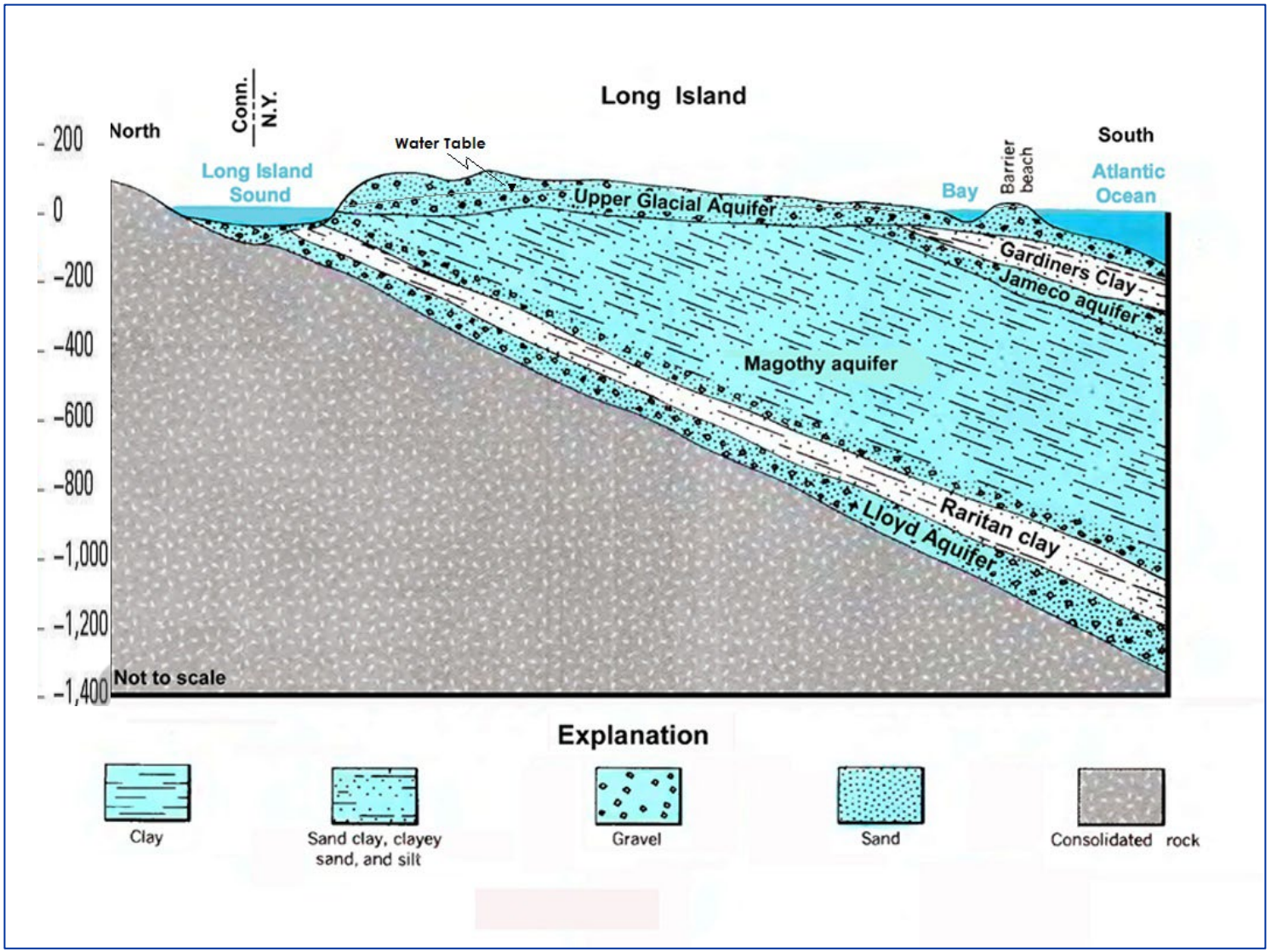
Orient Water Management Study
June 8, 2024

Agenda

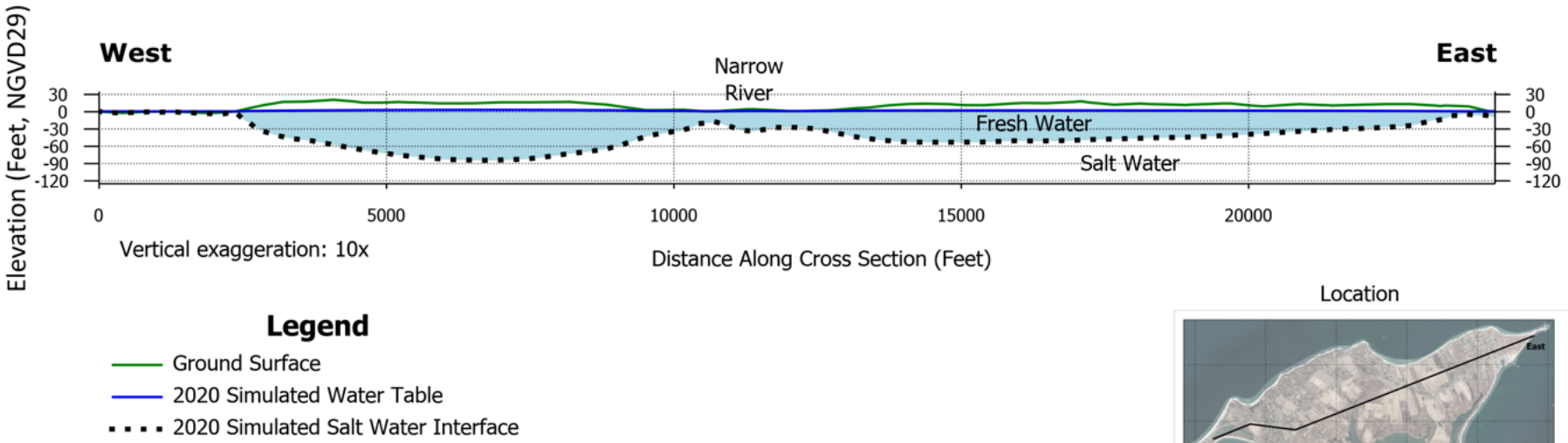
- Introduction
- Recap of Orient's Water Supply - Groundwater Quantity and Quality
- Surface Water Resources
- Overview of Water Resource Issues
- Potential Solutions
- Questions and Discussion

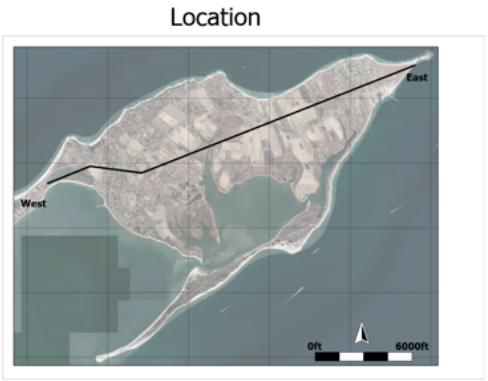
Orient’s Water Supply (Recap)

Groundwater – Long Island's Water Supply

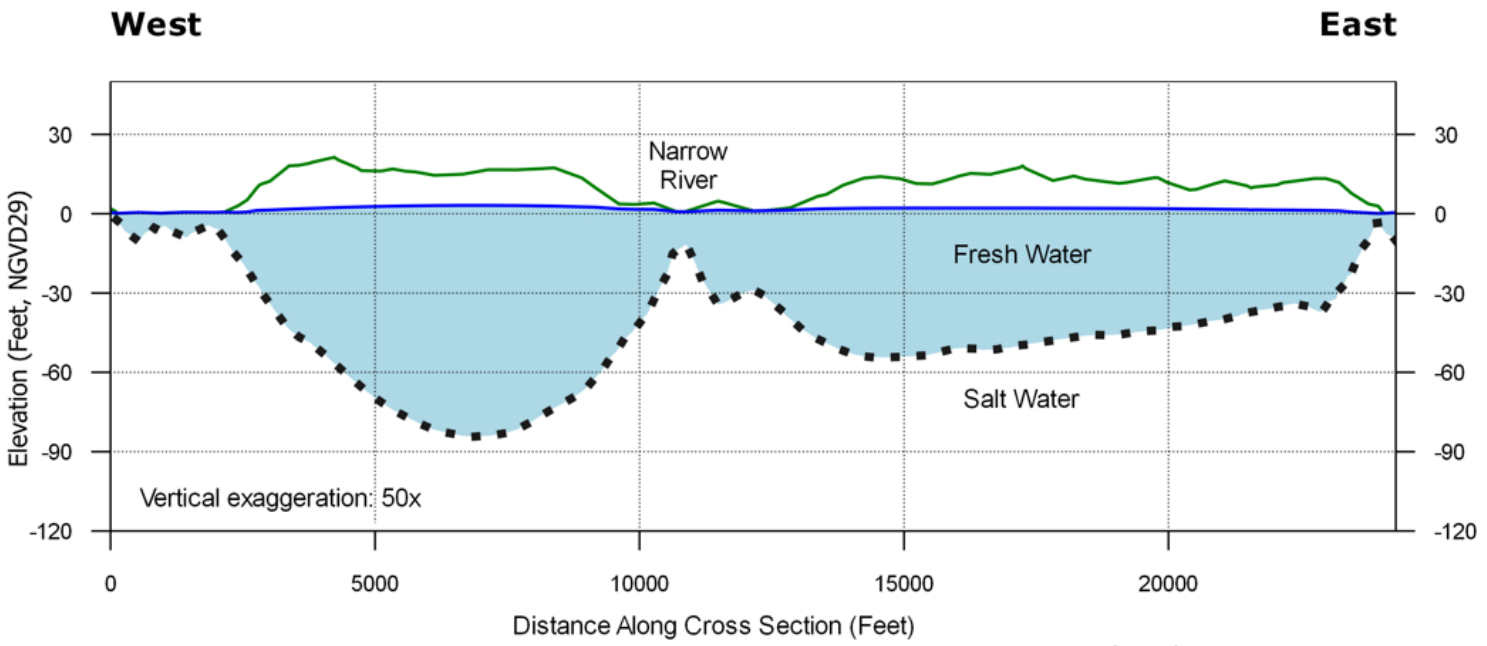


Groundwater – Orient's Water Supply





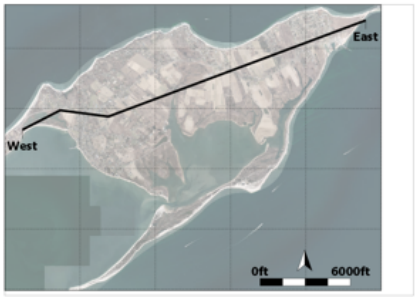
Groundwater – Orient's Water Supply



Legend

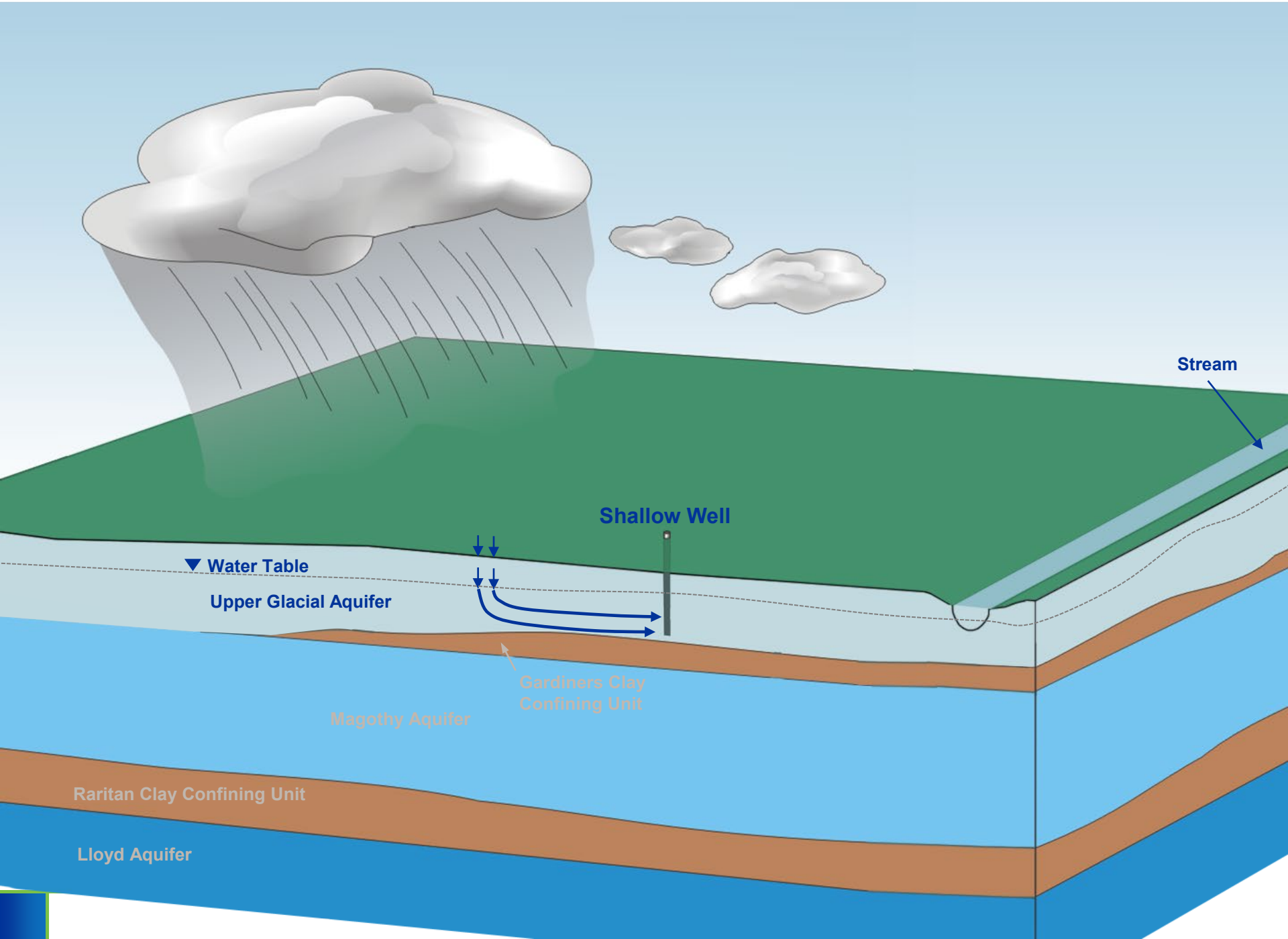
- Ground Surface
- 2020 Simulated Water Table
- 2020 Simulated Salt Water Interface

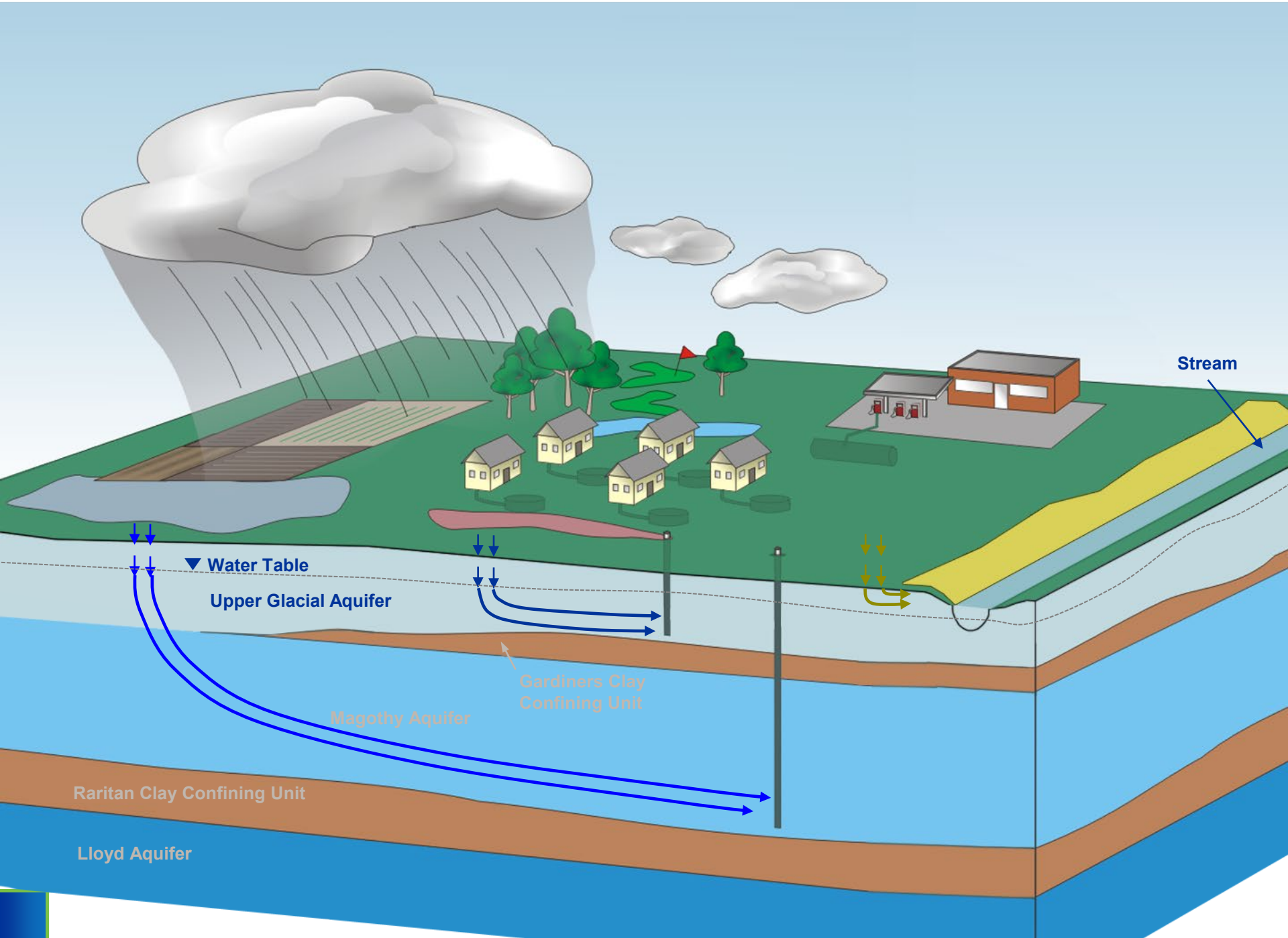
Location



Place holder for Orient Aquifer Animation

- C:\Users\Taylormb\Downloads\Annual Meeting May 27 2023 Annotated.mp4


Stream
Shallow Well
Water Table
Upper Glacial Aquifer
Gardiners Clay
Confining Unit
Magothy Aquifer
Raritan Clay Confining Unit
Lloyd Aquifer


Stream
Water Table
Upper Glacial Aquifer
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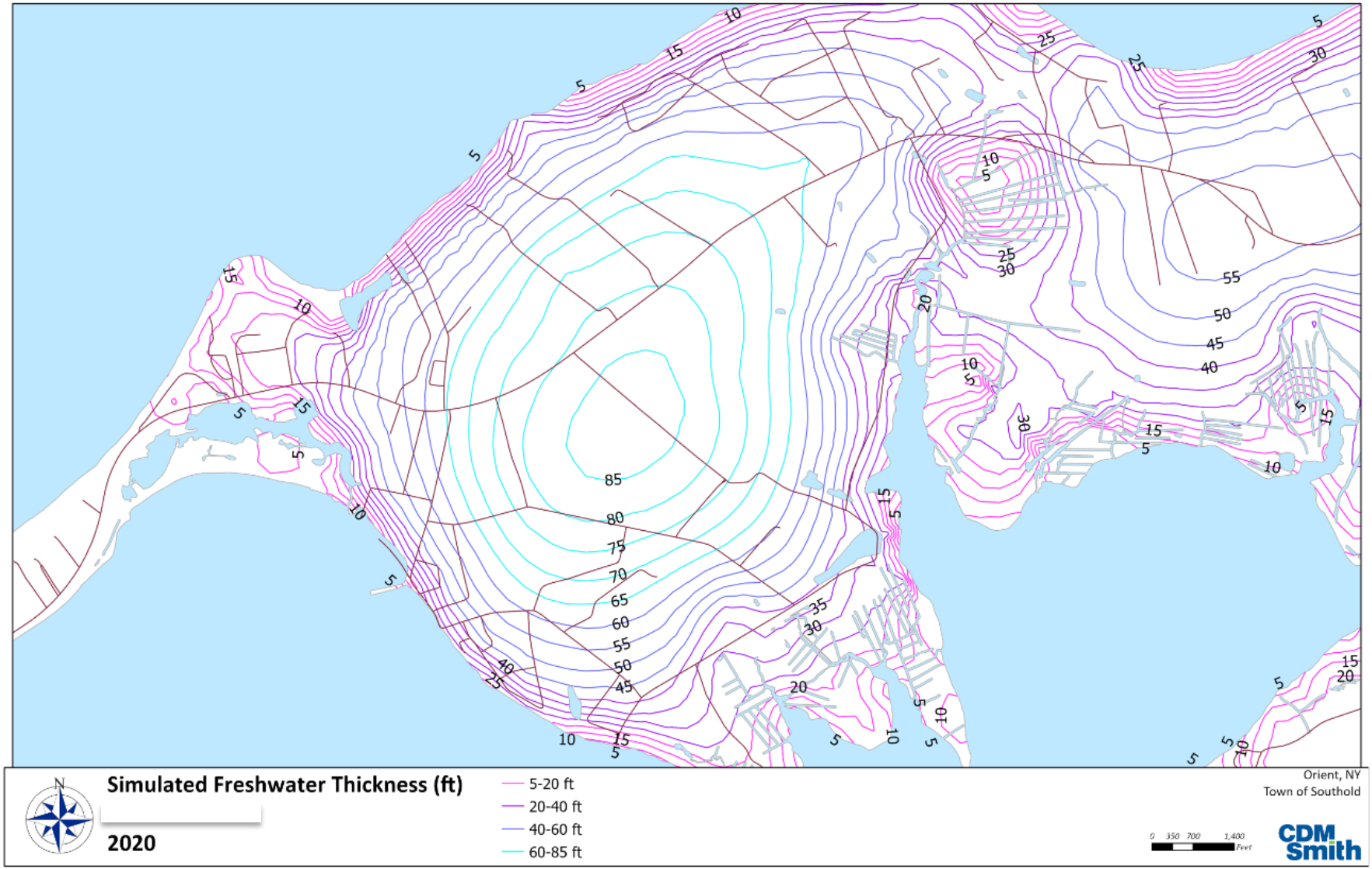
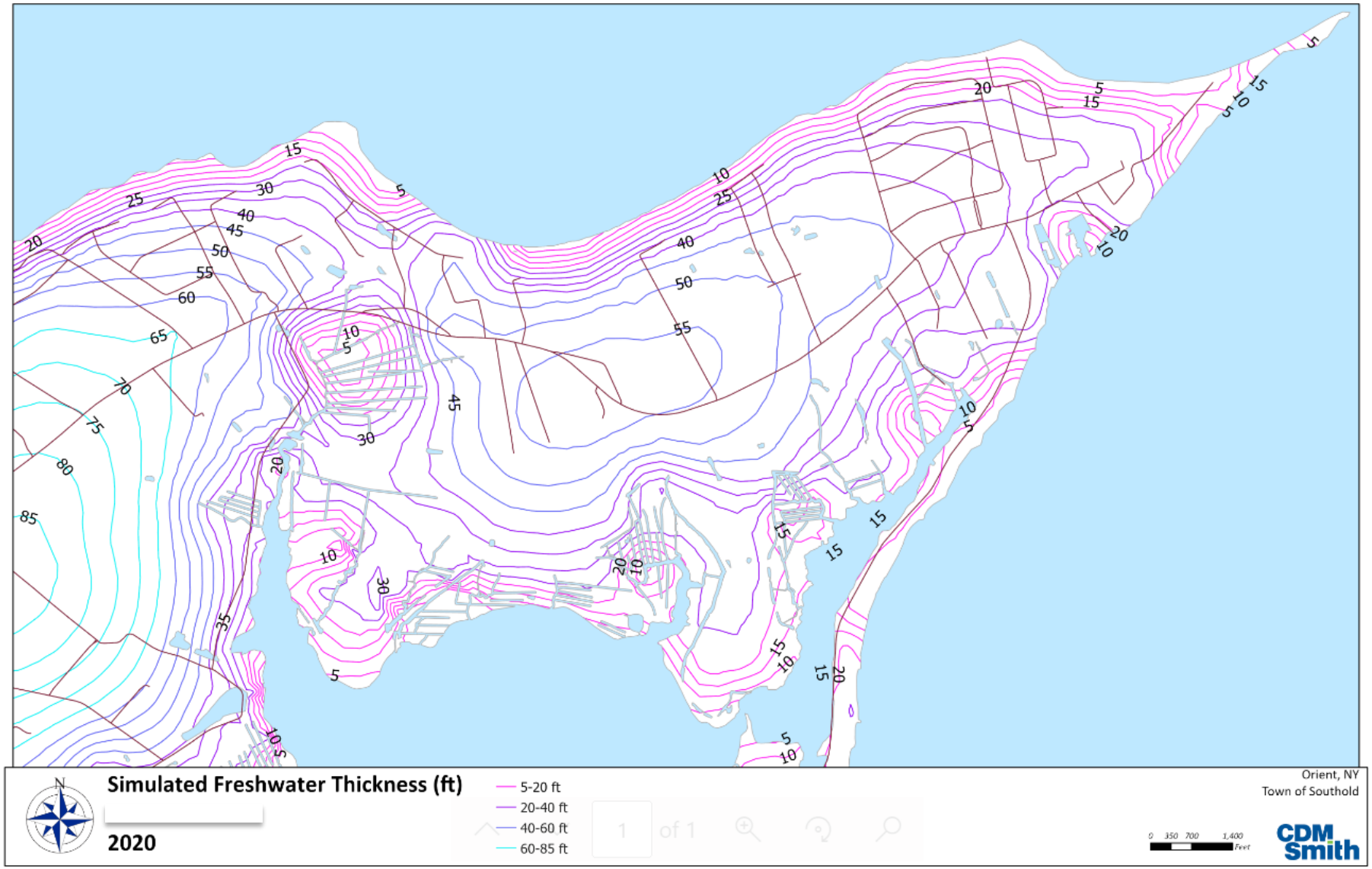
Does Orient Have Enough Water?

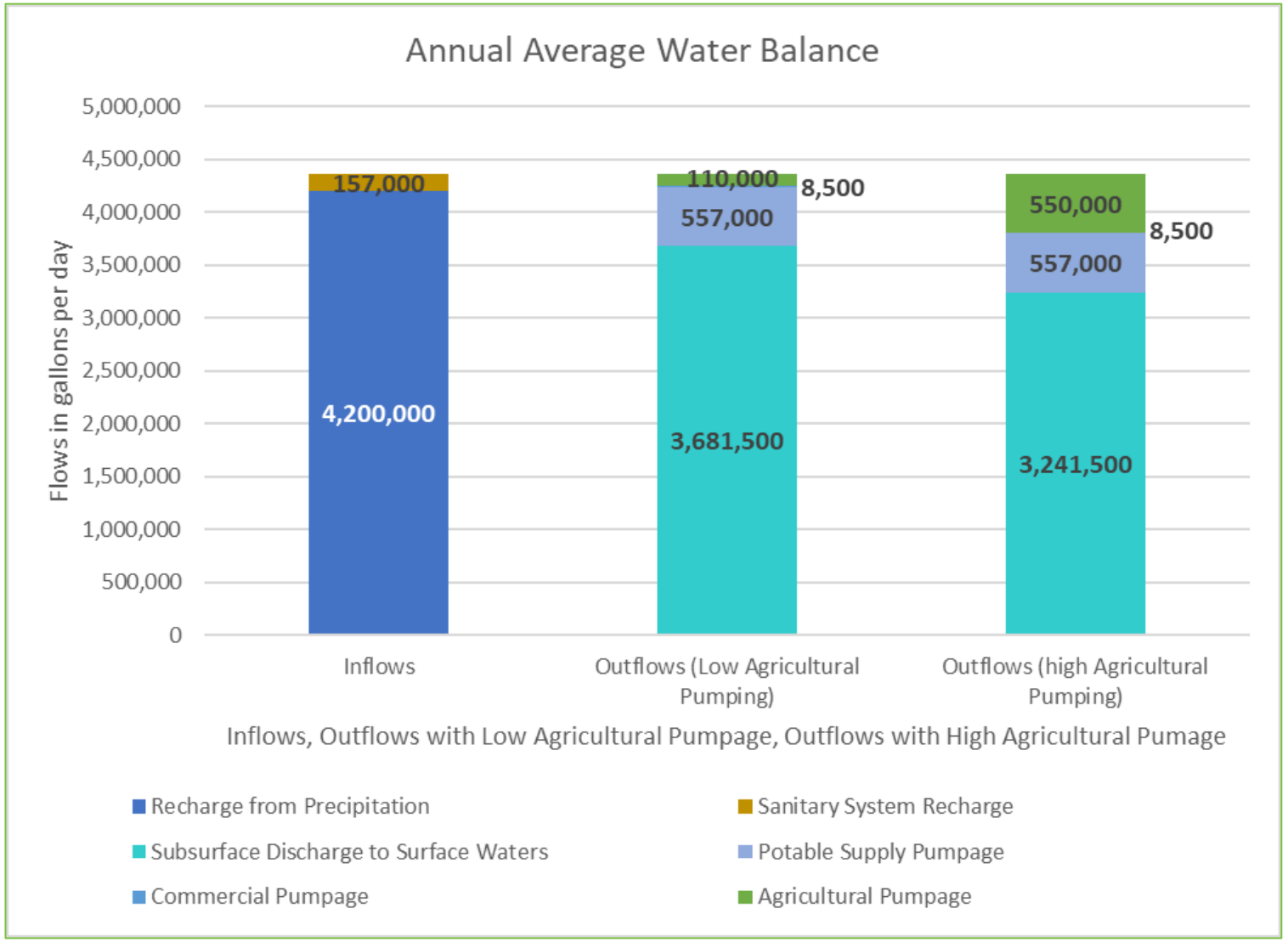
Orient (West) Aquifer Thickness - 2020



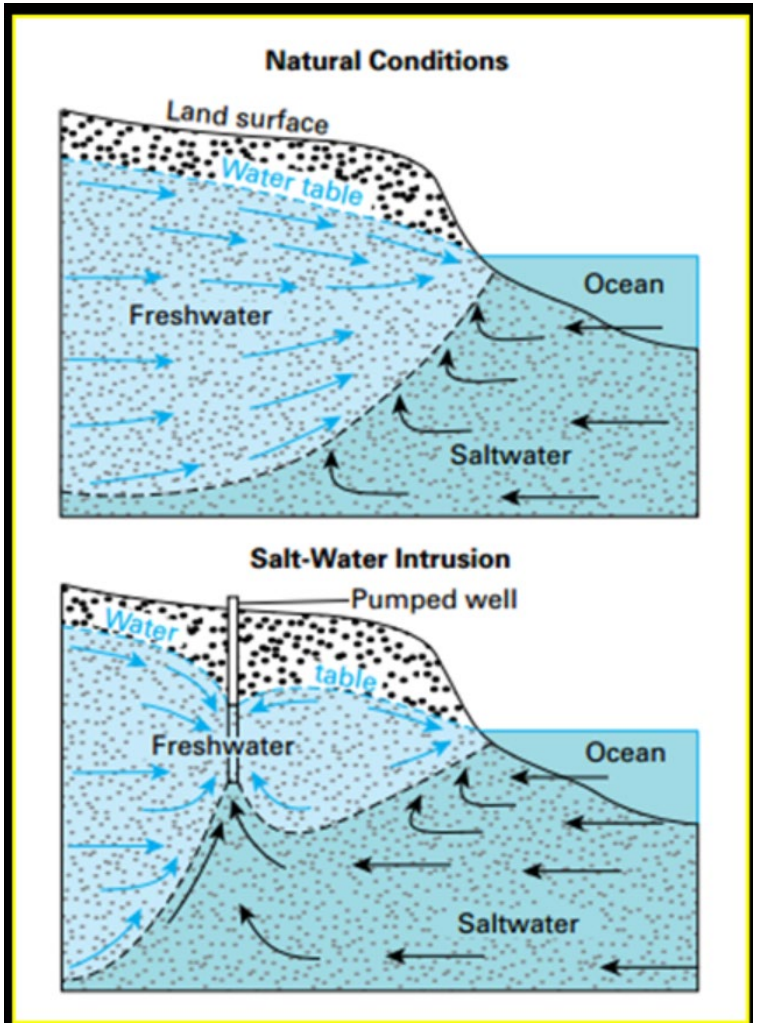
Orient (East) Aquifer Thickness - 2020



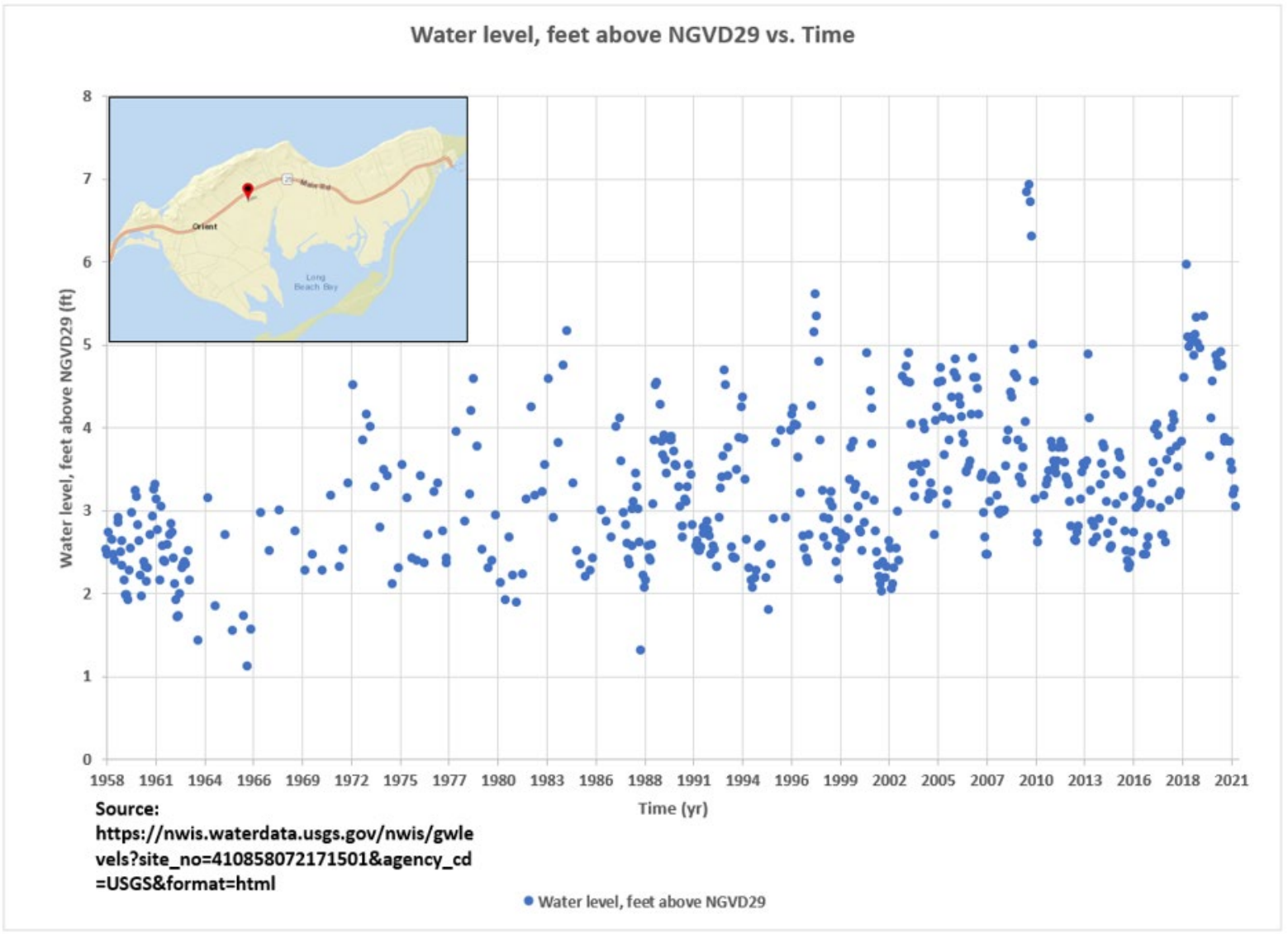
Does Orient Have Enough Water?



Potential for Salt Water Intrusion



Water Table Stable



Groundwater Quantity

- As a community, Orient has sufficient water to supply current and future projected demands, however:
  - Coastal wells are likely to be impacted from salt water intrusion, particularly during the summer months, and in the future as a result of sea level rise
  - High pumpage from inland wells may also cause salt water upconing

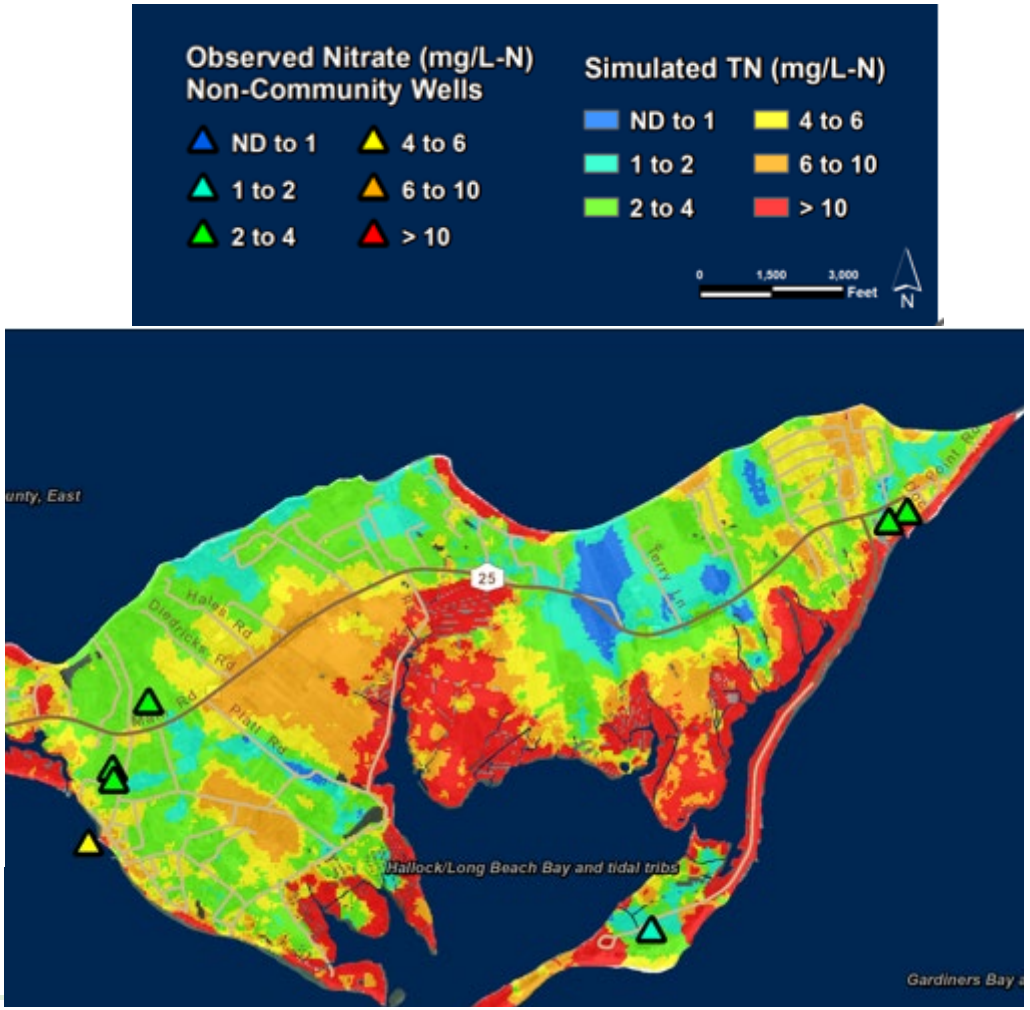
Groundwater Quality

Drinking Water Quality Standards

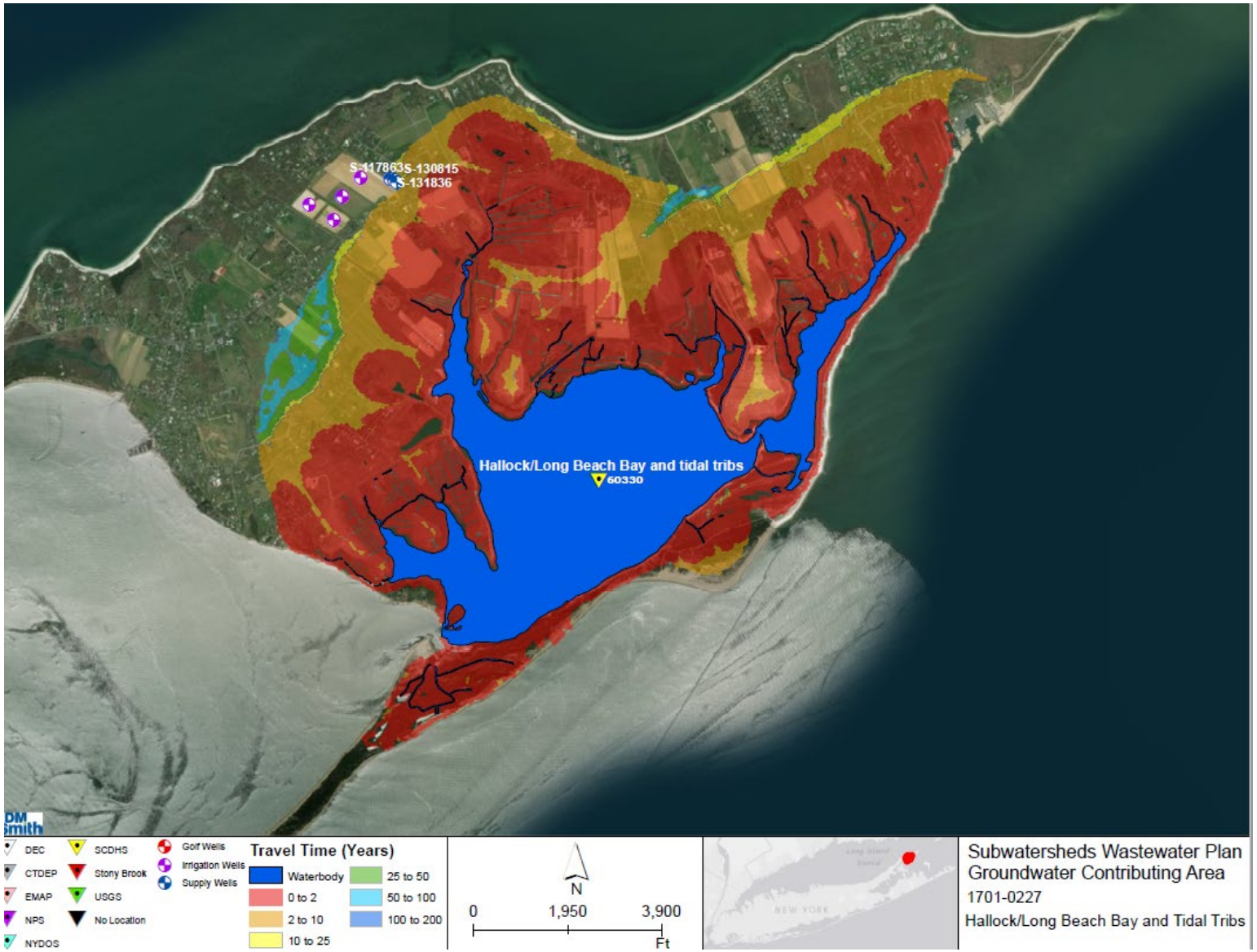
- Drinking water criteria (called Maximum Contaminant Levels or MCLs) established by USEPA and by New York State
- Contaminants Considered:
  - Nitrate
  - Chlorides
  - Pesticides
  - Pathogen Indicators
  - Emerging Contaminants – e.g., PFAS

Nitrogen in Orient Groundwater

- Suffolk County Department of Health Services (SCDHS) Tests Private Wells
- 137 Samples Collected between 2014 and 2021
- 18% > 10 mg/L MCL
- 54% > 6 mg/L GMZ IV Criterion
- Arithmetic Average = 6.2 mg/L



Why is Nitrogen Important?



Suffolk County PFAS Investigation

- SCDHS Survey of Private Wells
- NYS MCL for PFOS and PFOA is 10 parts per trillion (nanograms/liter)
- 50 percent of the wells tested exceeded the NYS Maximum Contaminant Level (MCL)
- USEPA recently established even lower limits of 4 parts per trillion (ppt) for PFOS and PFOA, and new limits of 10 ppt for four other PFAS compounds

Climate Change Considerations

New York State Projections of Sea Level Rise

- Climate Change Projections

(c) Long Island Region

Time Interval	Low Projection	Low-Medium Projection	Medium Projection	High-Medium Projection	High Projection
2020s	2 inches	4 inches	6 inches	8 inches	10 inches
2050s	8 inches	11 inches	16 inches	21 inches	30 inches
2080s	13 inches	18 inches	29 inches	39 inches	58 inches
2100	15 inches	21 inches	34 inches	47 inches	72 inches

Note: The New York State High-Medium projection (2017) is consistent with the NOAA 2022 Intermediate Projection

Predicted Inundation from Sea Level Rise 2050

Blue – connected to surface water, Green – not necessarily connected, but floods

Source: NOAA [Sea Level Rise and Coastal Flooding Impacts (noaa.gov)]

Predicted Inundation from Sea Level Rise 2100

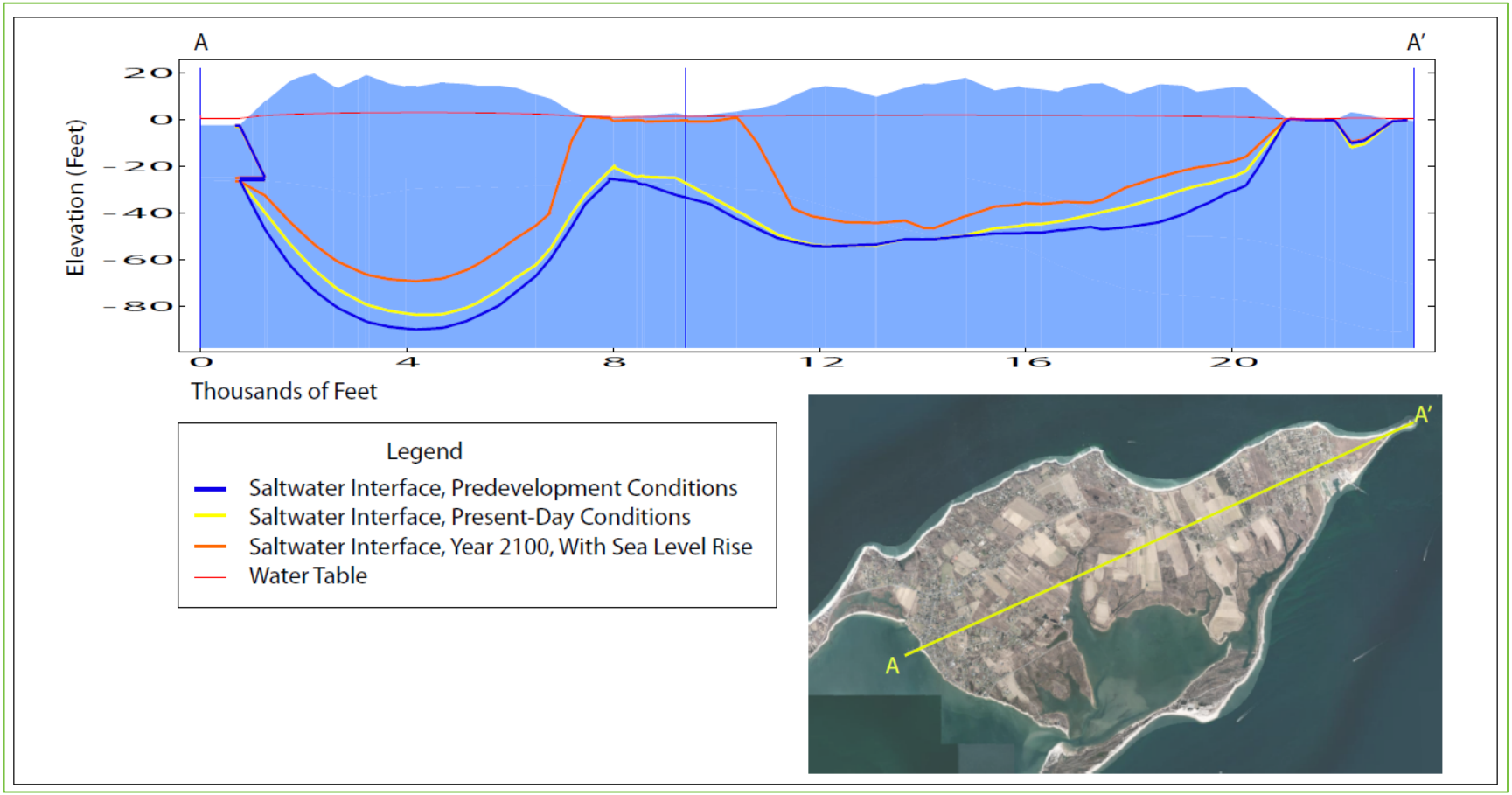
Blue – connected to surface water, Green – not necessarily connected, but floods

Source: NOAA [Sea Level Rise and Coastal Flooding Impacts (noaa.gov)]

Areas Currently Vulnerable to High-Tide Flooding

Source: NOAA Sea Level Rise and Coastal Flooding Impacts (noaa.gov)

Sea Level Rise Will Reduce Orient Aquifer Thickness



Climate Change

- Climate change is projected to:
  - Increase Precipitation and Intense Storm Events
  - Increase Temperature
  - Accelerate Sea Level Rise

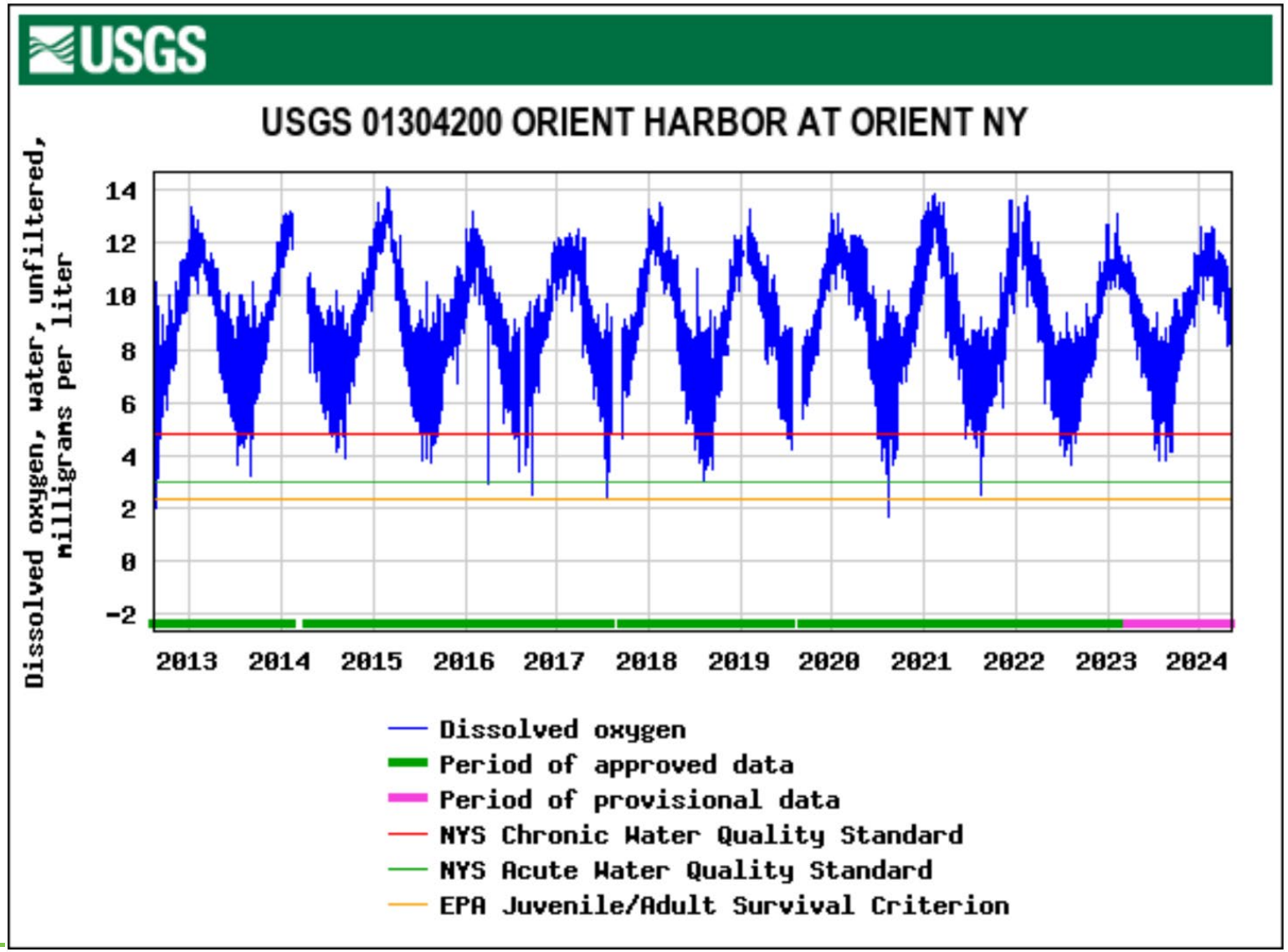
Surface Water Resources

Surface Water Quality Standards and Monitoring

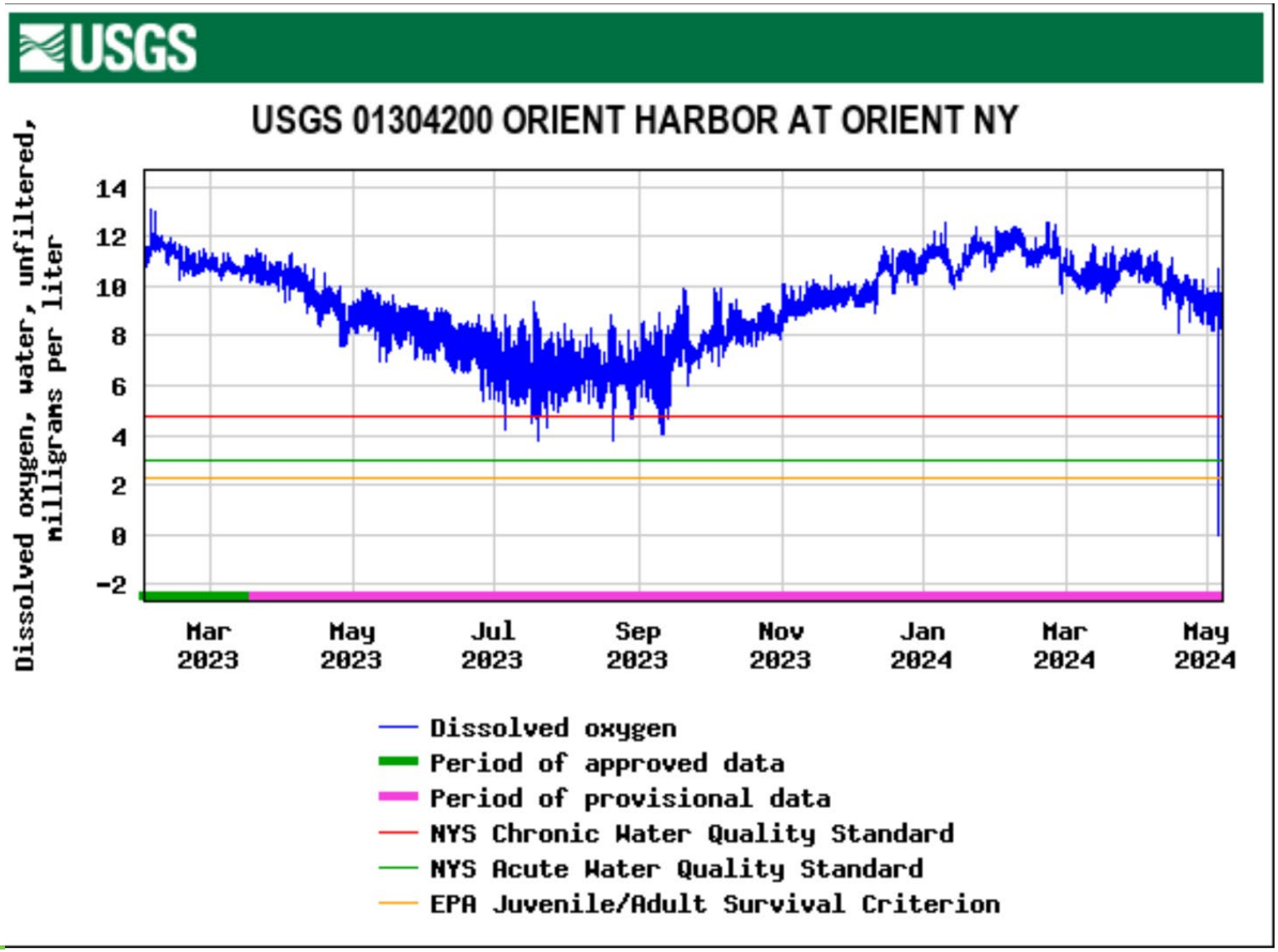
Many Parameters to Consider:

- Dissolved Oxygen
- Nitrogen
- Pathogen Indicators
- Temperature

Surface Water Quality – Dissolved Oxygen



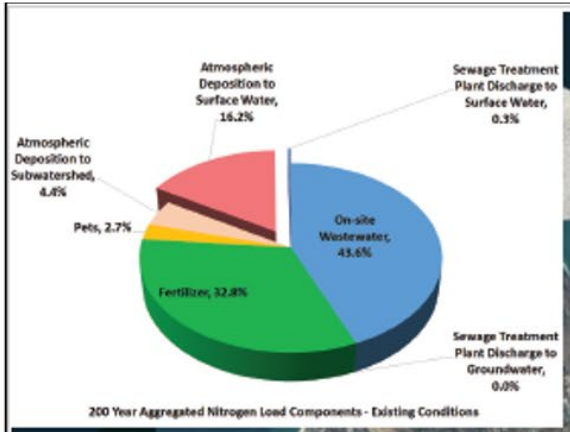
Surface Water Quality – Dissolved Oxygen



Ecological Sensitivity Rank

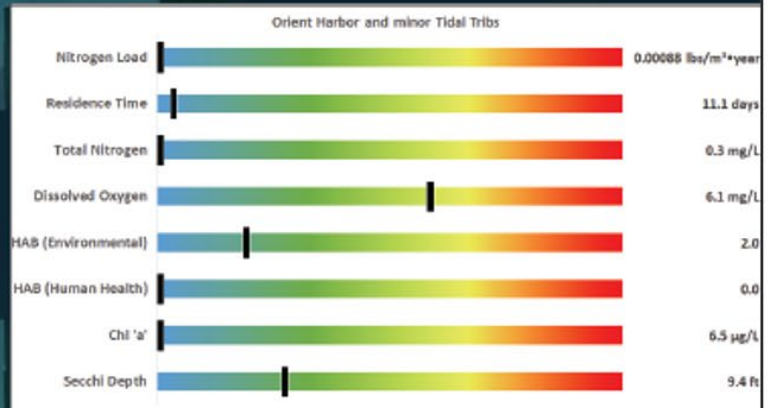
3

Note that the Ecological Sensitivity Rank above represents the final sensitivity rank for the aggregated wastewater management area. The original for this water body is Ecological Sensitivity Rank 4



200 Year Aggregated Nitrogen Load Components - Existing Conditions

Orient Harbor and minor tidal tribs



Management Area/Nitrogen Reduction Goal	
9	33%
12	6%

Travel Time (Years)
- 0 to 2
- 2 to 10
- 10 to 25
- 25 to 50

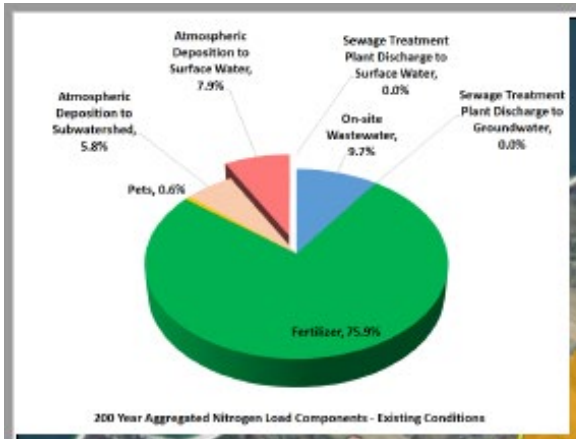
Subwatershed is Well Characterized

- Waterbody
- Sewered Area
- Well Contributing Area

N

0 1,450 2,900 Ft

Wastewater Management and Water Quality Characterization
25 Year Contributing Area
1701-0168
Orient Harbor

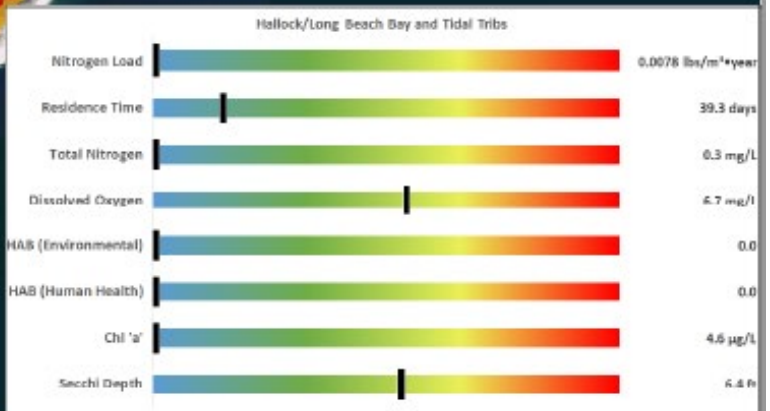


200 Year Aggregated Nitrogen Load Components - Existing Conditions

Ecological Sensitivity Rank

3

Hallock/Long Beach Bay and tidal tribs



CDM Smith

Management Area/Nitrogen Reduction Goal

9 33%

Travel Time (Years)
- 0 to 2
- 2 to 10
- 10 to 25
- 25 to 50

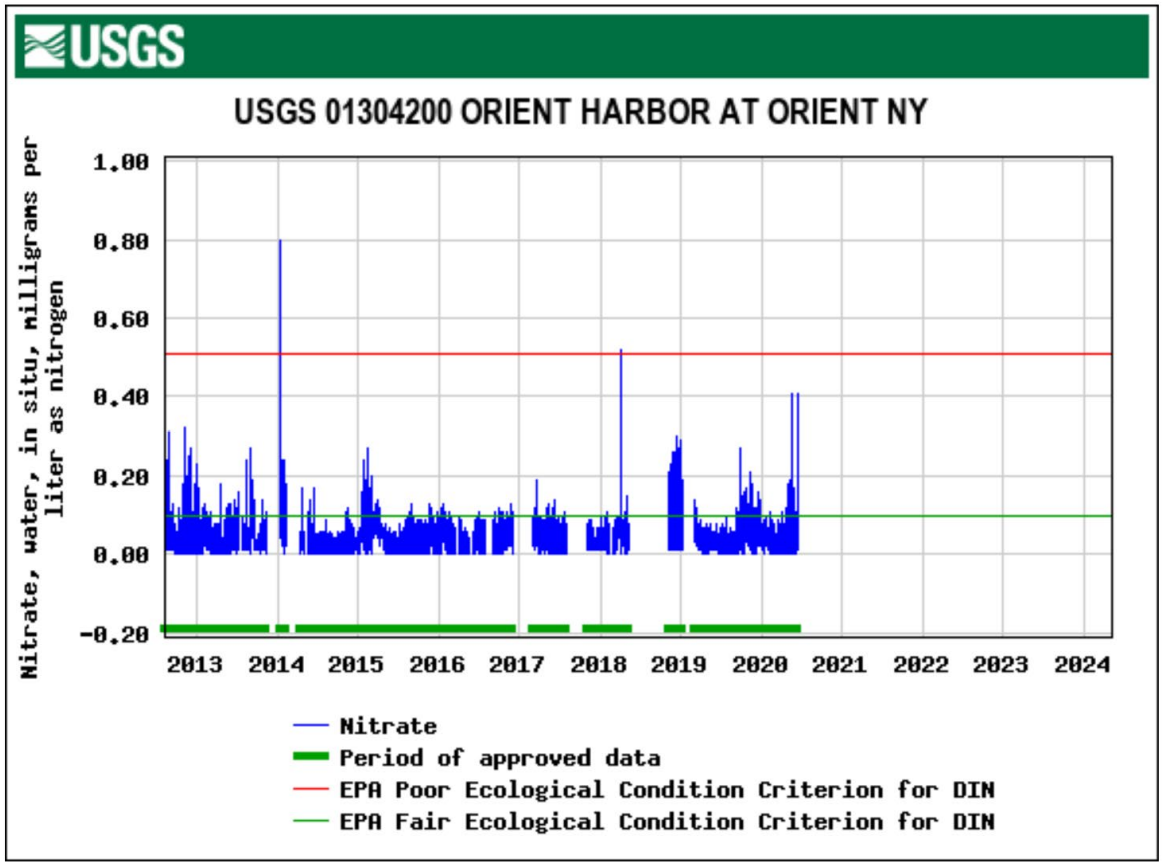
Subwatershed is Well Characterized
- Waterbody
- Sewered Area
- Well Contributing Area

N

0 1,050 2,100 Ft

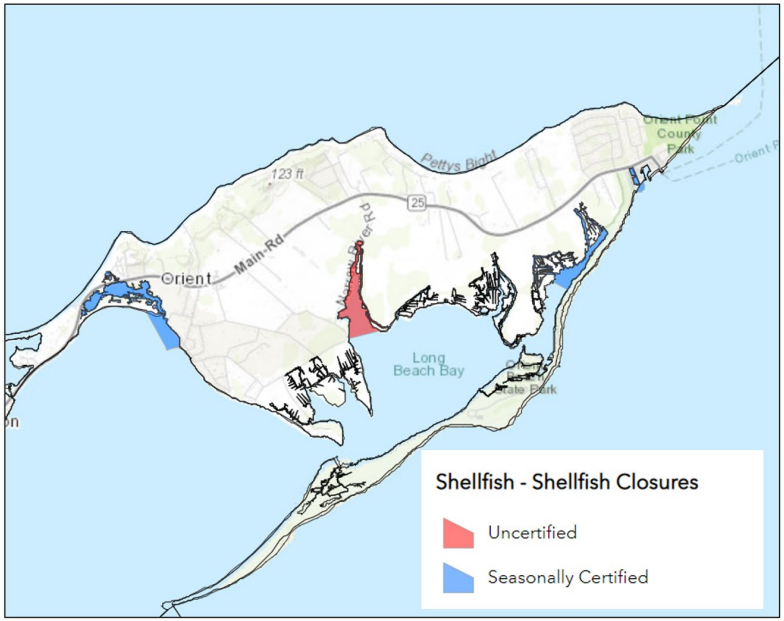
Wastewater Management and Water Quality Characterization
25 Year Contributing Area
1701-0227
Hallock/Long Beach Bay and Tidal Tribs

Surface Water Quality - Nitrogen

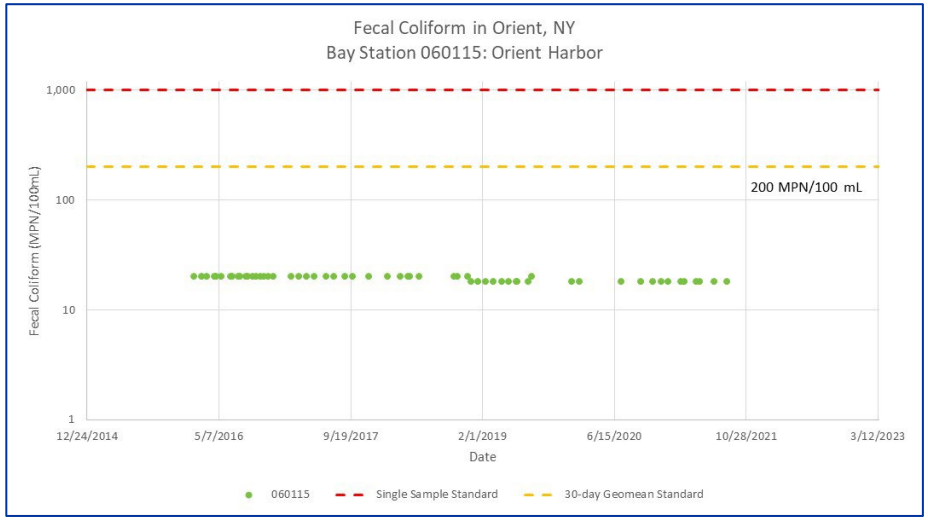


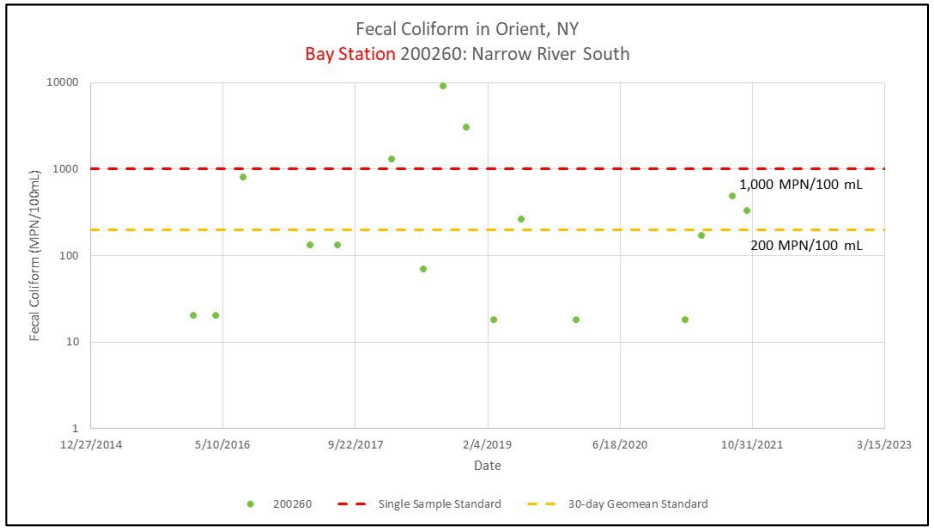
Subwatershed	Existing Conditions (lbs./day)	Projected Future Build-out (lbs./day)	% Change
Orient Harbor and tidal tributaries	75.3	70.4	-6.4%
Hallock/Long Beach Bay and tidal tributaries	98.7	94.8	-4.0%

Surface Water Quality - Fecal Coliform



Source:https://nysdec.maps.arcgis.com/apps/webappviewer/index.html?id=d98abc91849f4ccf8c38dbb70f8a0042

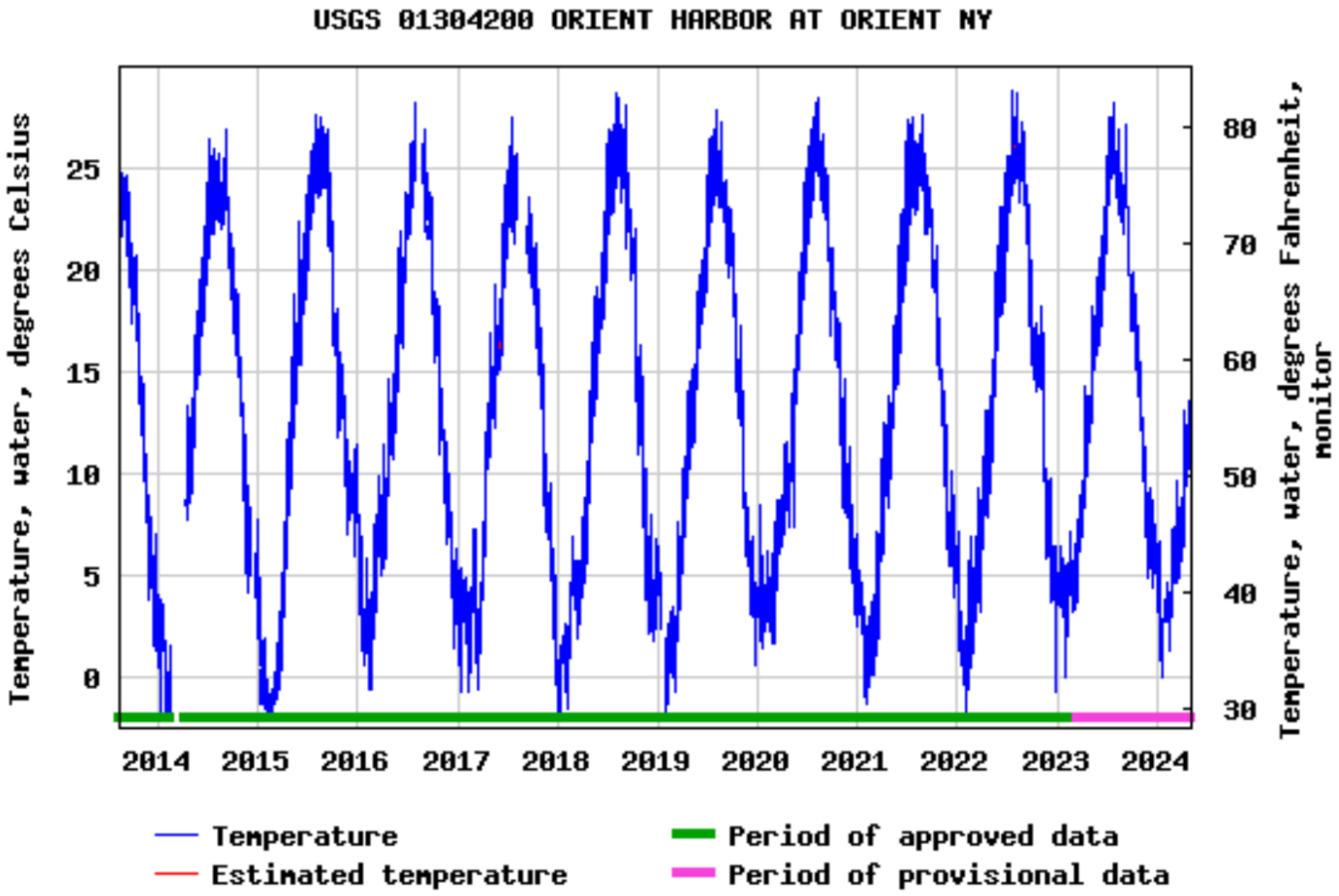




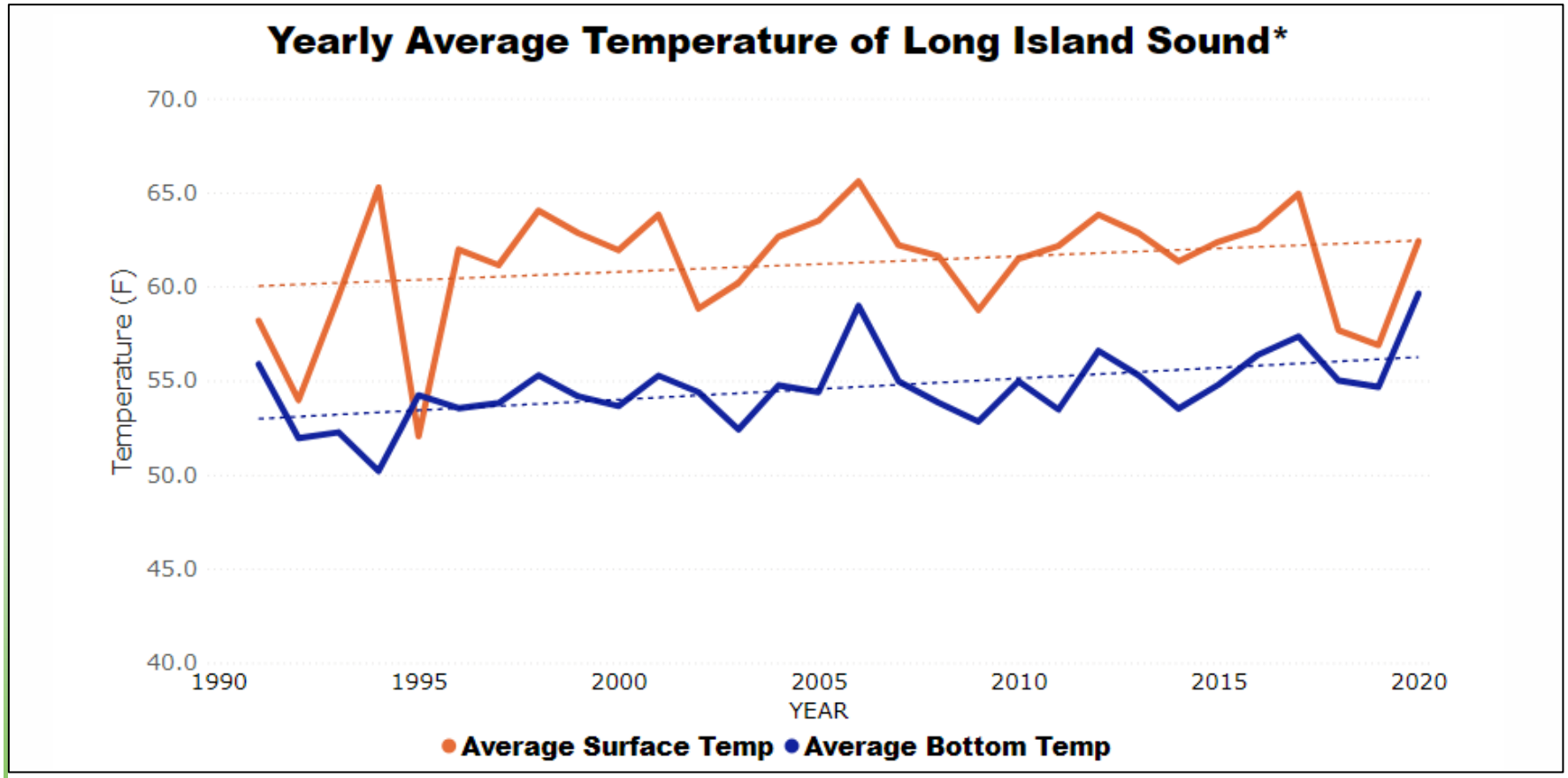
Surface Water Quality - Temperature

Temperature, water, degrees Celsius, monitor

Most recent instantaneous value: 13.1 05-07-2024 06:54 EST



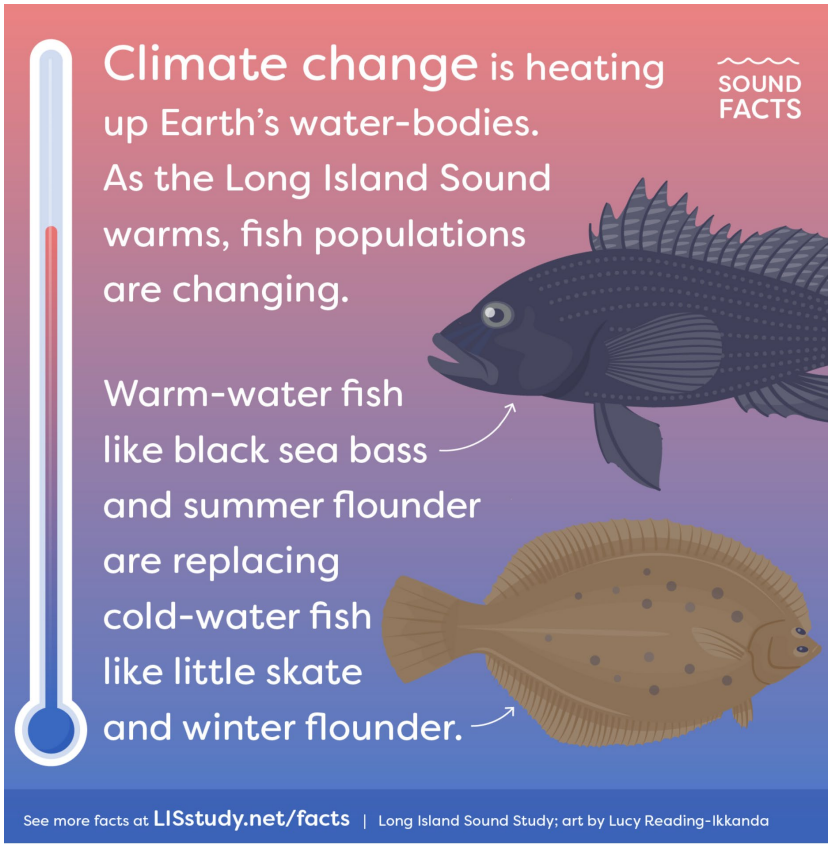
Surface Water Quality - Temperature



Surface Water Quality – Currently Very Good

Most Significant Stress: Climate Change

- Increased Water Temperature: increased occurrence, distribution and duration of HAB events
- Sea Level Rise and Increased Temperature: contributes to loss of eel grass and other Wetland Areas
- Sea level rise reduces separation between septic systems and water table and can result in discharges to surface waters
- More frequent, intense storm events can wash animal/waste into surface waters



Overview of Water Resource Issues

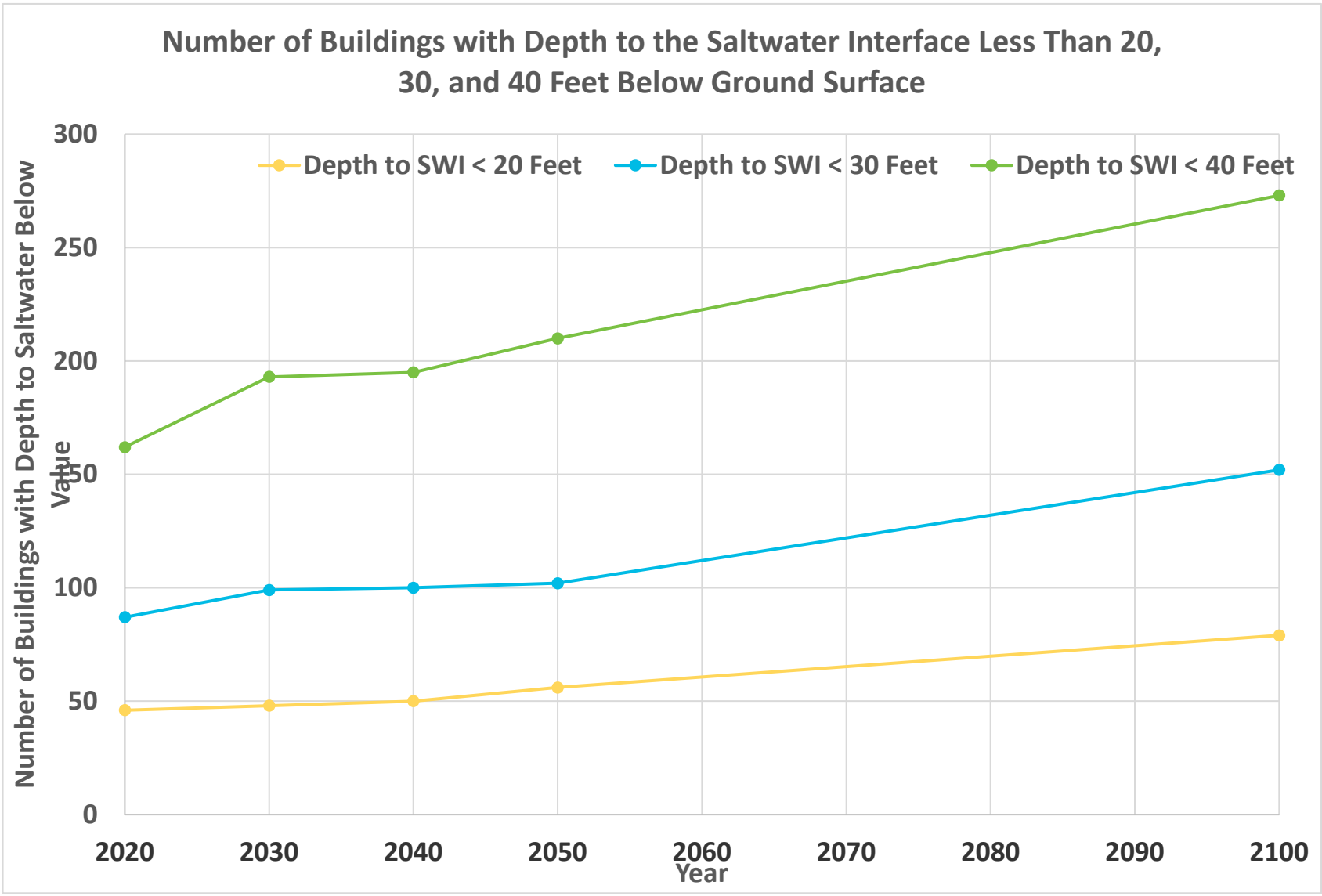
Water Resource Issues of Concern

- **Climate Change**
- Potable Water Supply - As a community, Orient has sufficient water to supply current and future projected demands, however:
  - Coastal wells are likely to be impacted from salt water intrusion, particularly during the summer months, and in the future as a result of sea level rise
  - High pumpage from inland wells may also cause salt water upconing
  - Nitrates, chlorides, PFAS and other contaminants of concern associated with wastewater disposal
- Wastewater Management – impacts on groundwater and surface waters

Climate Change Impacts

- Sea Level Rise
  - Potential impacts to infrastructure including water supply and wastewater management
- Increased Water Temperature
  - Potential impacts to ecosystems
- Increased Frequency of Intense Storm Events
  - Potential Flooding
- Ocean Acidification
  - Impacts on aquatic resources

Sea Level Rise Impacts



Sea Level Rise Impacts on Fresh Water Supply

Most Vulnerable Areas to Freshwater Thickness Reductions

Potential Solutions to Water Resources Issues

Climate Change Response Alternatives

- Climate change response to address water resources issues must be developed as one component of a larger framework that considers Orient access, homes, roads, etc.

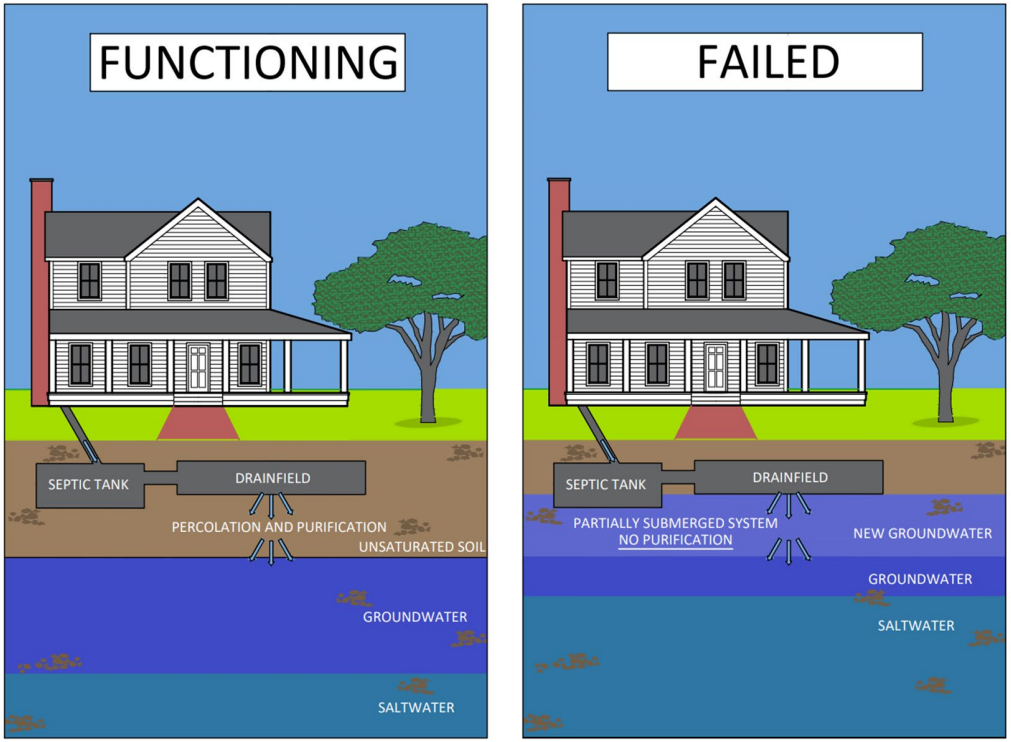
- Alternatives could include no action, shoreline hardening and elevation of roads/homes/septic systems, retreat, etc.

- Immediately - education, collaboration with agencies at all levels of government to access available funding and grants to study, plan and respond.

Nitrogen & Wastewater Management Alternatives

- No Action
- I/A OWTS Implementation
- Centralized Sewage Collection and Treatment System
- Fertilizer Management - PRBs/Biofiltration

Note: Wastewater management must consider much more than nitrogen – sea level rise impacts on pathogen indicator migration will be a more significant issue in coastal areas.

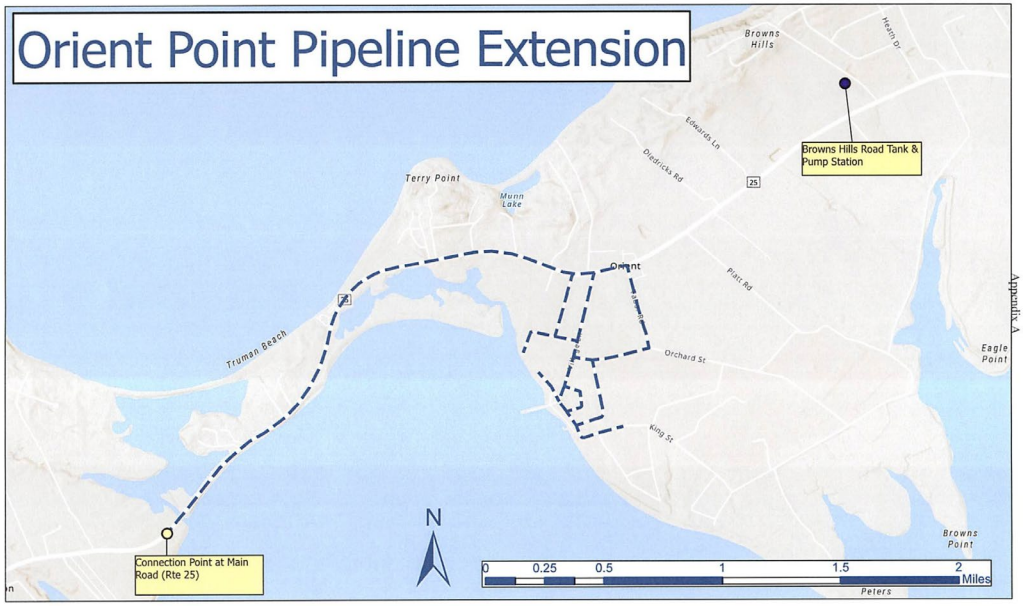


Courtesy of Barbara Friedman

Water Supply Solutions

Potential Water Supply Solutions

- No Action
- Individual Home Treatment Systems
  - Point of Use
  - Point of Entry
- SCWA Supply to Orient
- SCWA Supply to Village
- New Village Supply



Solutions Evaluated Considering Many Criteria

- **Protection of human health (e.g., adequate supply of water that meets drinking water standards)**
- Reliability
- Resiliency
- Impact on surface water resources/ecosystems
- Implementation (regulatory requirements, permitting)
- Siting Requirements/Construction Disturbance
- Impact on Development Potential
- Capital Cost
- Annual Operation and & Maintenance Costs
- Implementation Schedule

No Action

Actual/Perceived Benefits

- Residents retain complete independence
- Straightforward implementation
- Perceived deterrent to development
- Low cost of operation

Actual/Perceived Disadvantages

- Shallow wells vulnerable to contamination
- Wells (especially coastal wells) vulnerable to salt water intrusion and/or upconing
- Not always reliable/resilient or protective of human health

Home Treatment Systems

Actual/Perceived Benefits

- Provides increased protection of human health
- Homeowners retain complete independence
- Straightforward implementation
- Immediate implementation possible
- Perceived deterrent to development

Actual/Perceived Disadvantages

- Different treatment systems remove different contaminants - May not remove all contaminants of concern
- Wells (especially coastal wells) remain vulnerable to salt water intrusion and/or upconing
- Both capital and operation costs may be significant depending on technology
- Homeowner must maintain
- Resulting water quality not routinely monitored

Suffolk County Water Authority Supply

Actual/Perceived Benefits

- Highest level of human health protection
- Provides long-term reliability
- Provides long-term resiliency
- Improves quality of groundwater discharging to surface waters
- Consistent with Suffolk County Department of Health Services recommendations and code

Actual/Perceived Disadvantages

- Loss of independent control
- Perceived to encourage increased development
- Years-long implementation schedule
- Construction disturbance as distribution system is built
- ***Capital cost***
- ***Annual cost of water***

New Orient Water Supply

Actual/Perceived Benefits

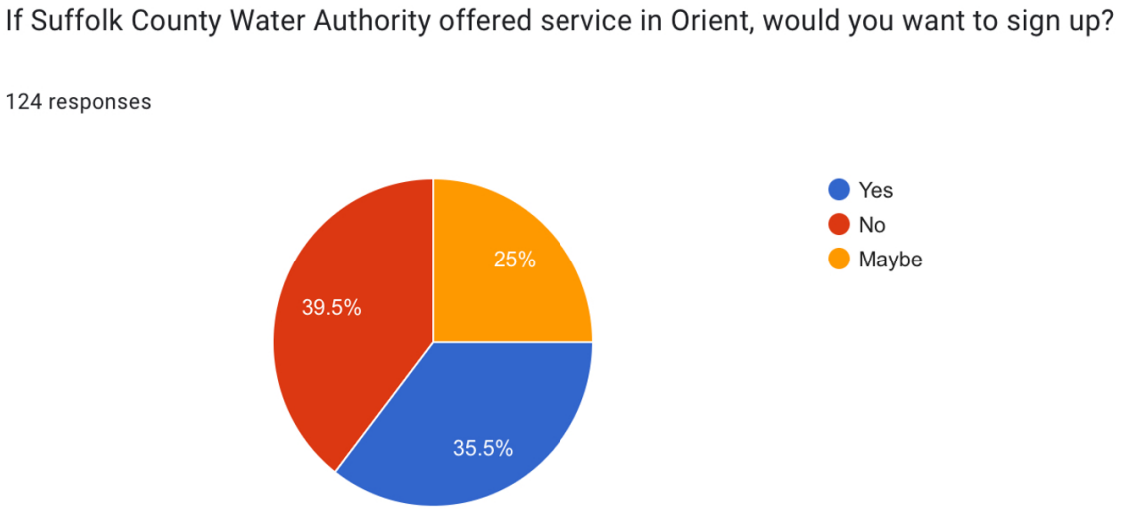
- Residents retain independence
- High level of human health protection
- Improves quality of groundwater discharging to surface waters

Actual/Perceived Disadvantages

- Challenging and potentially impossible implementation
- Unsustainable
- Most costly to implement
- Most costly to operate and maintain
- Anticipated decades-long implementation schedule
- Perceived to enable increased development
- Construction disturbance as wells, treatment plant and distribution system are built

Water Supply Solutions Summary

- SCWA supply would provide a reliable, sustainable source of water that consistently achieves drinking water quality criteria
- However, many members of the community strongly feel that public water is not the solution, as shown by OA's survey results:



Example Actions for Immediate Implementation

- Monitor private well quality ($100 fee): Private Well Water Testing Program (suffolkcountyny.gov)
- Conserve water, particularly during the growing season – limit irrigated areas and irrigation
- Utilize available programs to dispose of products containing hazardous materials (e.g., oils and fuels, paints and solvents, pesticides, Hazardous Waste | Southold, NY - Official Website (southoldtownny.gov)) and unused medications (example: CVS)
- Choose cleaning, household, and personal care products carefully
- Limited use of fertilizers

Discussion and Questions