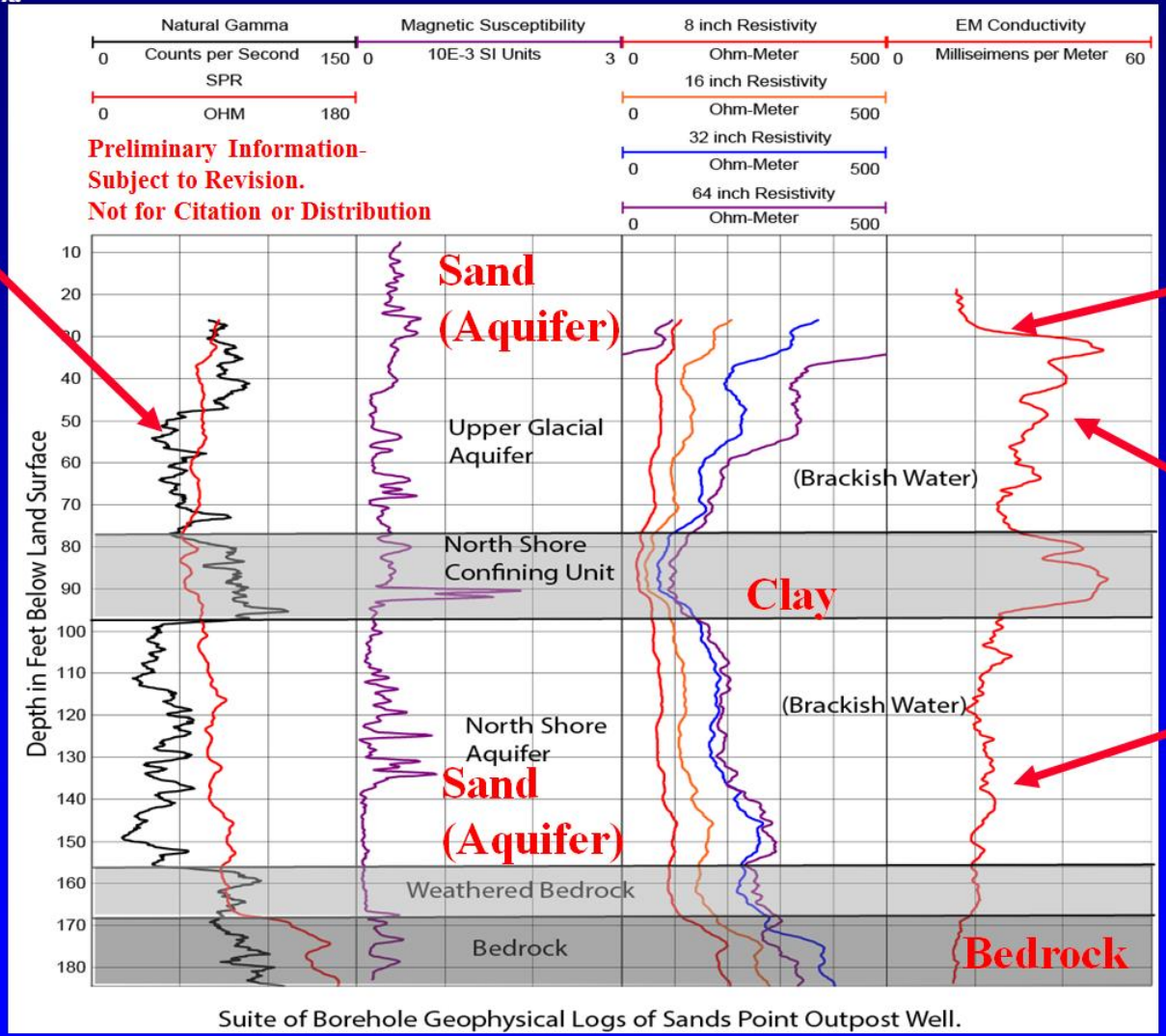
Geophysical Logs From the First Outpost Well



Gamma Log

Conductivity Log

Brackish Water

Suite of Borehole Geophysical Logs of Sands Point Outpost Well.

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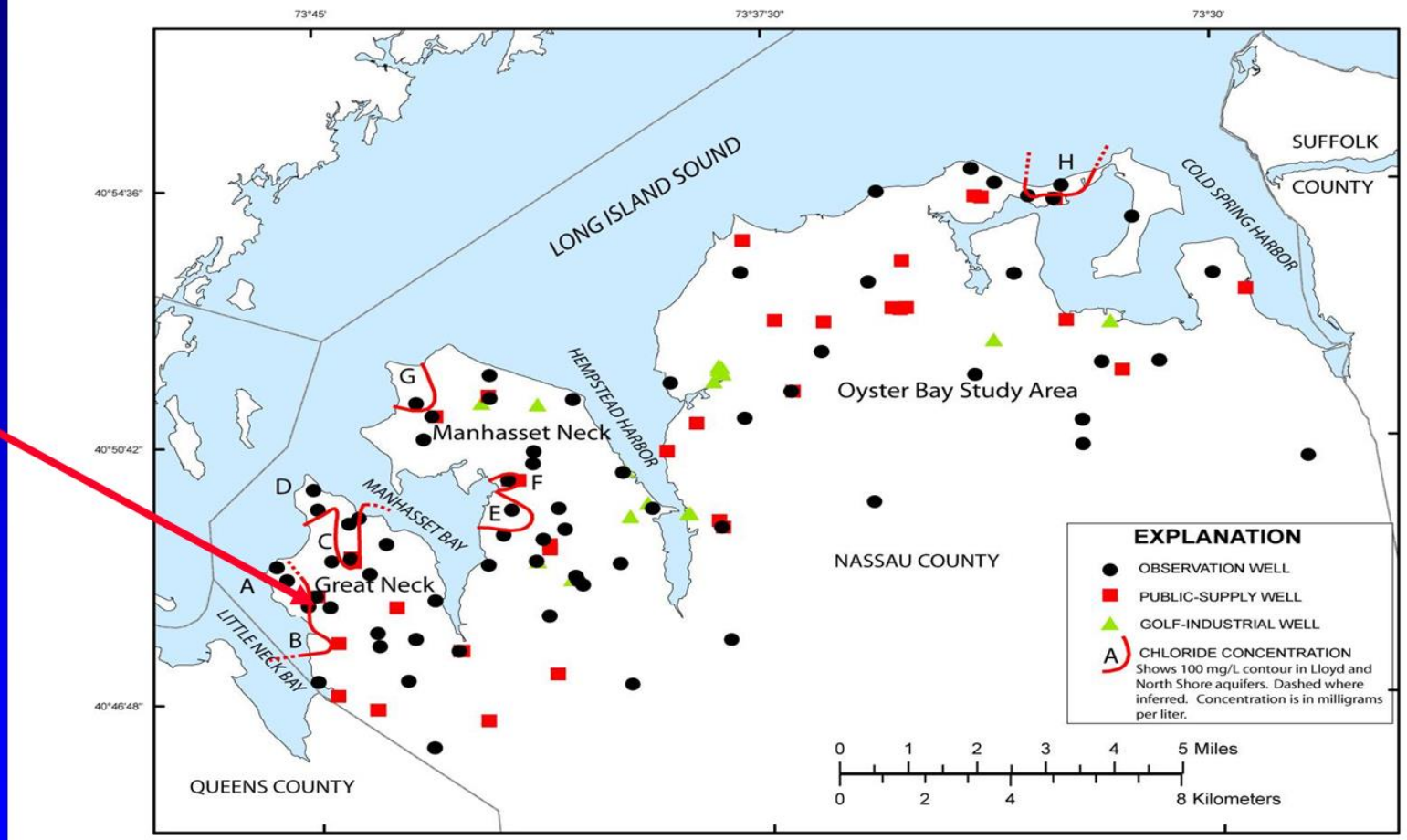
Active Saltwater Intrusion in Great Neck



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Active Saltwater Intrusion in Great Neck

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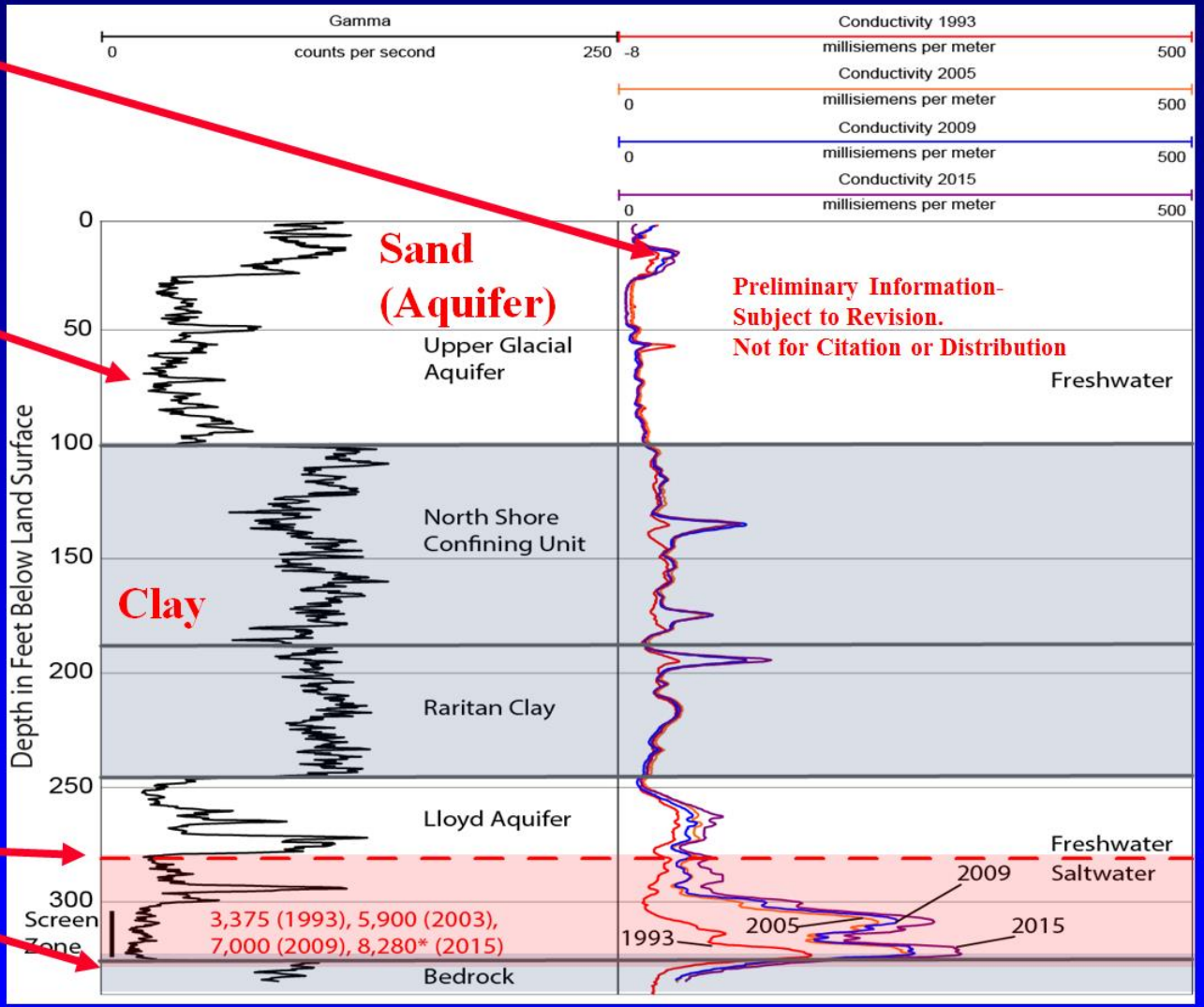
Conductivity Log

Gamma Log

Chloride mg/L

1993	3,400
2003	6,000
2009	7,000
2015	8,300

Saltwater



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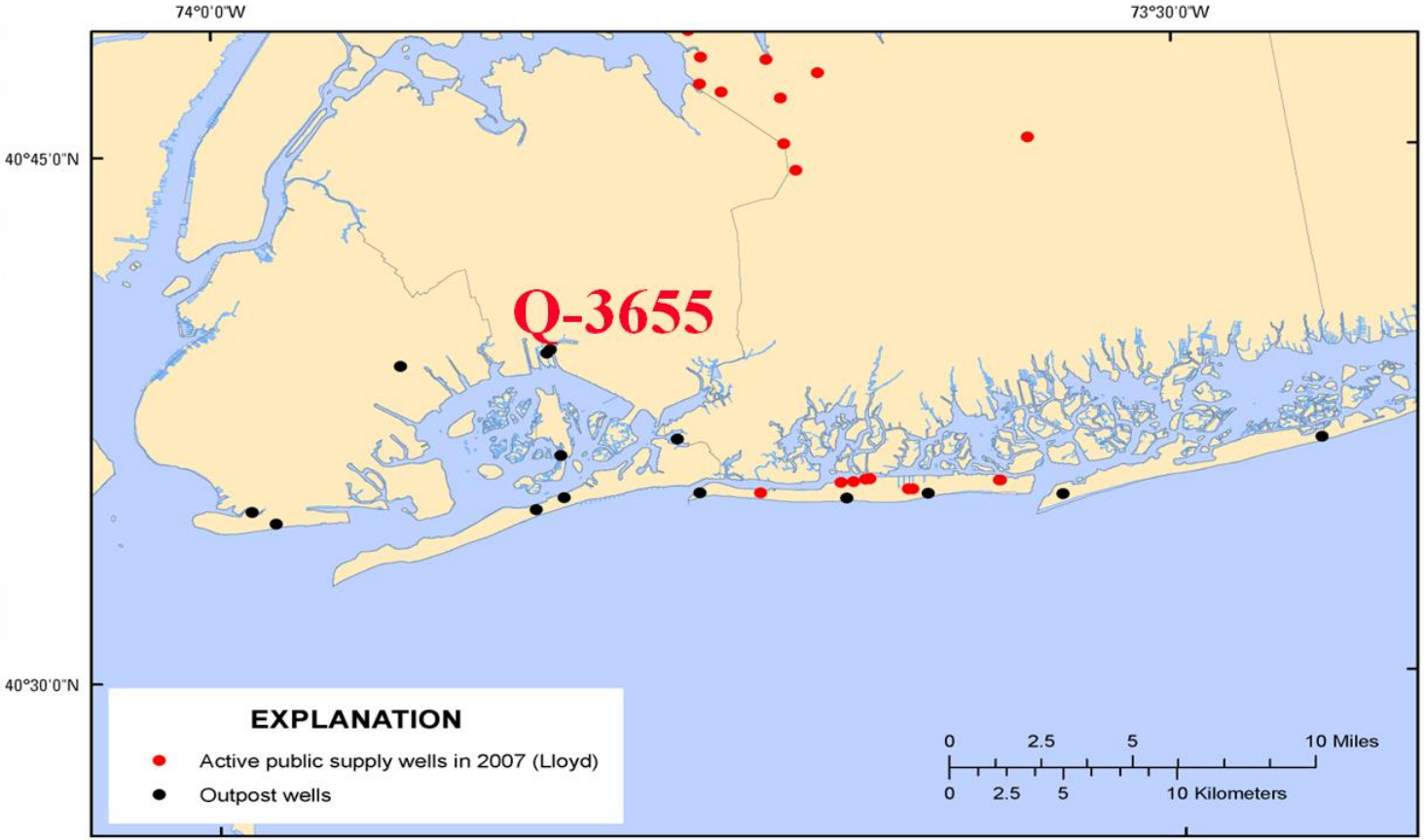
Saltwater Intrusion in Queens County



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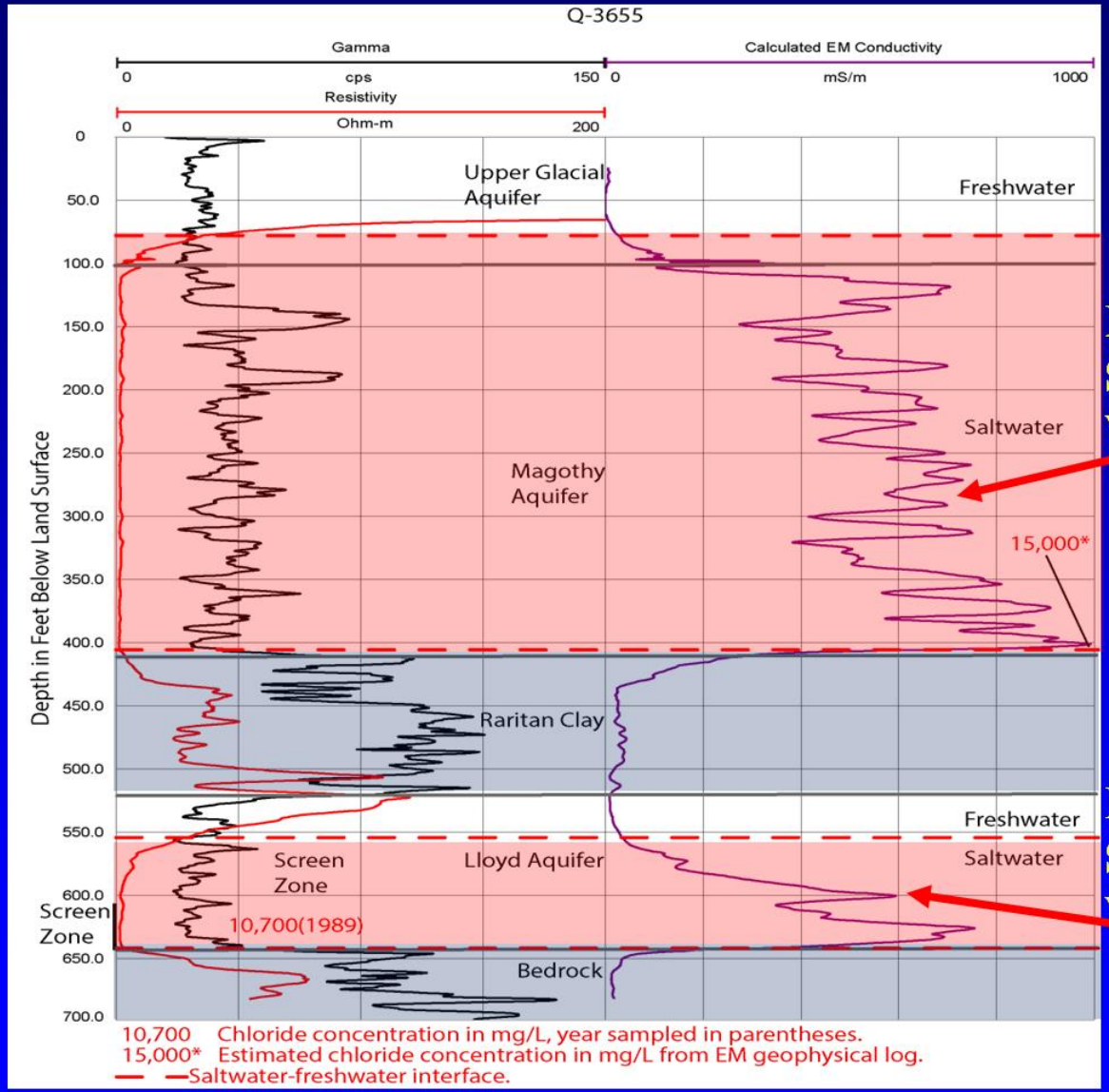
Saltwater Intrusion at Well Q-3655 JFK Airport in 1989



100% Magothy Saltwater Wedge

70% Lloyd Saltwater Wedge

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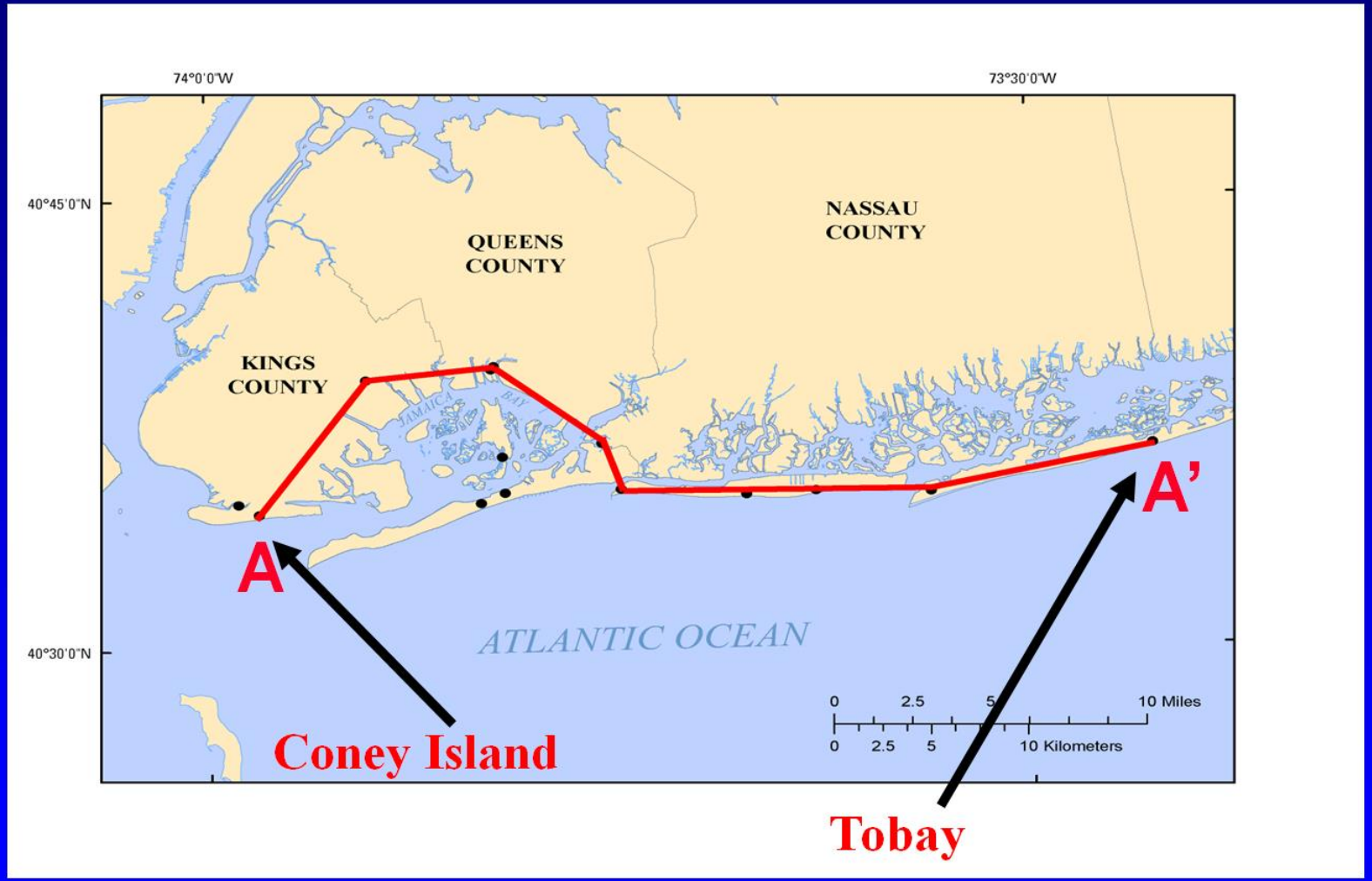
Cross Section of Saltwater Intrusion



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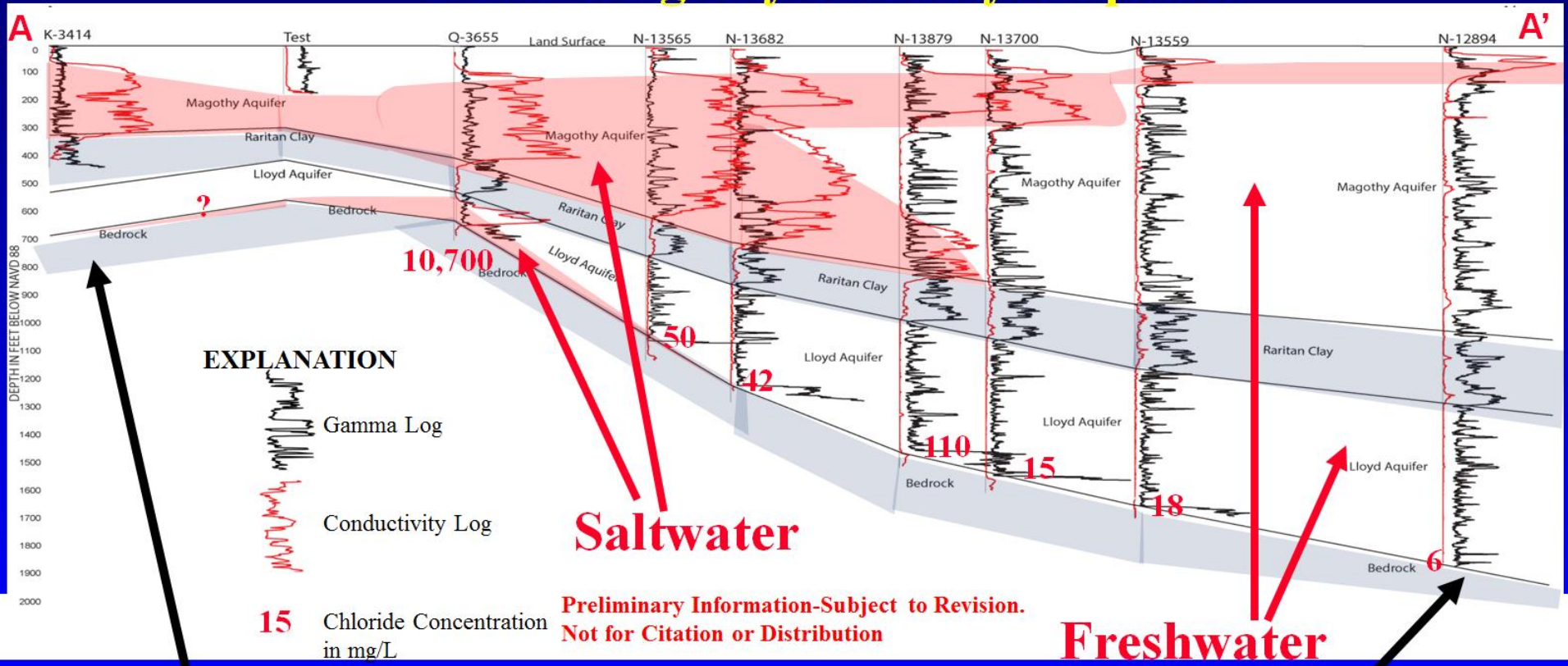
Cross-Sectional View of Saltwater Wedges in the Magothy and Lloyd Aquifers



Coney Island

Tobay

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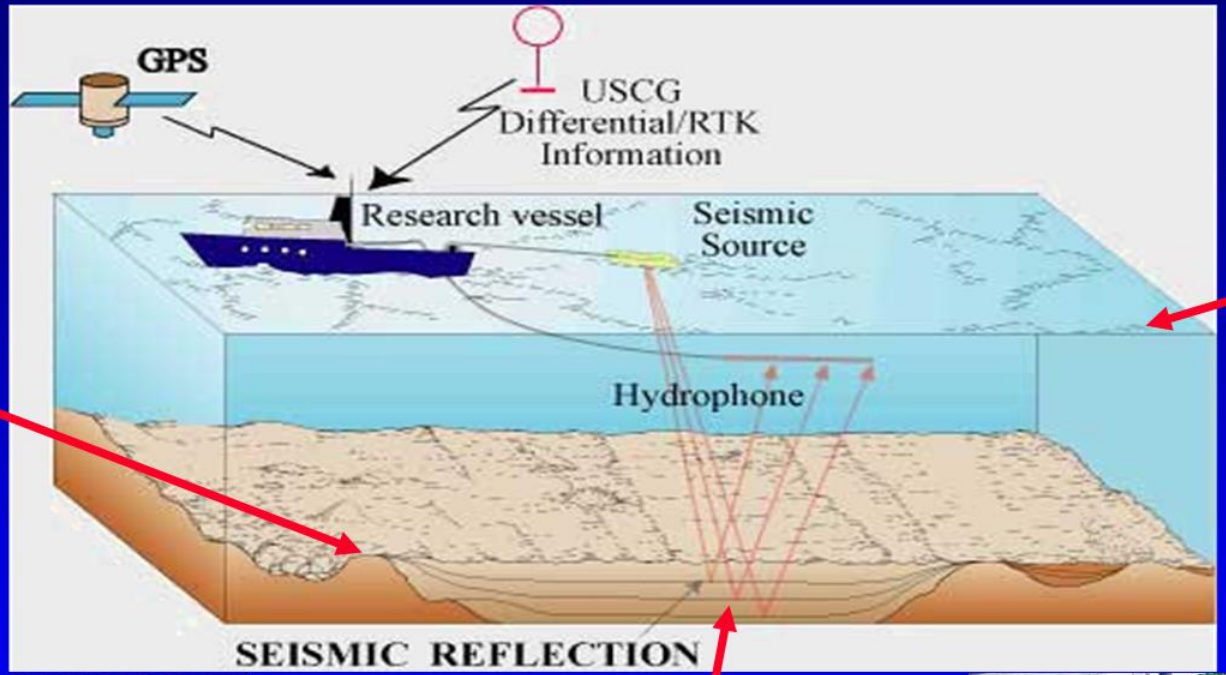
Marine Seismic-Reflection System



Sea Surface

Sea Floor

Subsurface Features

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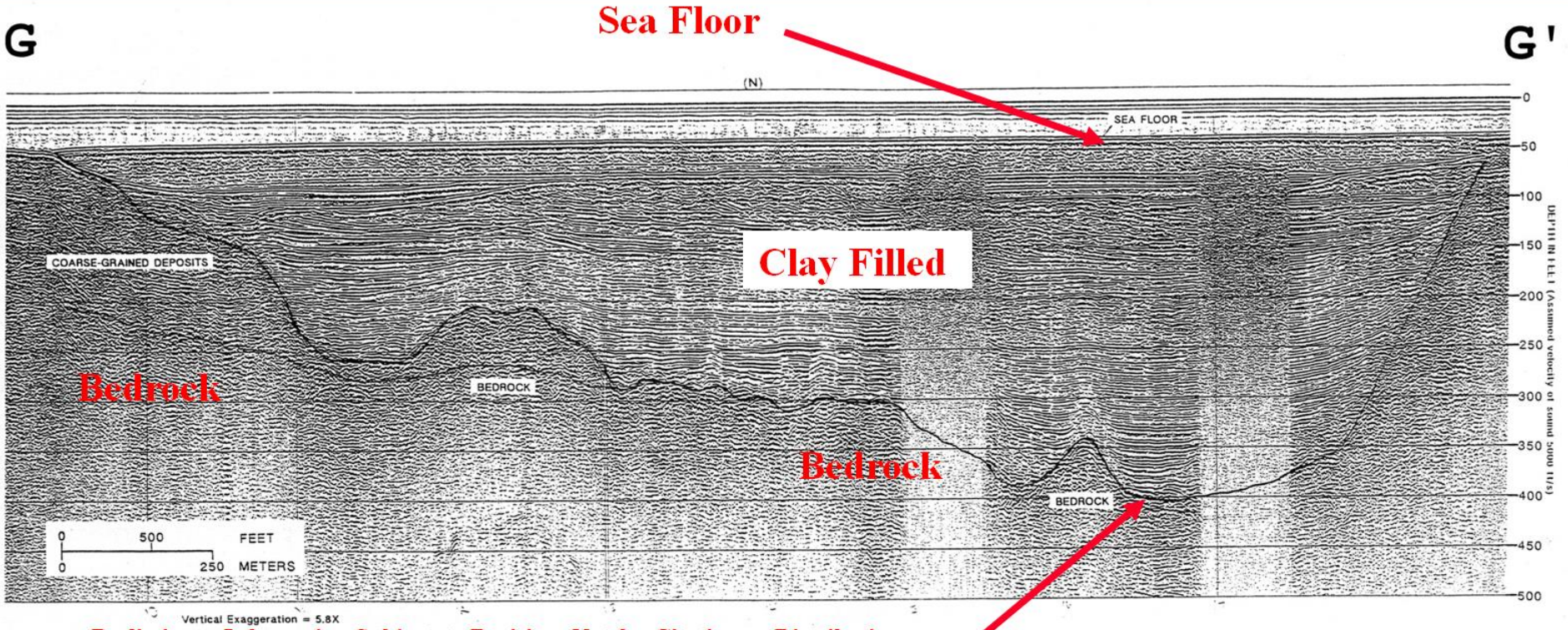
Seismic-Reflection Profile of a Deep Clay Filled Valley



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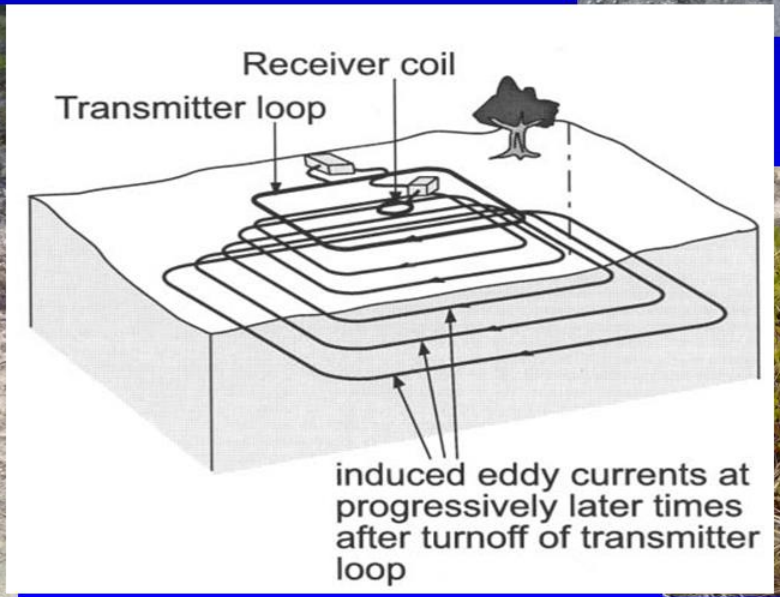
Surface EM Method

- Primary EM field induces eddy currents into subsurface
- Depth is determined by time of measurement during Tx off time

Depth of this survey ranged from 300 to 450 feet BLS.



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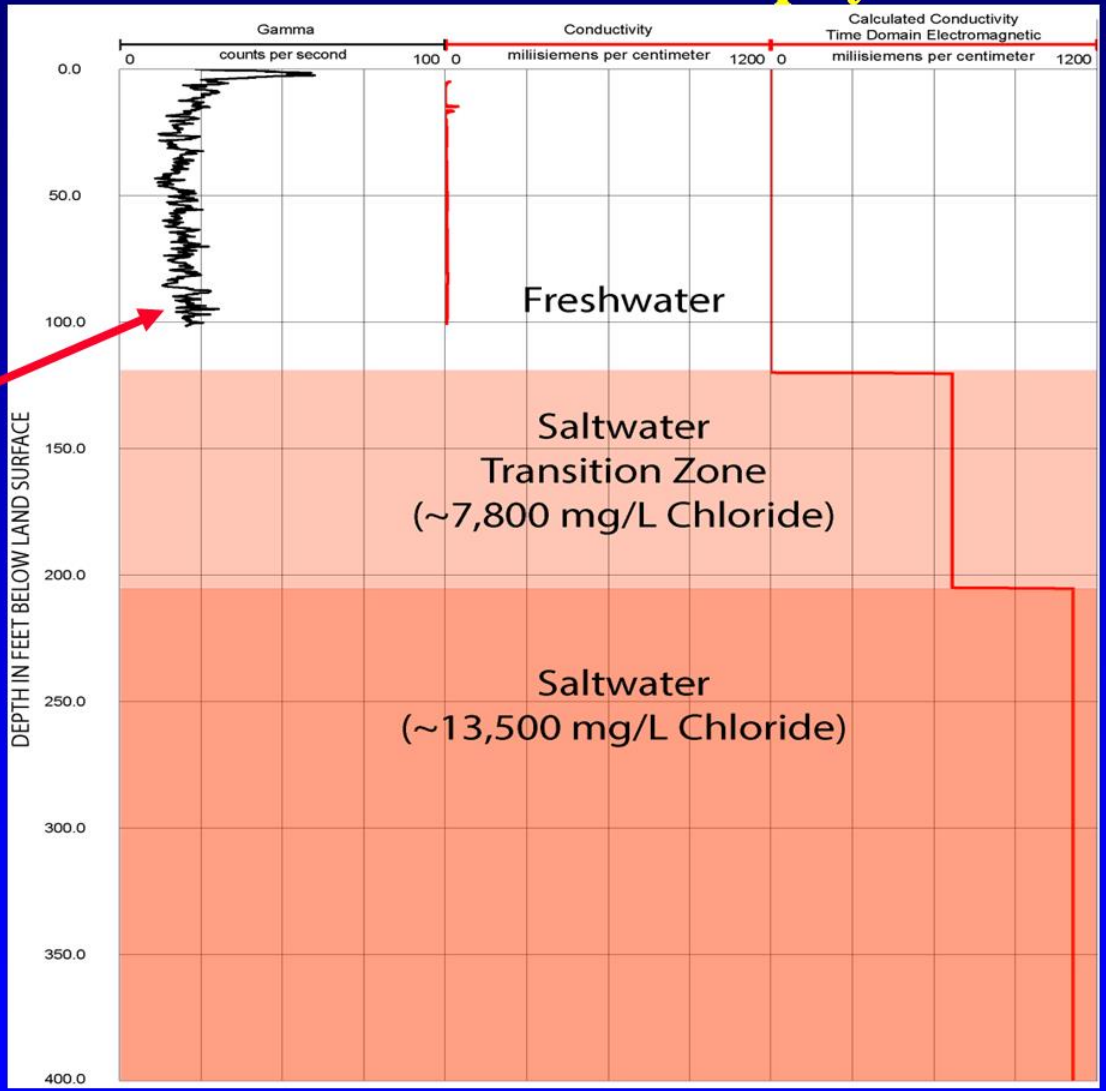
Surface and Borehole Geophysical Data

Observation Well



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Summary

- No island-wide network of outpost wells currently exists. As a result we do not know where the saltwater interface is throughout most of Long Island
- To map the hydrogeologic framework of the major aquifers and confining units underlying Long Island we need new wells drilled.
- Determine the current location, thickness, and chloride concentration of the saltwater-freshwater interface using the newly drilled wells
- The new wells are critical to constraining the new groundwater flow model. Without the new wells less confidence in model predictions.

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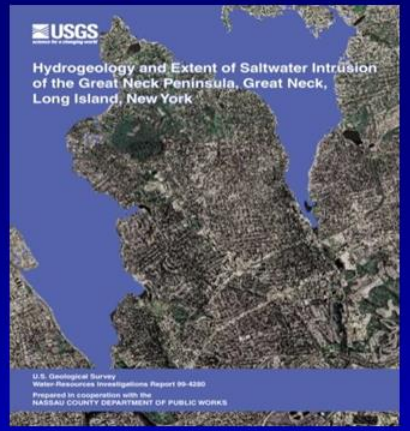
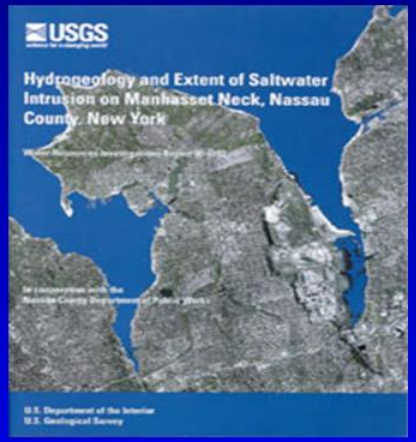
Great Neck Report

http://ny.water.usgs.gov/pubs/wri/wri994280/



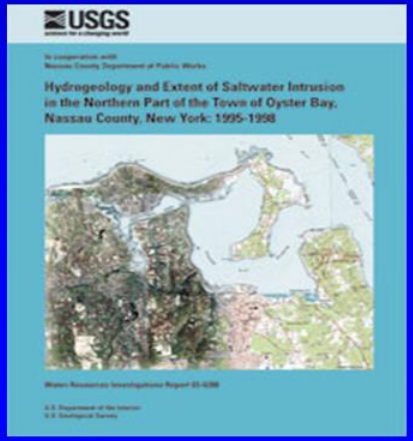


Manhasset Neck Report

http://ny.water.usgs.gov/pubs/wri/wri004193

Oyster Bay Report

http://ny.water.usgs.gov/pubs/wri/wri034288/



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