Naval Facilities Engineering Systems Command
NAVFAC MID-ATLANTIC

Department of Navy
Naval Weapons Industrial Reserve Plant
Restoration Advisory Board Meeting

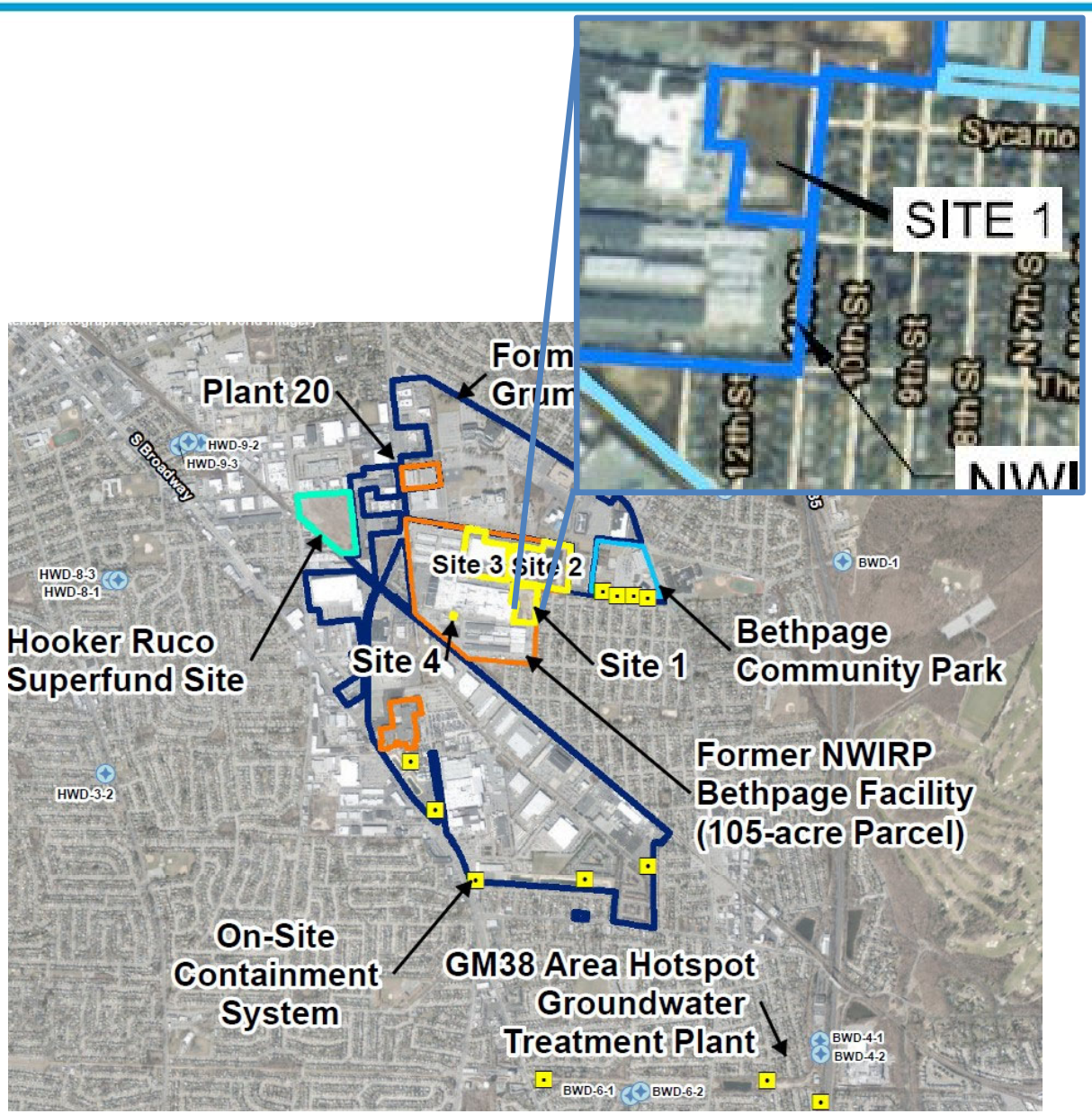
NWIRP Bethpage Program Overview

Presented by:
Scott Sokolowski, Remedial Project Manager
NAVFAC Mid-Atlantic
17 May 2023

Presentation Topics – NWIRP Bethpage Program Overview

- Site 1 General Update
- Site 4 General Update
- Phase I – GM38 Groundwater Treatment Plant Update
- Ongoing/Upcoming Remedial Construction Projects

Site 1



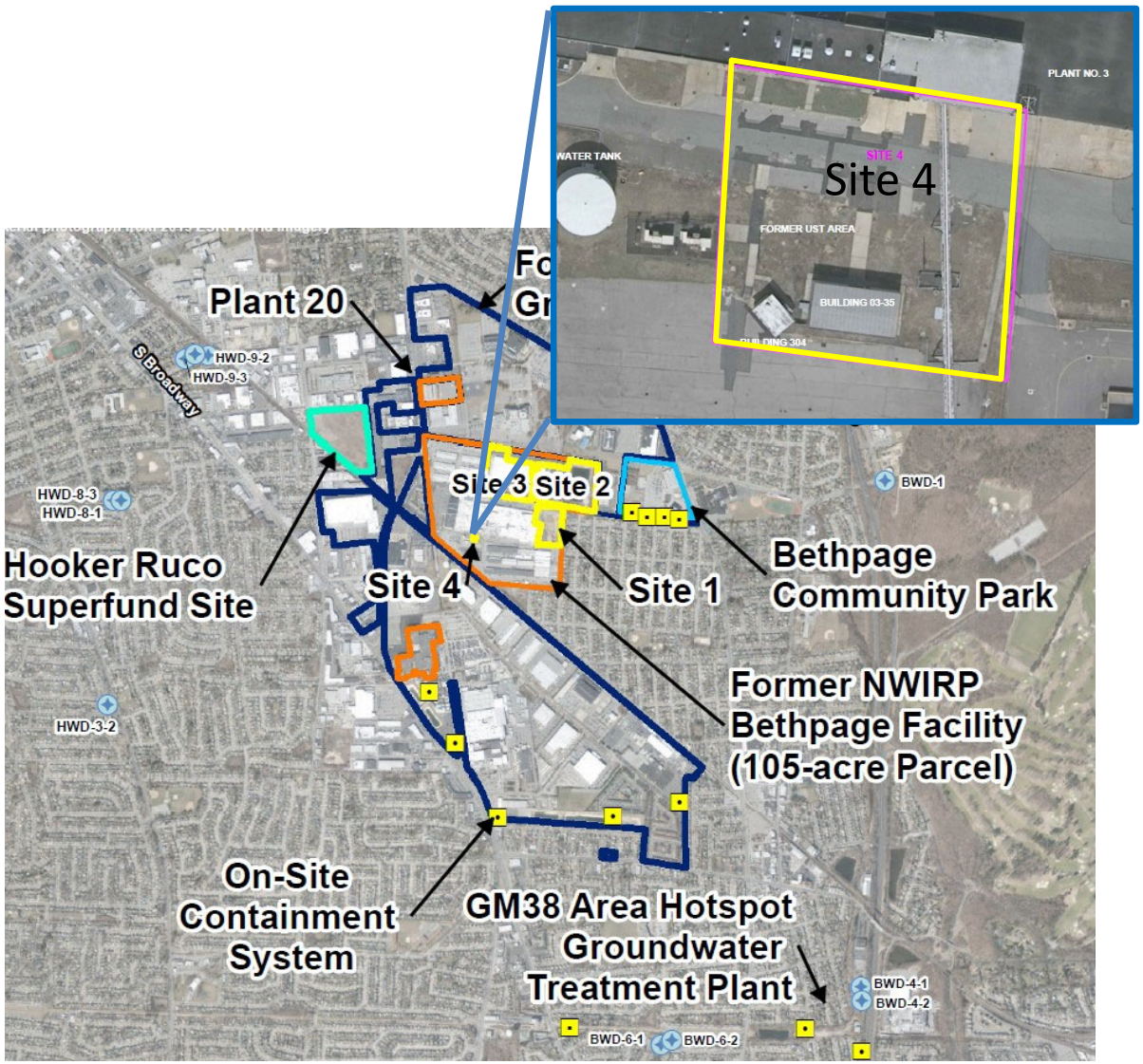
- Former drum marshalling area
- Soil removal actions completed in 2020
- All remedies are in place and operational
- Currently leased to Steel Equities from Nassau County

Site 1

- General Update
  - Remedial Action for Contaminated Soil is in its post construction Operation & Maintenance phase with quarterly inspections and site maintenance until February 2023
  - Soil Vapor Extraction System Expansion project was completed in August 2022

- Steel Equities have paved the site for use as a parking lot
- Surveys were completed to ensure that the Navy's remedial actions remain undisturbed

Site 4



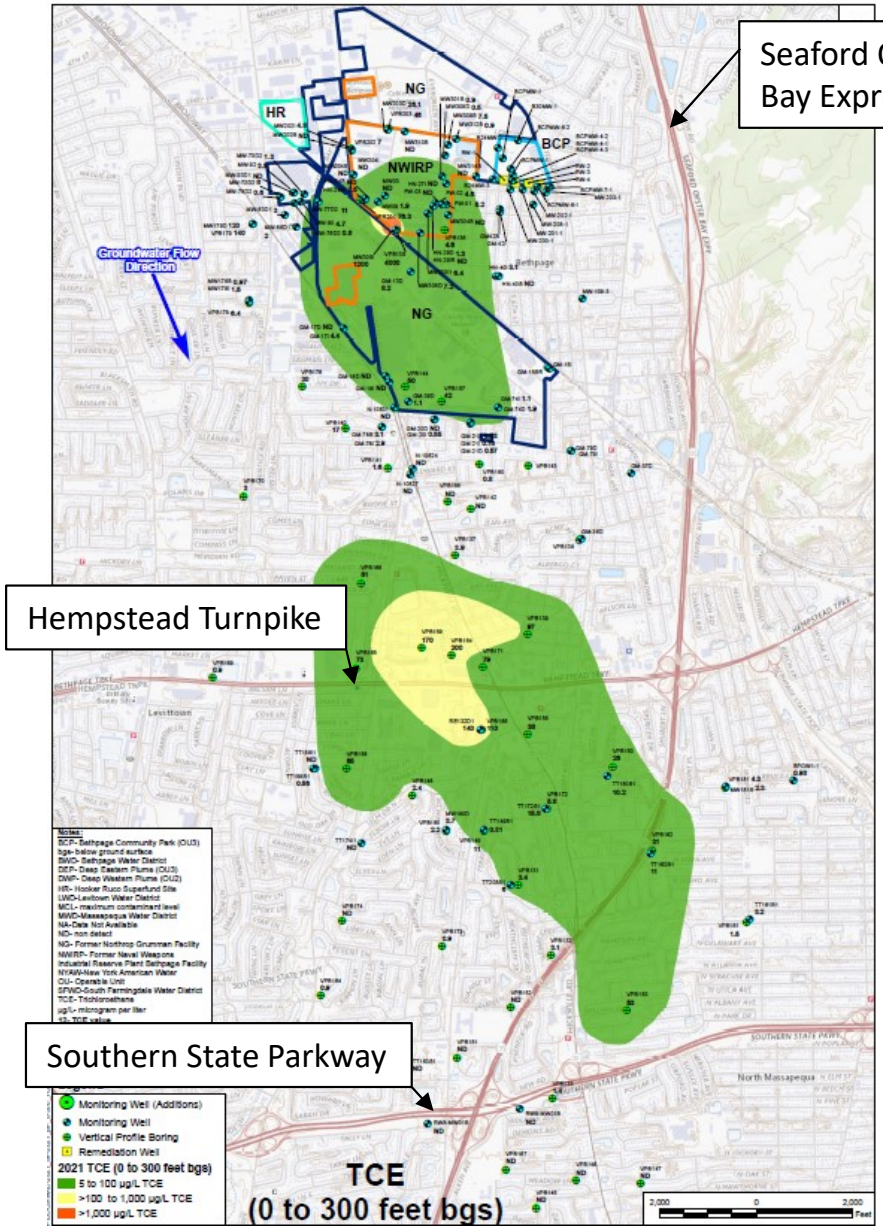
- Environmental concerns were first identified at Site 4 during a 1997 investigation by Northrop Grumman Corporation (NGC) that identified former USTs and petroleum-contaminated soil in the area.
- The steam injection pilot study was run from April 2019 to May 2020.
- Biosparge system has been operating since July 2021

Site 4 Update

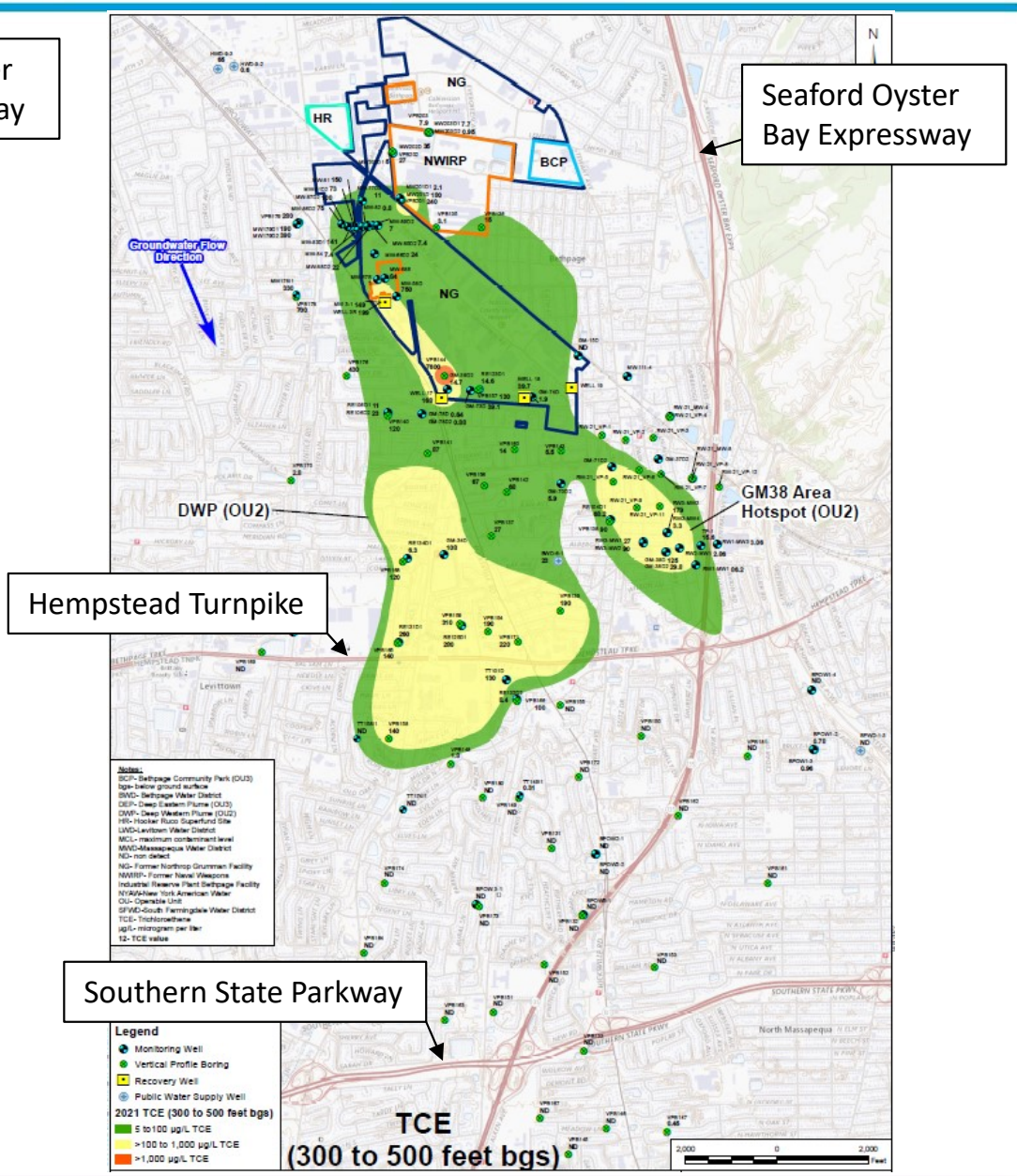
- The biosparge system will continue to operate for the next four years
- Conducting general site maintenance and upkeep

Navy-Northrop Grumman TCE Plume Maps

Shallow

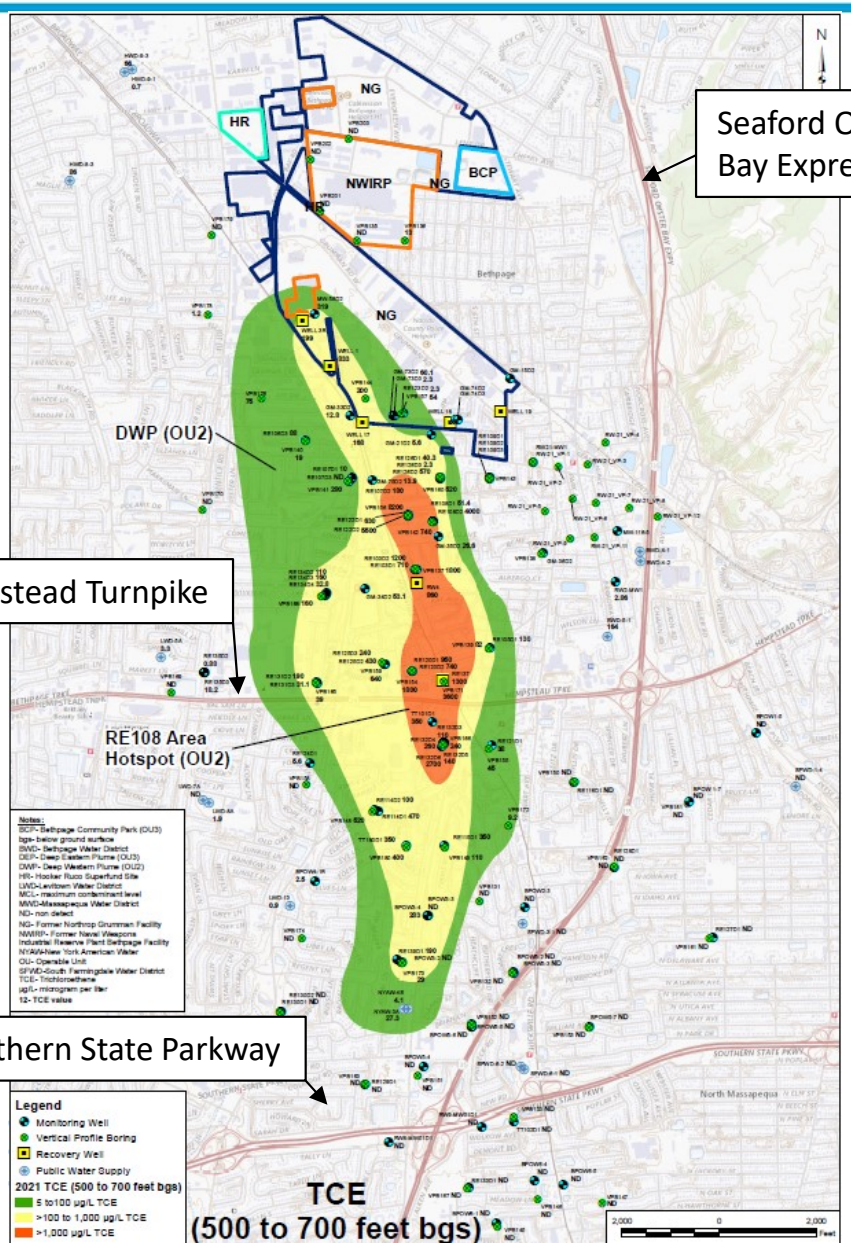


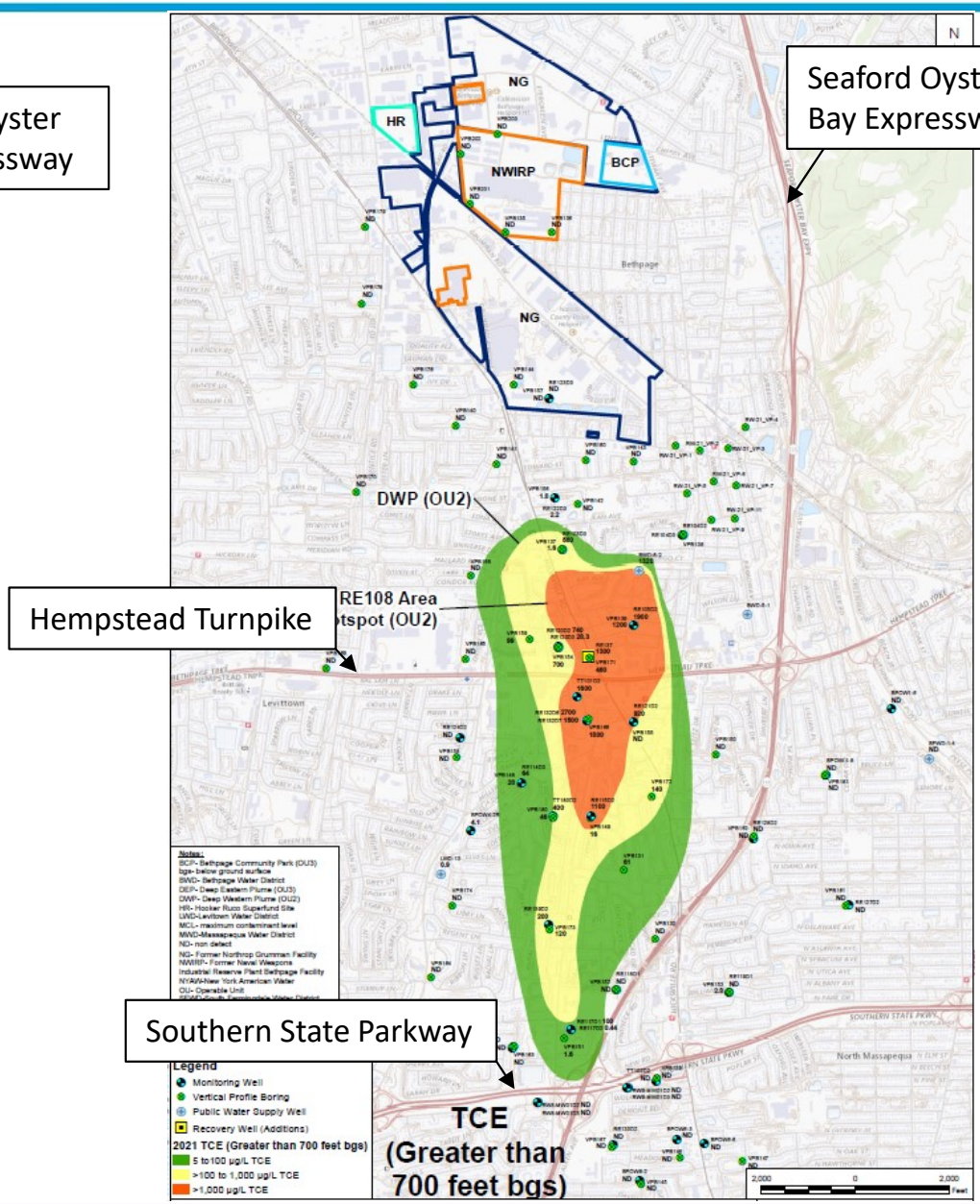
Intermediate



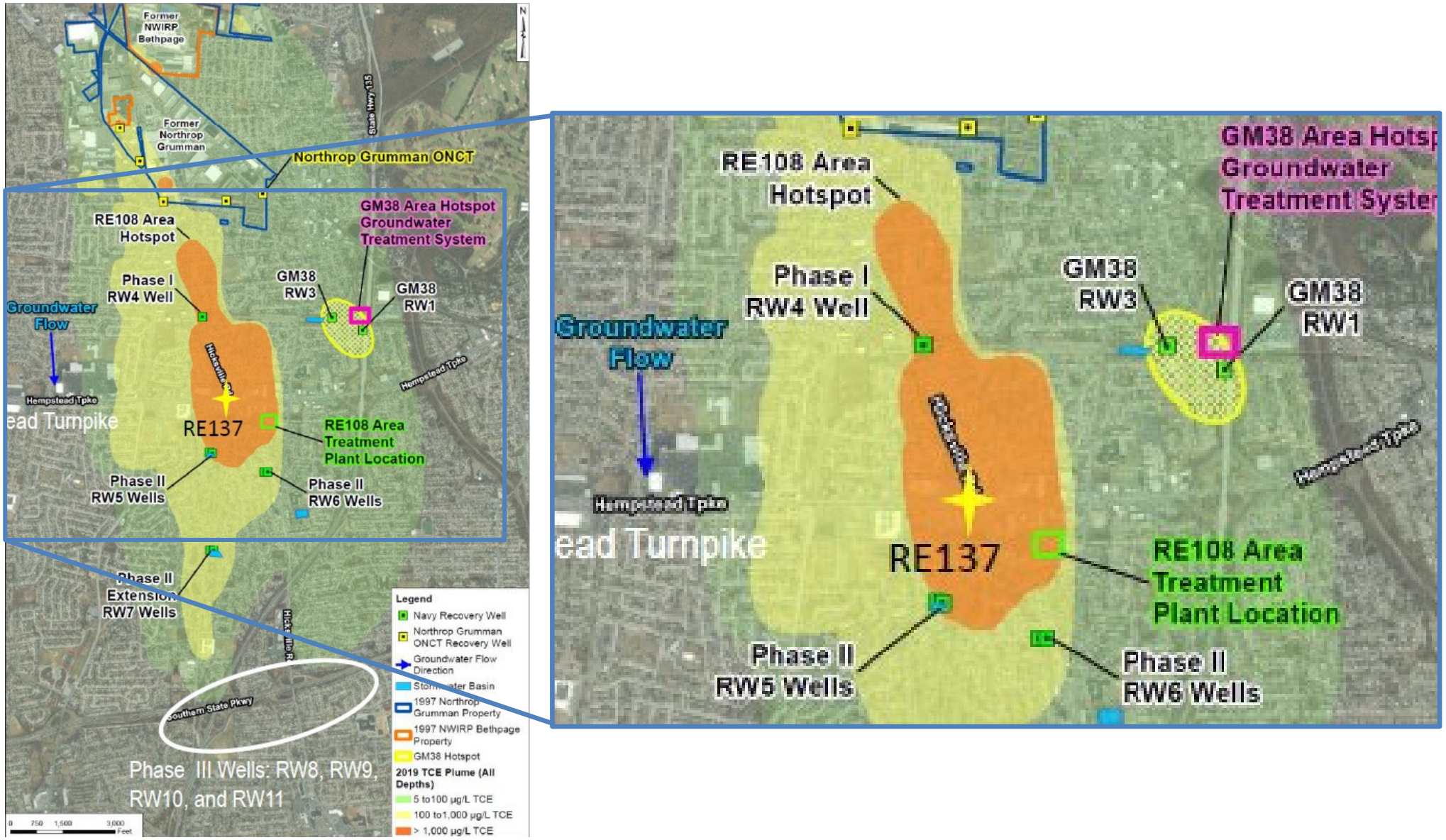
Navy-Northrop Grumman TCE Plume Maps

Deep





Phase I
RE108 Hotspot



Phase I
RE108 Hotspot

- GM38 Groundwater Treatment Plant Update
  - Advanced Oxidation Processing (AOP) was added to the plant in April 2021 for the treatment of 1,4 dioxane. The system has been operating as it should since it's installation.
  - Navy is planning upgrades in 2024 to the treatment plant to increase treatment capacity.
  - The GM38 groundwater treatment plant is operating as expected, water testing of the system is taking place monthly and 1,4 dioxane and trichloroethylene (TCE) are non-detect or very low in the effluent.

GM38 AOP


GM38 Peroxide Tank


RE137 AOP

Ongoing/Upcoming Remedial Construction Projects

- Remedial Construction Projects
  - Much of the Navy's remedy relies on recovery wells. Recovery wells are strategically placed to pump contaminated water from the plume and treat the water to drinking water standards for discharge to local basins.
  - The RE137 temporary treatment system (near the intersection of Hicksville Road and Hempstead Turnpike) will operate until RE137 is connected into the GM38 Groundwater Treatment Plant in 2024.
  - Phase II Recovery Wells 5A, 5B, 6A, 6B, 7A, and 7B have been completed.
  - Phase III Recovery Wells 8 and 9 are complete. RW10 site work will begin in November/December 2022. The Phase III Groundwater Treatment Plant design is in progress.
  - Phase II Groundwater Treatment Plant construction began in December 2021 and is projected to be commissioned June 2023 with full operation by October 2023.

NEXT: Groundwater Monitoring Results
Dave Brayack, Tetra Tech

Naval Facilities Engineering Systems Command
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Naval Weapons Industrial Reserve Plant Bethpage
Restoration Advisory Board Meeting

Operable Unit 2 Groundwater Monitoring/ Modeling Results

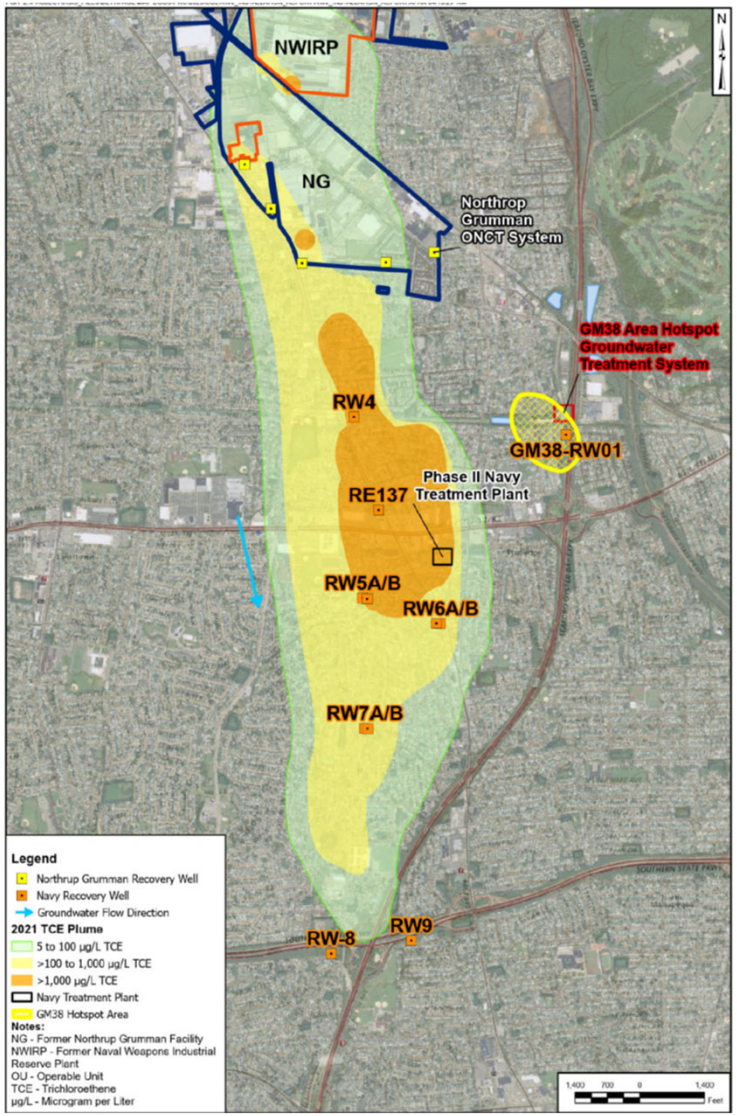
Presented by:
David Brayack, Project Manager
Tetra Tech
17 May 2023

Operable Unit 2 Groundwater Monitoring, Treatment, and Interim Action Update Outline

- Overview of the OU2 Remedial Activities
- OU2 Groundwater Monitoring Activities
- OU2 Groundwater Fate and Transport Modeling

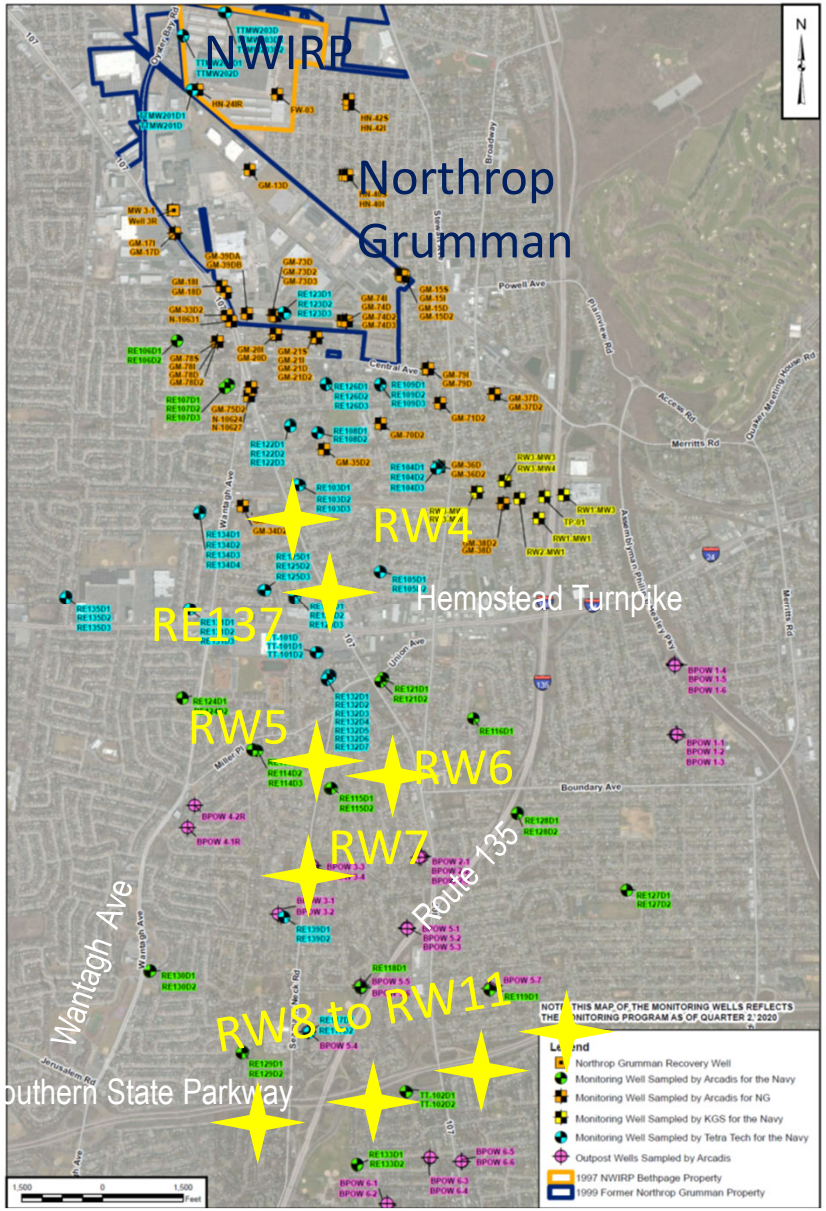
OU2 Groundwater Remediation Overview

- Northrop Grumman Onsite Containment System – 1998
- Navy GM38 Area Hotspot Treatment System – 2009
- Navy GM38 Advanced Oxidation Process (AOP) – May 2021
- Navy Phase I Recovery Well RW4 to GM89 Treatment System – April 2021
- Navy RE137 Interim Treatment System – March 2022
- Navy Phase II Recovery Wells – 5 of 6 complete
- Navy Phase II Treatment System – under construction
- Navy Phase III Recovery Wells – 2 of 4 completed



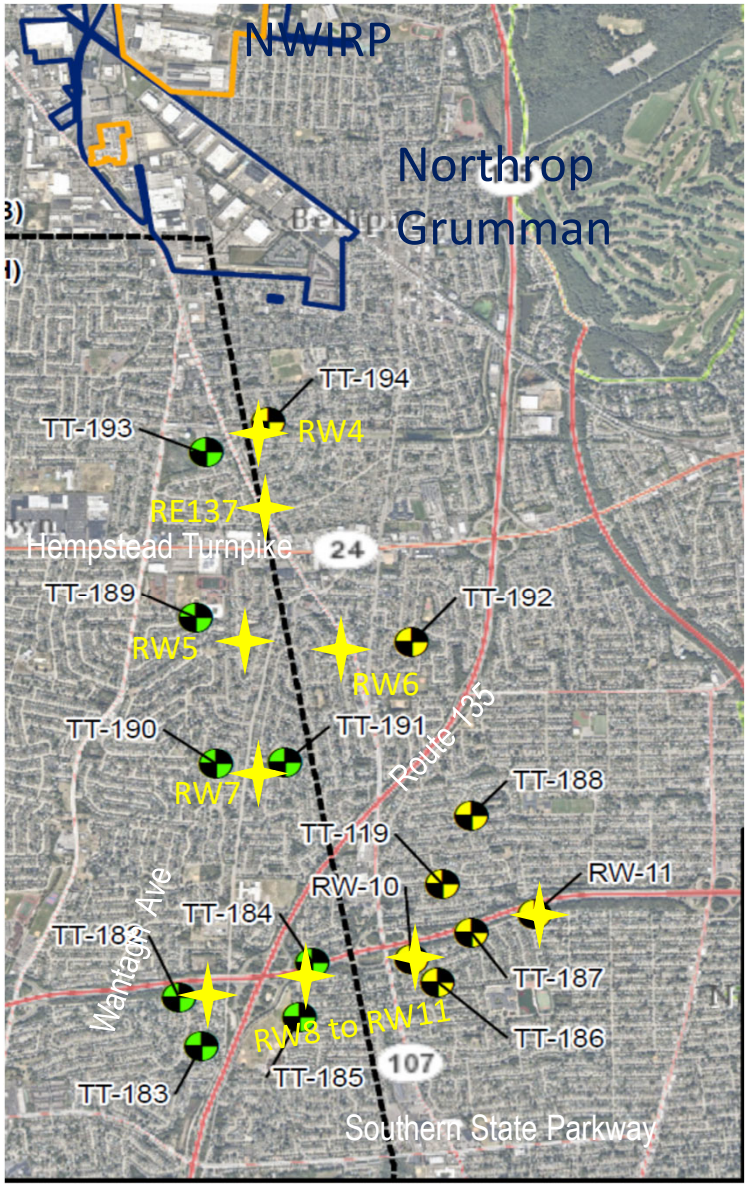
OU2 Groundwater Monitoring Program

- Monitoring – OU2 plume migration, attenuation, and cleanup
- Groundwater samples – 180 wells on a quarterly, semi-annual, or annual basis, and analyzed for Volatile Organic Compounds (VOCs) and 1,4-dioxane
- Recovery Wells RW4 and RE137 are installed and operating
- Recovery Wells RW5A/5B, RW6A/B, RW7A/B, RW8 and RW9 are installed
- Recovery Well RW10 vertical profile boring and monitoring wells are installed, currently evaluating the data
- Drilling moved to Recovery Well RW11 area early May



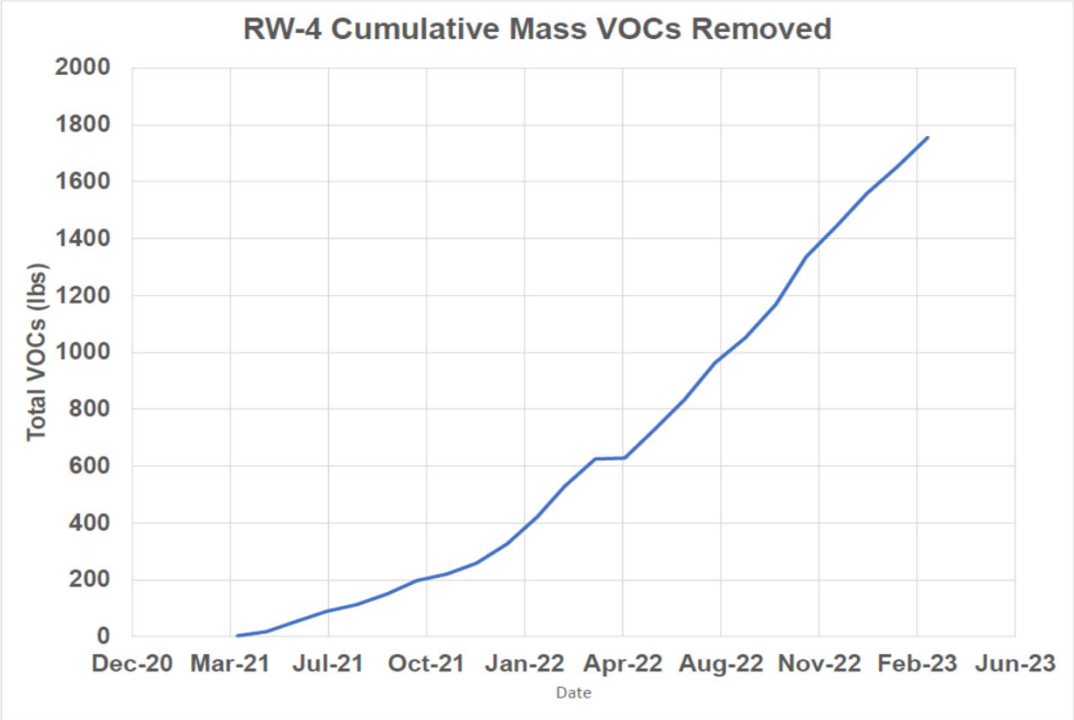
OU2 Groundwater Monitoring Program

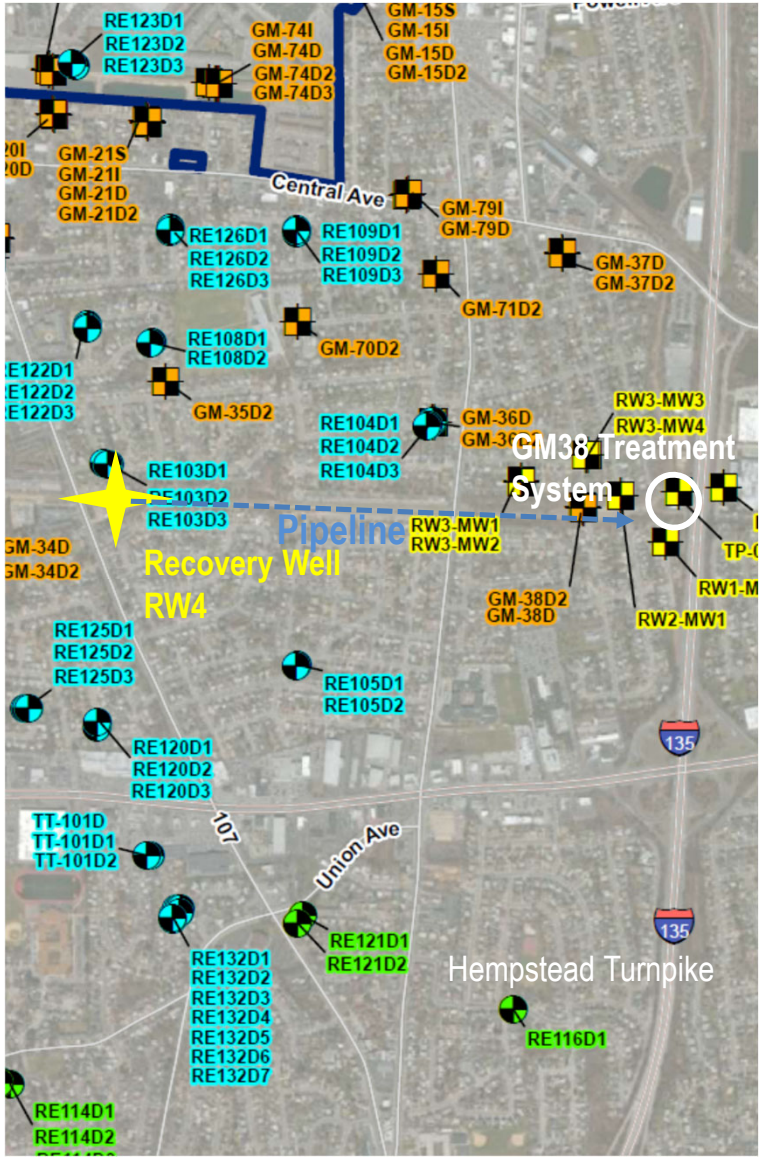
- New monitoring wells continue to be added as needed:
  - ➢Shallow and intermediate-depth groundwater data gap wells (200 to 350 feet below ground surface): completed in 2022
  - ➢Additional data gap wells planned for 2023 and 2024 – to support plume cleanup and capture analysis
- **Monitoring well program has shifted from plume delineation to support of plume cleanup**



OU2 Groundwater Monitoring – Recovery Well RW4 (Phase I)

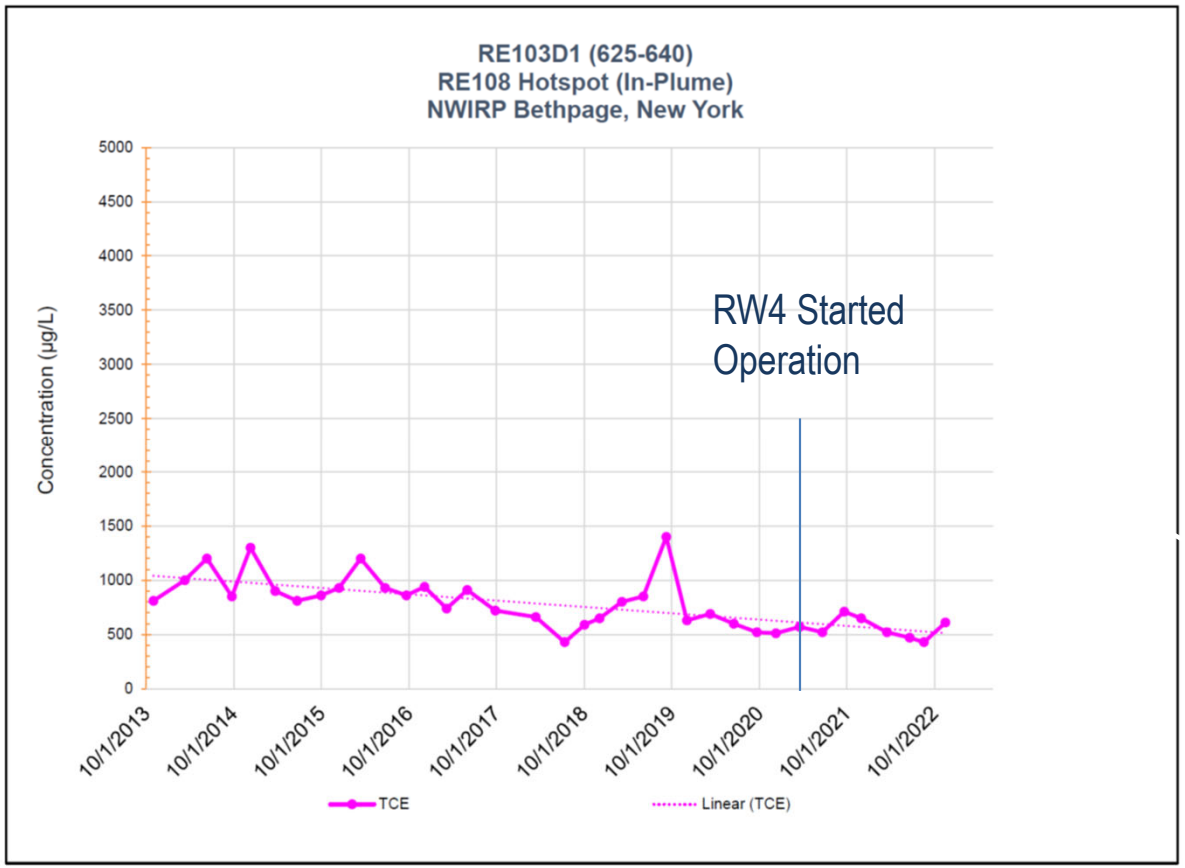
- Well and pipeline started operation in April 2021
- Trichloroethene (TCE) mass removal continues, pumping rate is 0.72 million gallons per day (MGD)
- 102 Pounds of VOCs were removed in March 2023
- Groundwater is treated at GM38 Treatment System

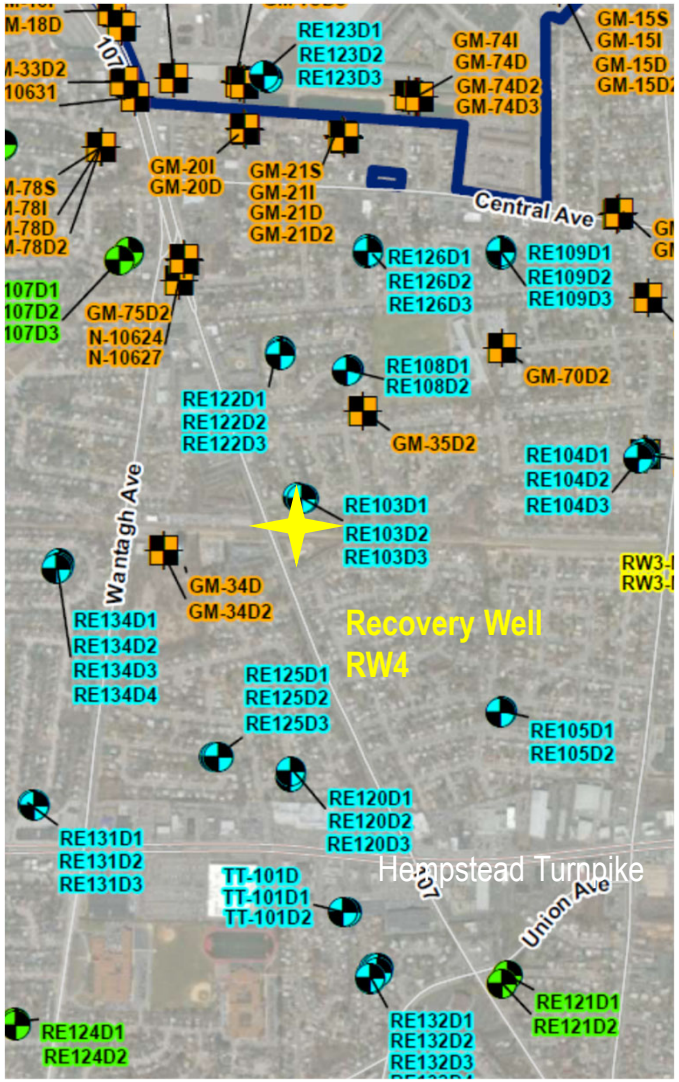




OU2 Groundwater Monitoring – Recovery Well RW4 (Phase I)

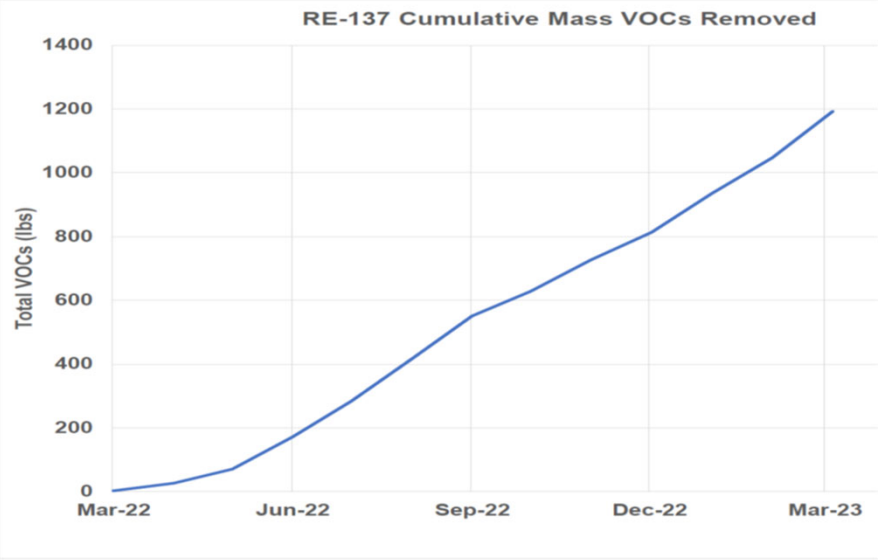
- Changes in water level and VOC concentrations in nearby monitoring wells are used to evaluate effectiveness of recovery wells
- Water level data is processed with computer modeling

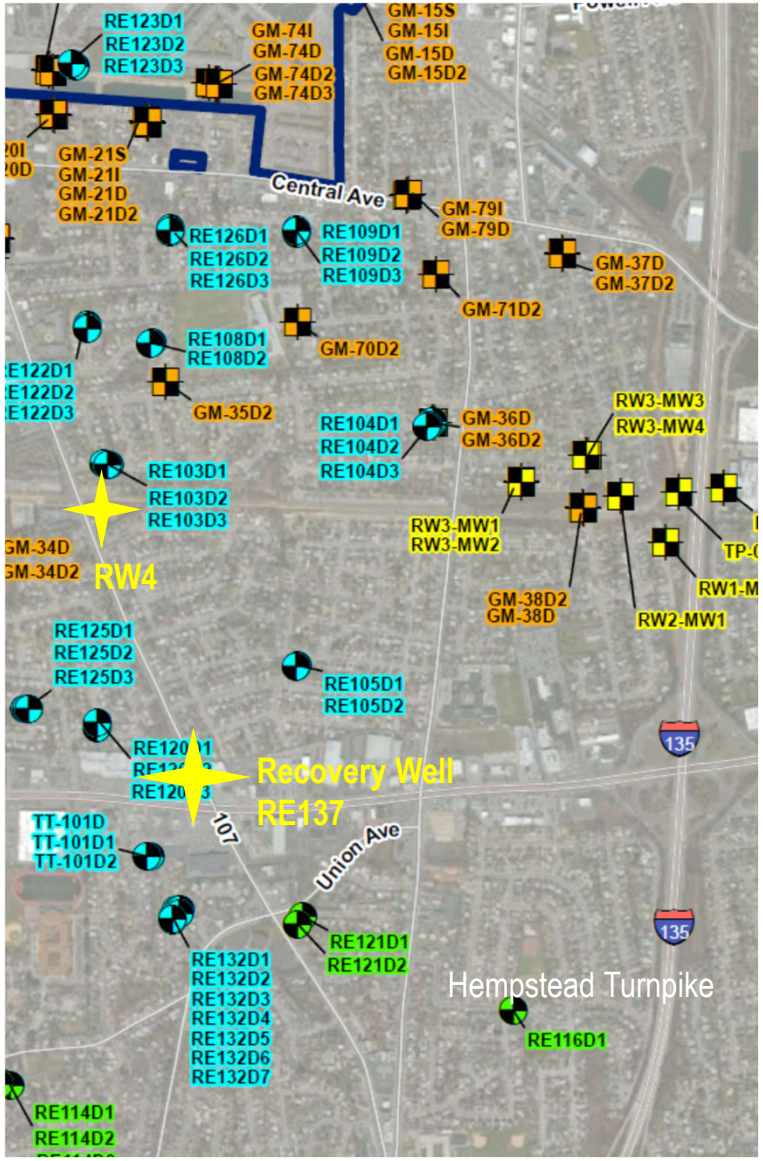




OU2 Groundwater Monitoring – Recovery Well RE137

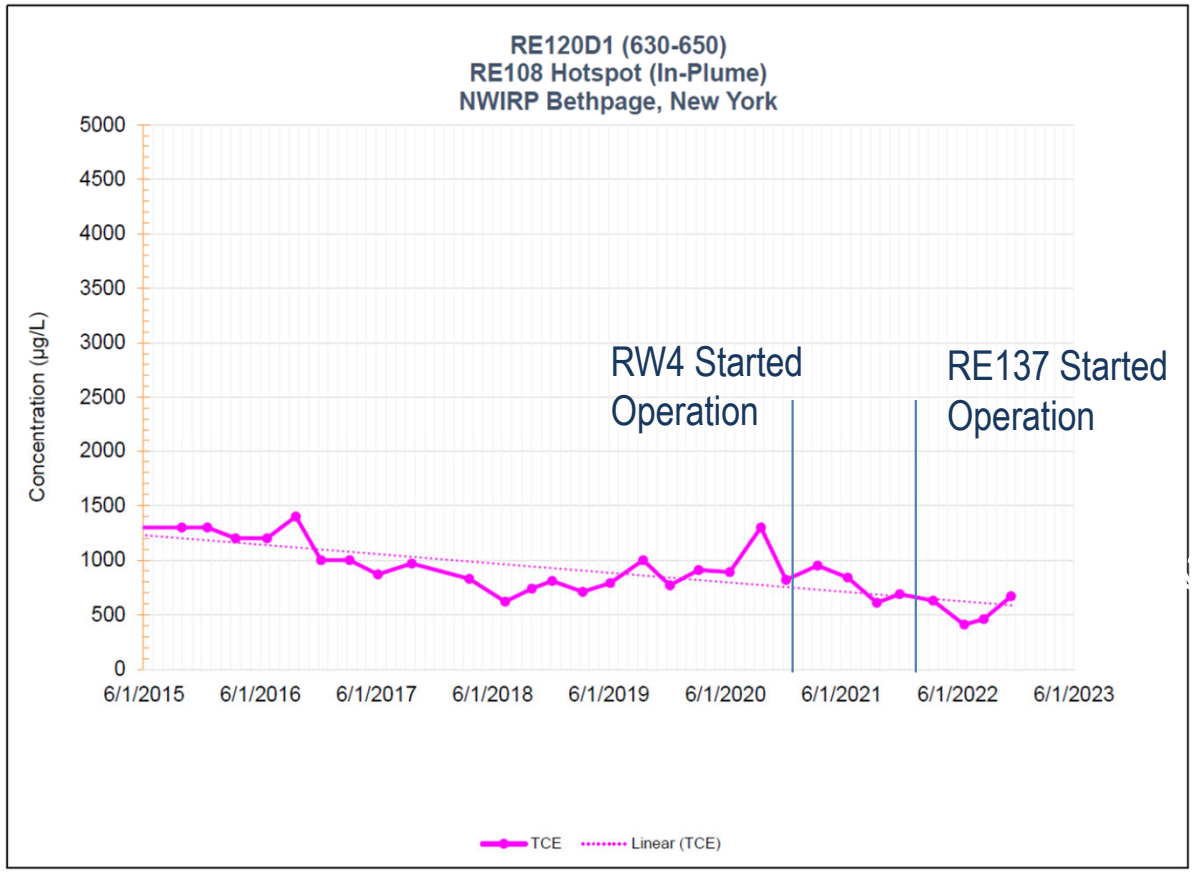
- Well started operation in March 2022
- Trichloroethene (TCE) mass removal continues, pumping rate is 0.52 MGD
- Groundwater is treated locally using Advanced Oxidation Process (AOP) system and Granular Activated Carbon (GAC), discharged into adjacent basin
- 129 Pounds of VOCs were removed in March 2023

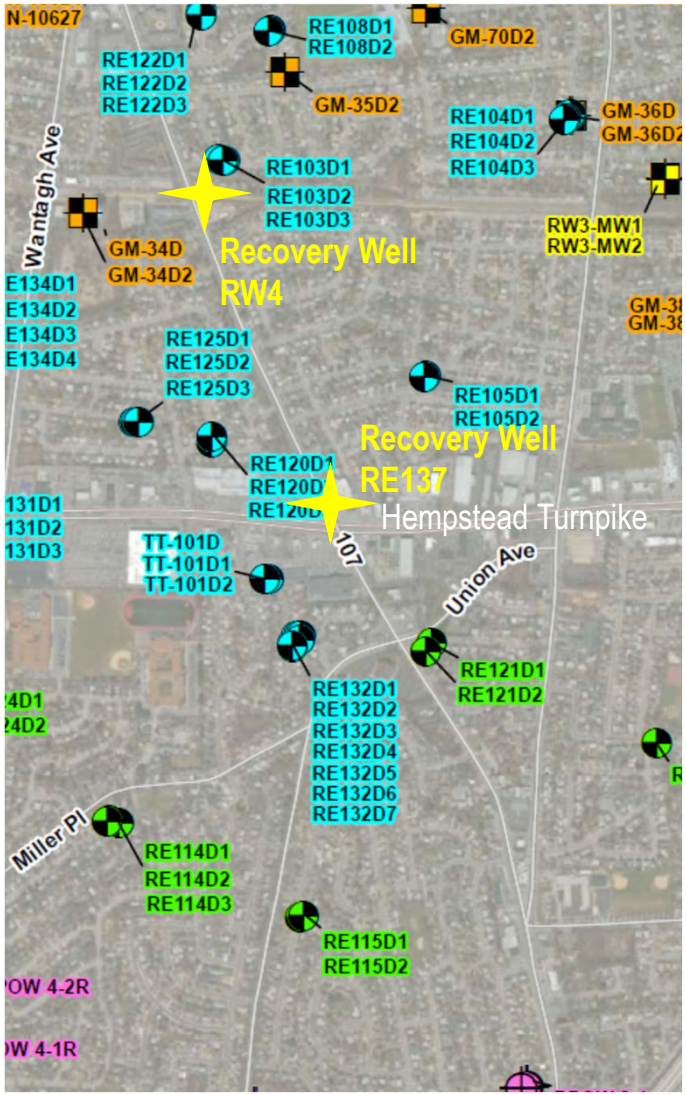




OU2 Groundwater Monitoring – Recovery Well RE137

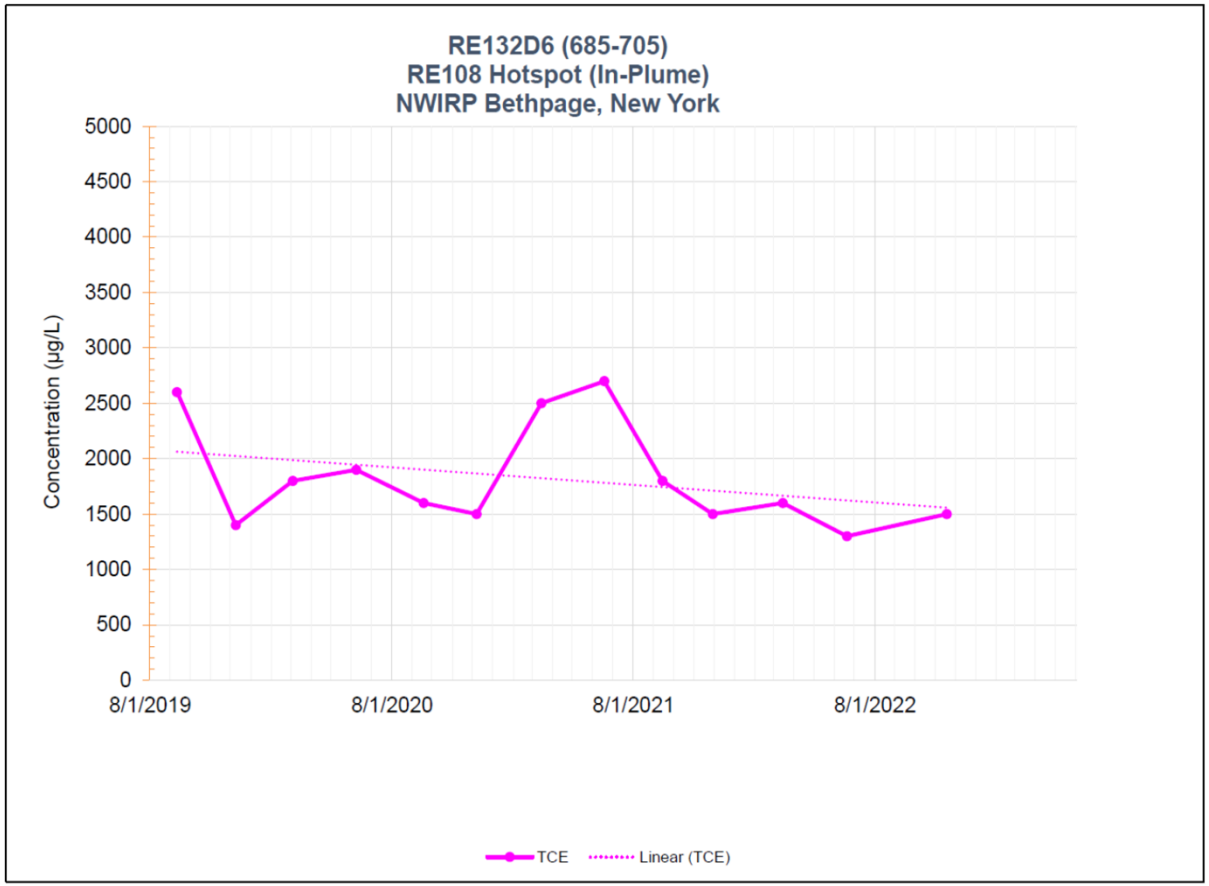
- Pilot testing – Startup in March 2022
- Planned operation through December 2023, and potentially longer

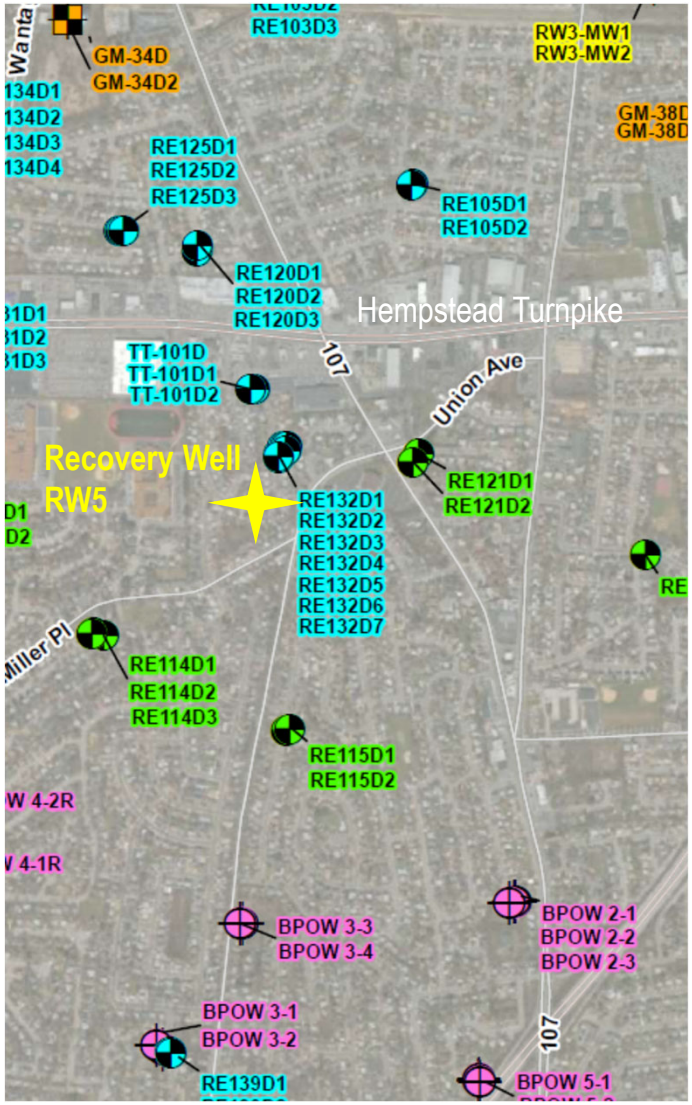




OU2 Groundwater Monitoring – Recovery Well RW5 (Phase II)

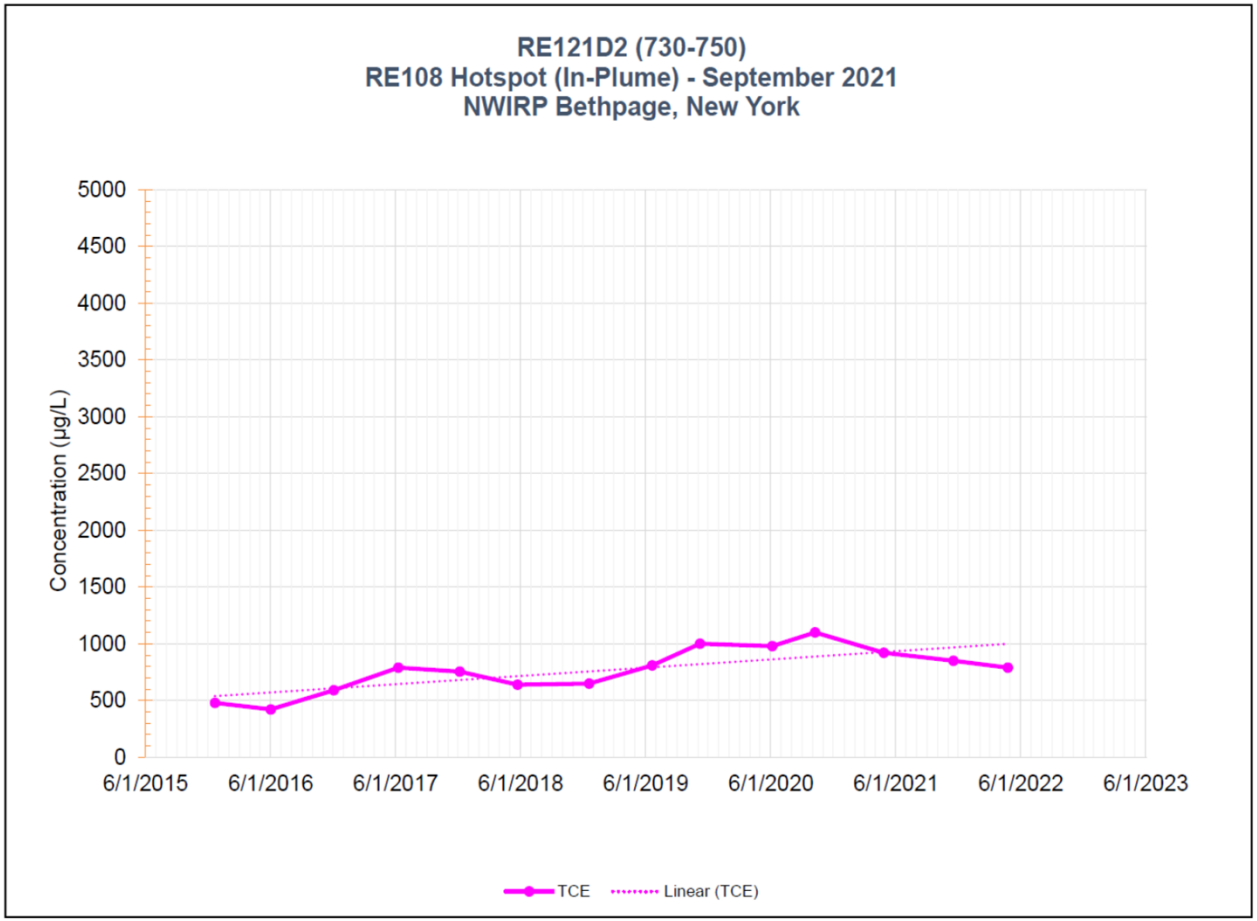
- RW5A/B installation completed (May 2023) with planned operation in 2023

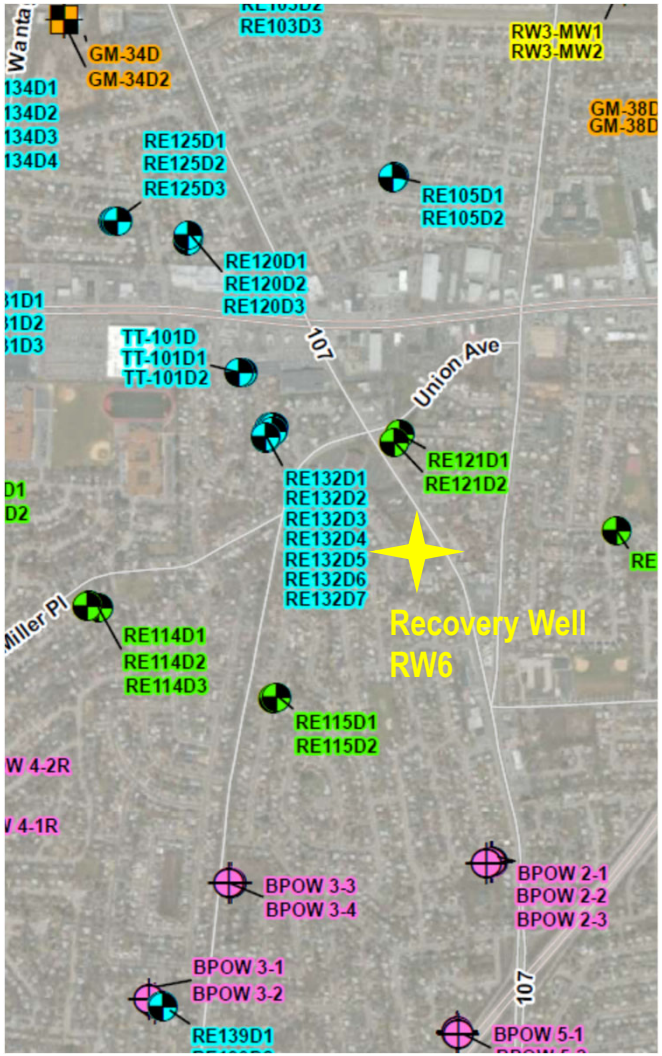




OU2 Groundwater Monitoring – Recovery Well RW6 (Phase II)

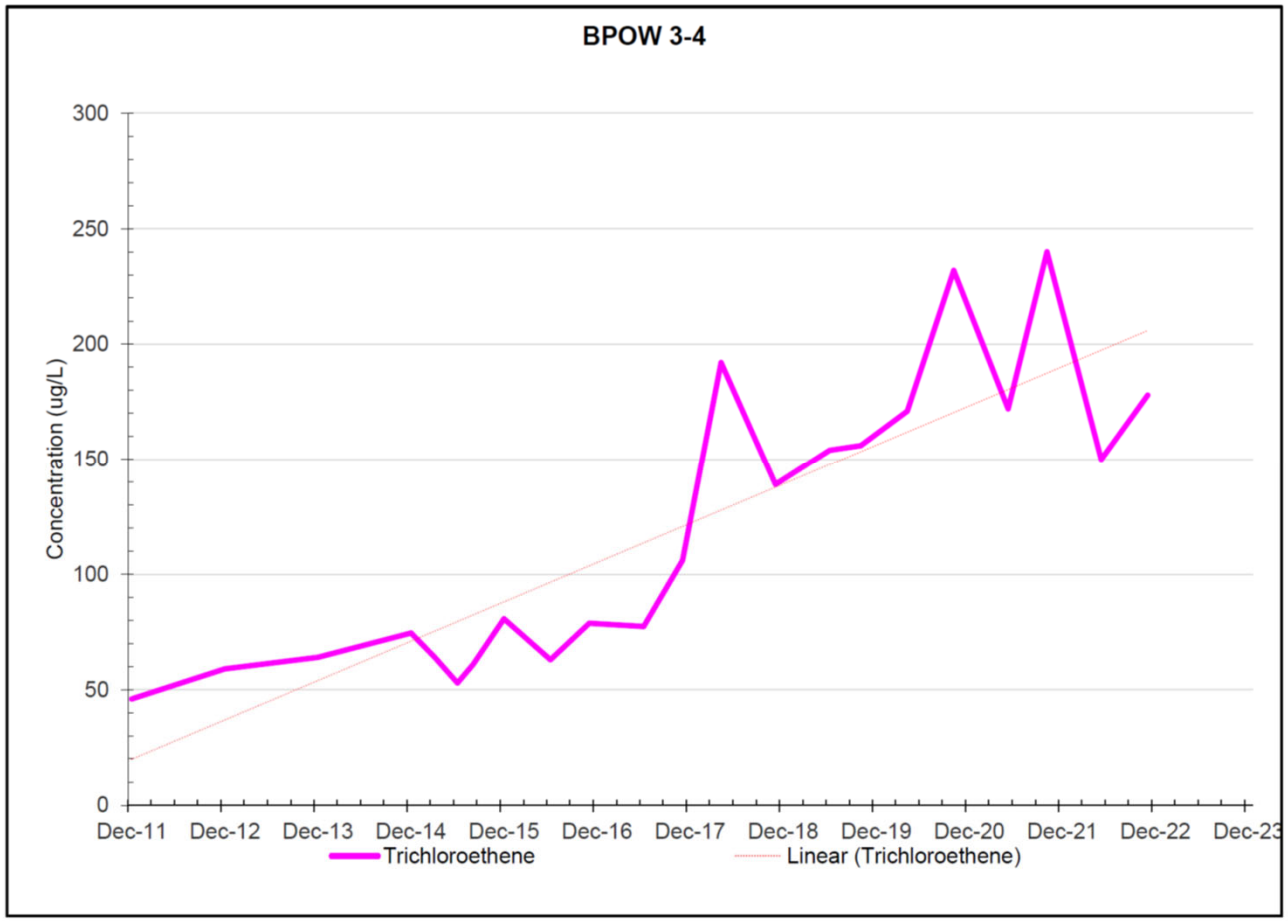
- RW6A/B are installed and planned for operation in 2023

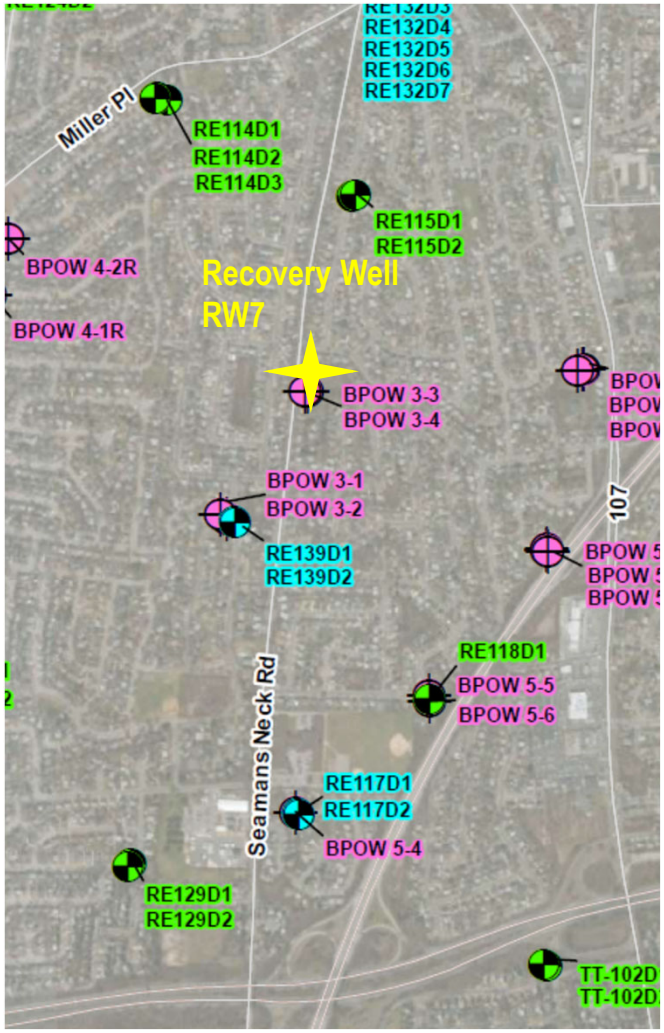




OU2 Groundwater Monitoring – Recovery Well RW7 (Phase II Extension)

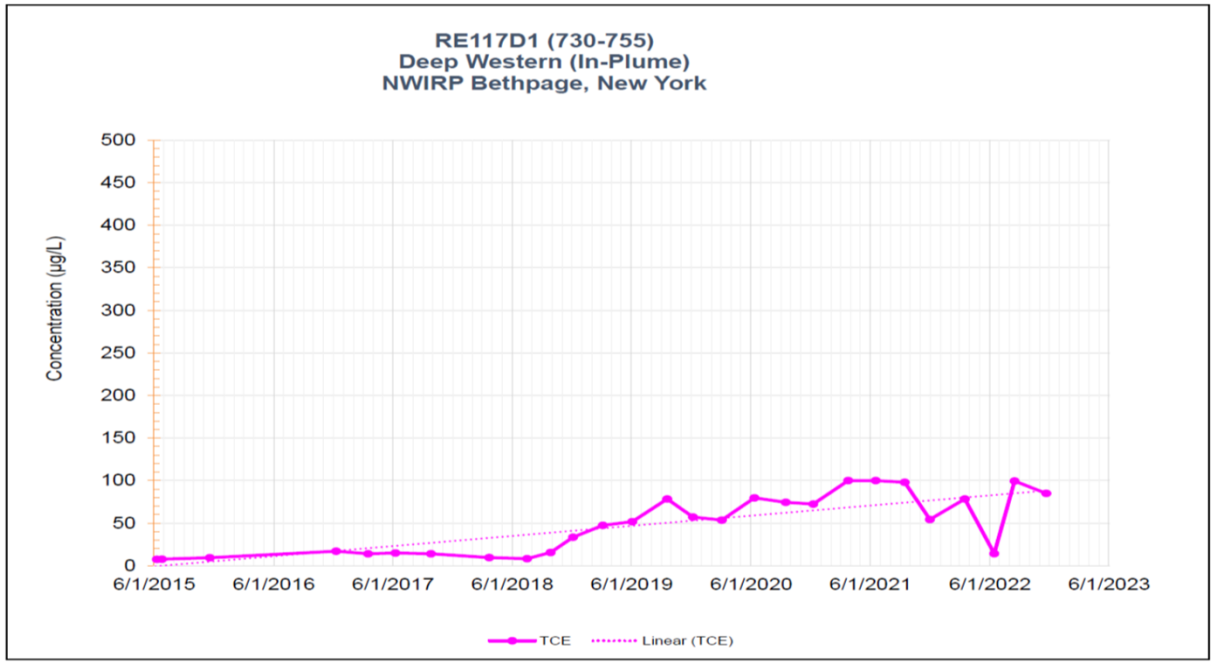
- RW7A/B are installed and planned for operation in 2023

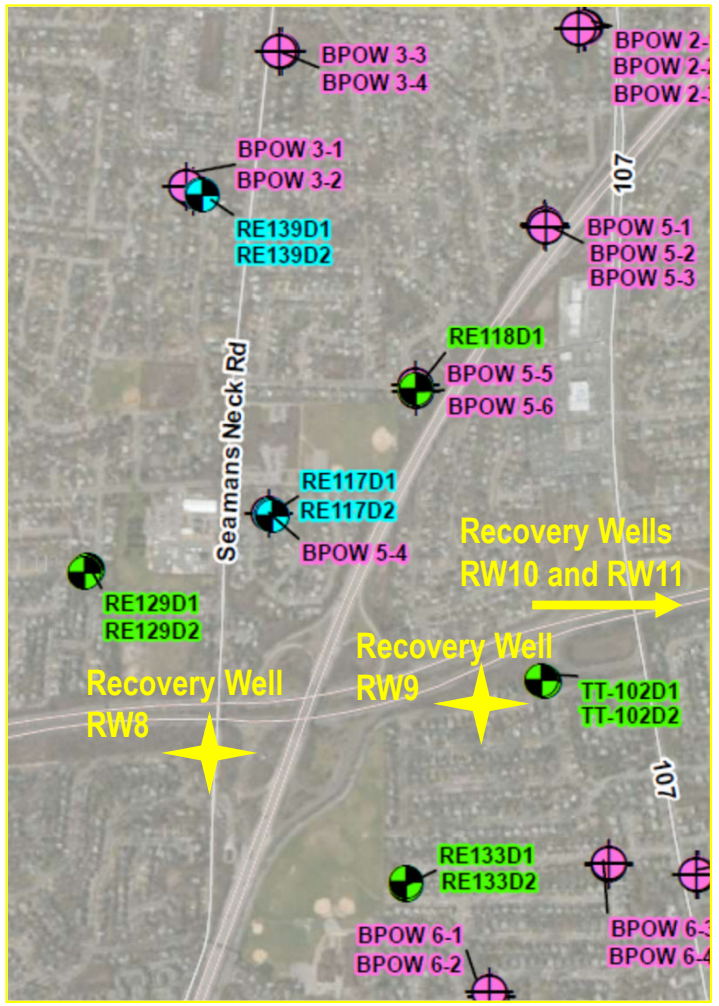




OU2 Groundwater Monitoring – Recovery Well RW8 to RW11 (Phase III)

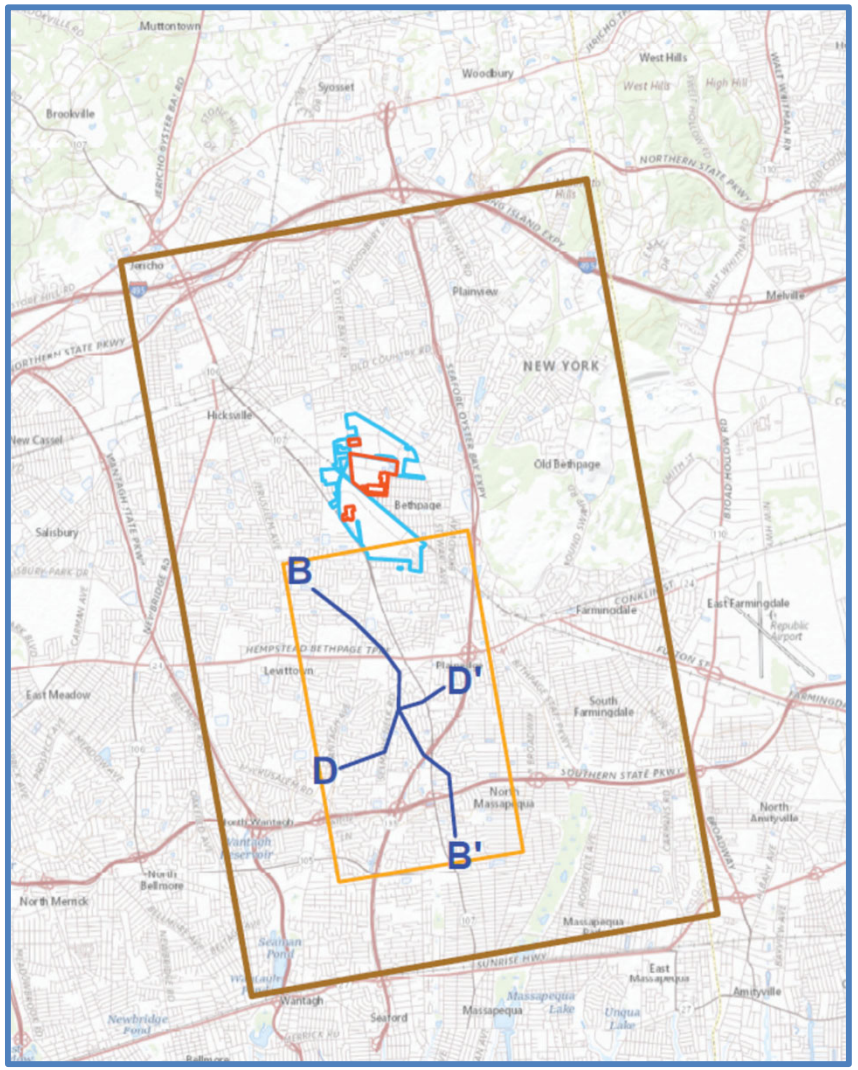
- Recovery Wells RW8 and RW9 target deep groundwater at monitoring well RE117
- RW8 and RW9 are installed, pumping tests completed in December 2022. Design activities are underway, with system to be constructed in 2024
- RW10 VPB and monitoring wells completed
- RW11 VPB and monitoring wells started in May 2023





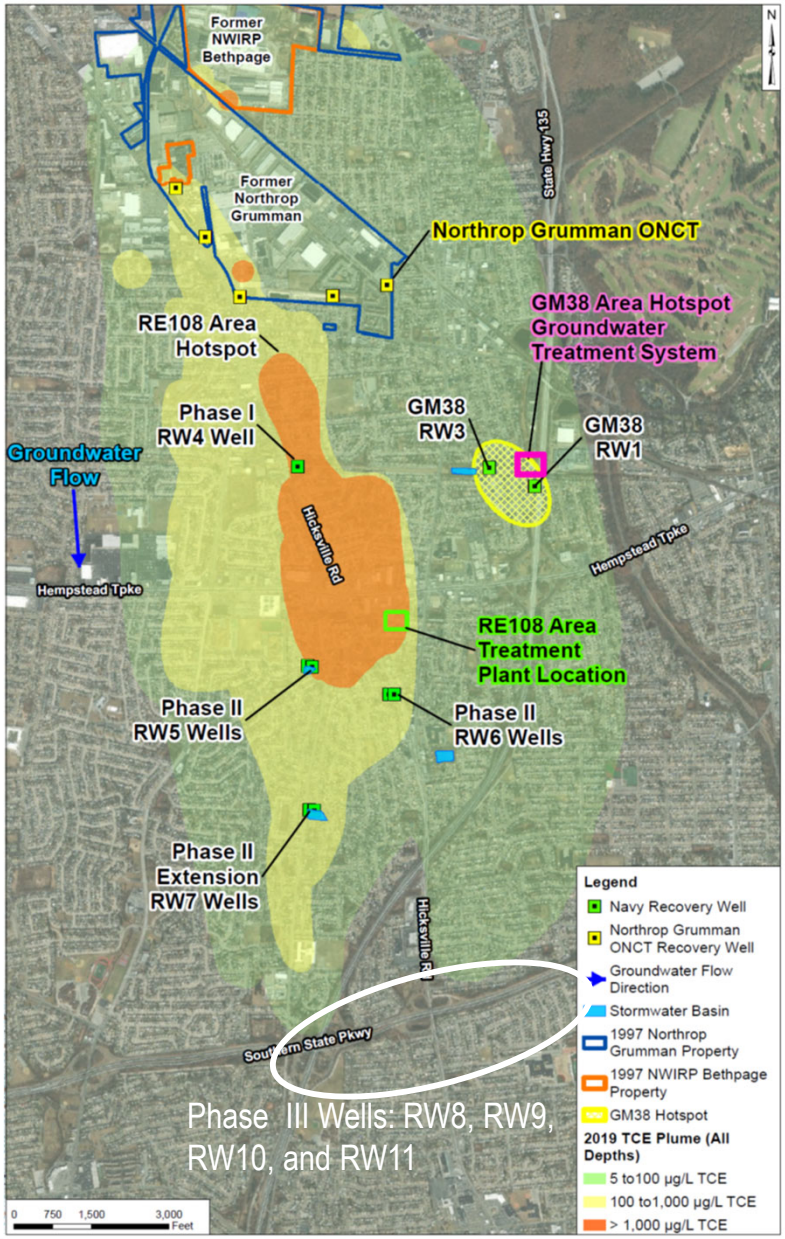
OU2 Groundwater Fate and Transport Modeling

- Flow model used to evaluate OU2 plume behavior over time
- Model is approximately 42 square miles and 2 million cells
- Design, evaluate, and optimize remedial systems

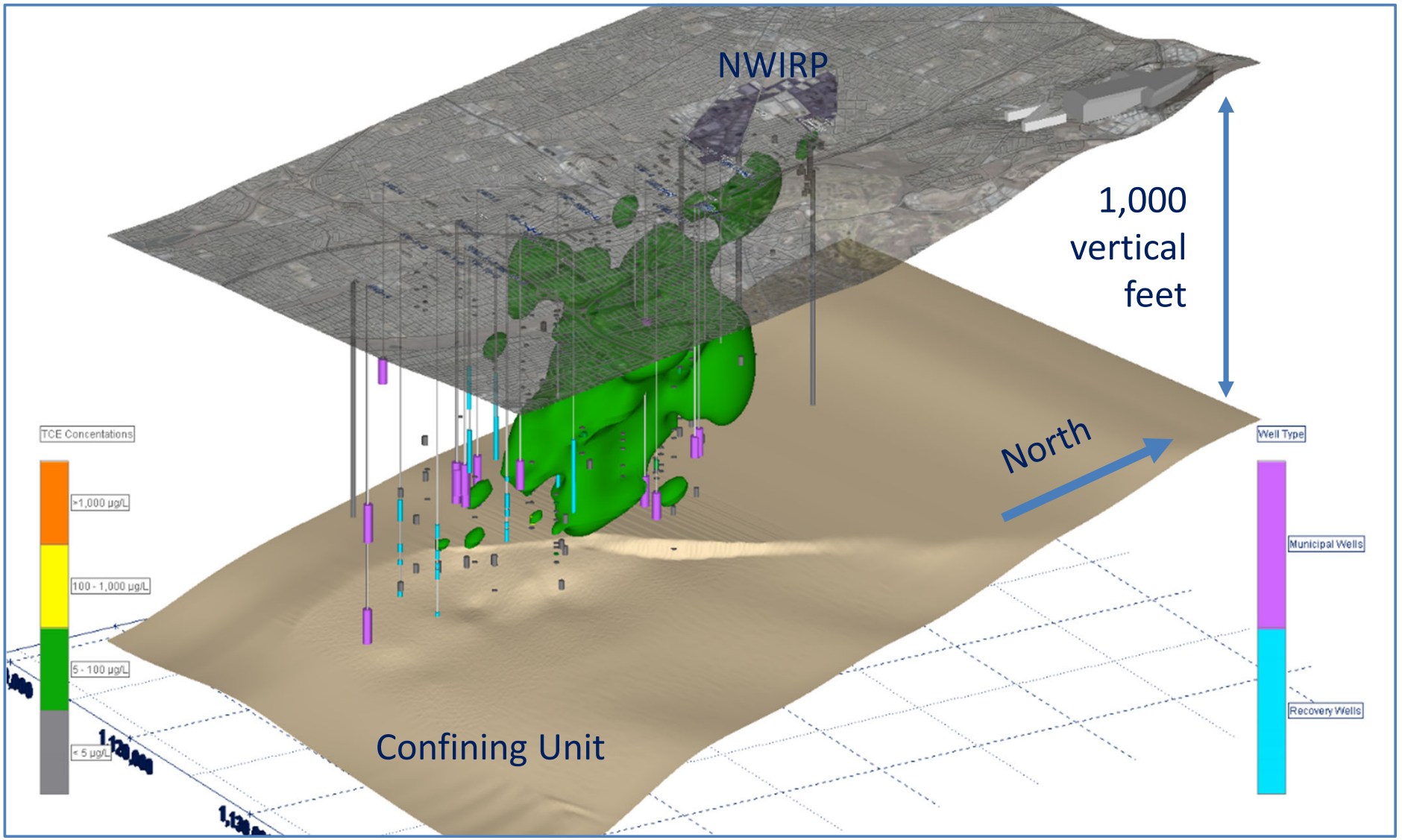


OU2 Groundwater Fate and Transport Modeling

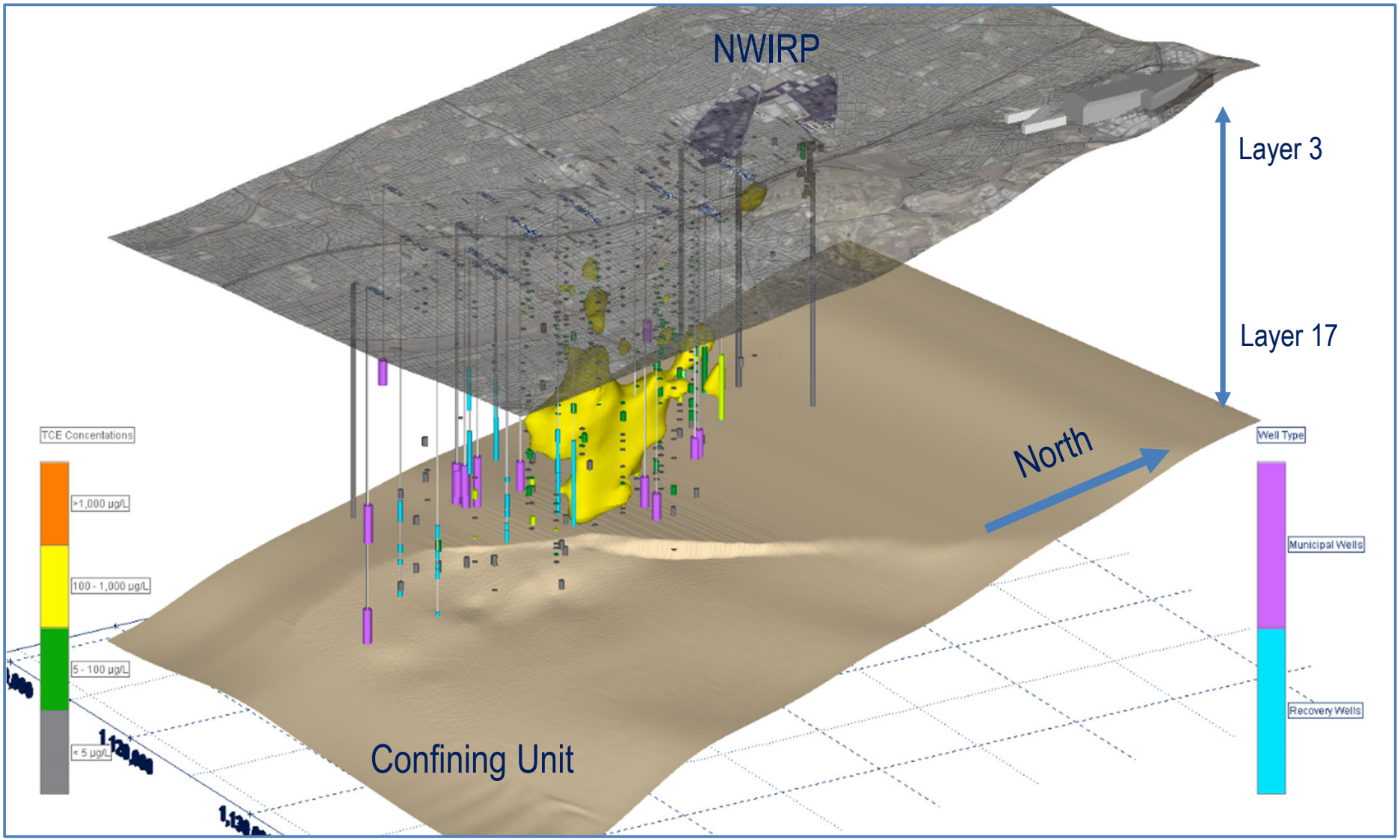
- Plume boundaries are shown using trichloroethene (TCE) as:
  - Green - 5 to 100 micrograms per liter (ug/L)
  - Yellow - 100 to 1,000 ug/L
  - Orange - greater than 1,000 ug/L
- Boundary includes non-OU2 contributors



OU2 Groundwater Fate and Transport Modeling – 3D TCE Plume



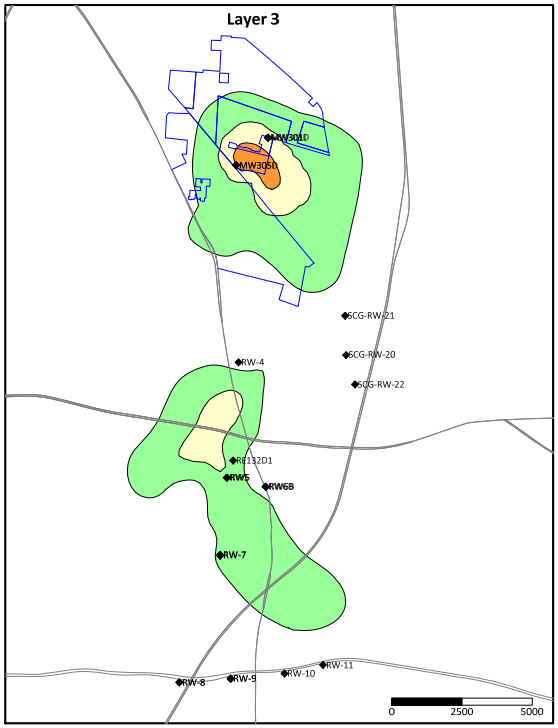
OU2 Groundwater Fate and Transport Modeling – 3D TCE Plume



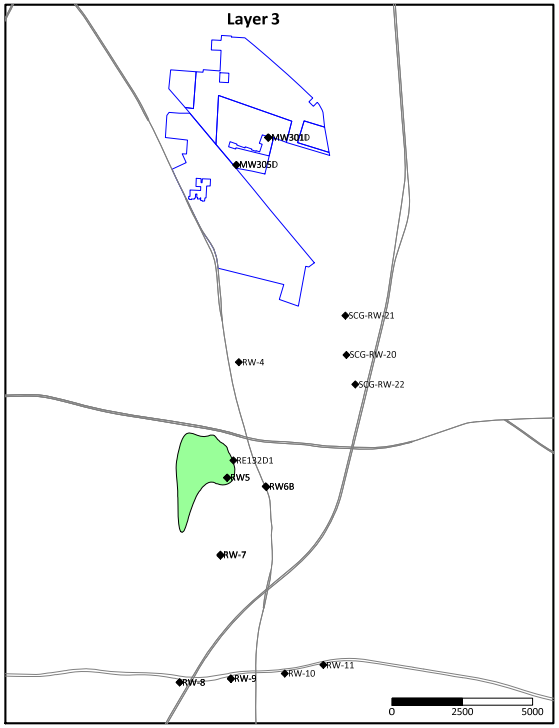
OU2 Groundwater Fate and Transport Modeling

- Layer 3 (Approx. 250 feet below ground surface) plume cleanup estimates (Trichloroethene)
- Different layers and concentrations cleanup at different rates (Shallow layers cleanup faster)

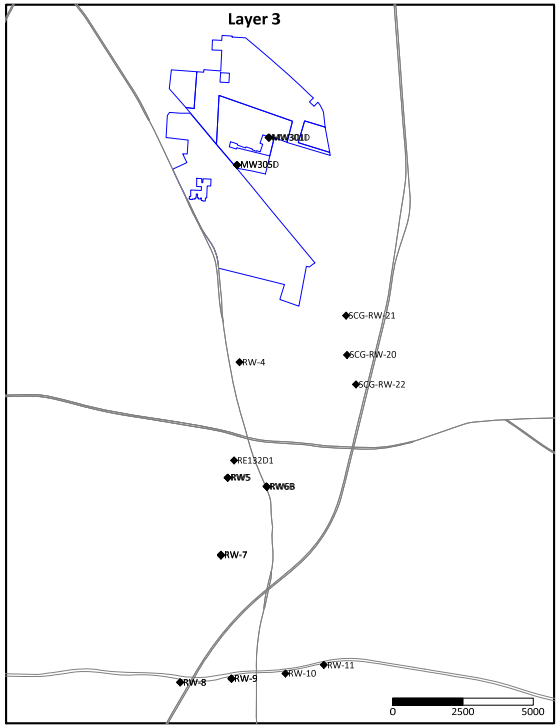
2020

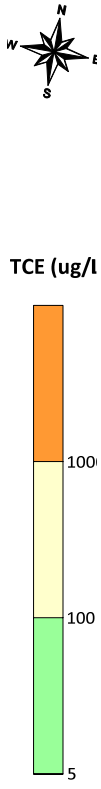


2050



2070

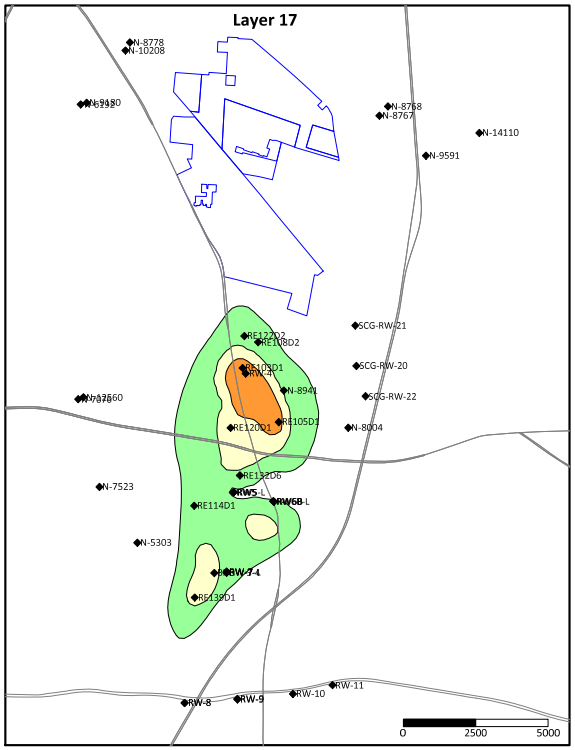




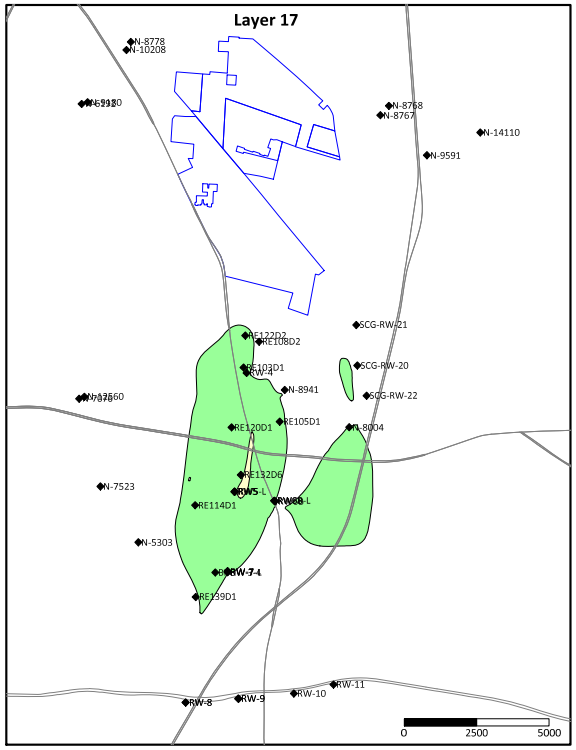
OU2 Groundwater Fate and Transport Modeling

- Layer 17 (Approx. 700 feet below ground surface) plume cleanup estimates (Trichloroethene)
- Different layers and concentrations cleanup at different rates (Deeper layers take longer)

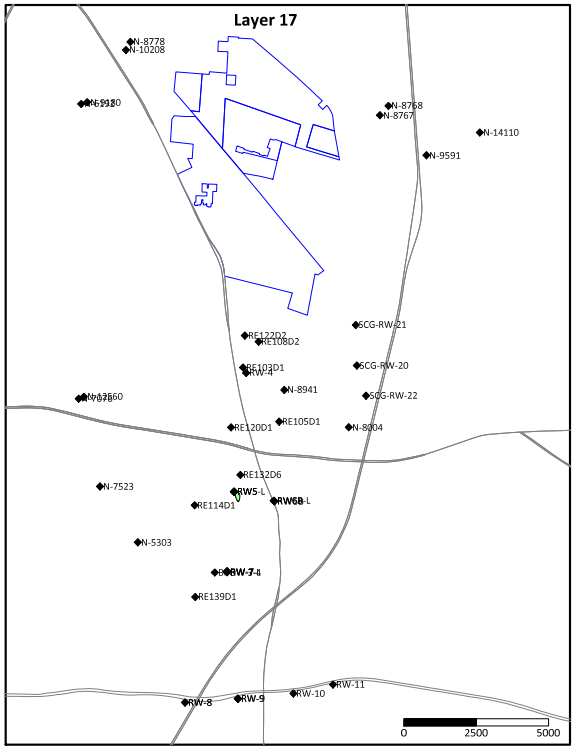
2020

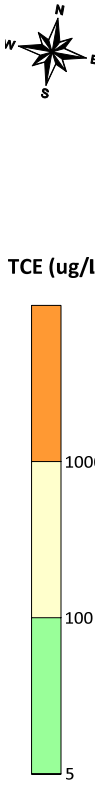


2050



2080





OU2 Groundwater Fate and Transport Modeling

- Three-dimensional plume video

OU2 Groundwater Fate and Transport Modeling

RAB Member Questions

Naval Facilities Engineering Systems Command
NAVFAC MID-ATLANTIC

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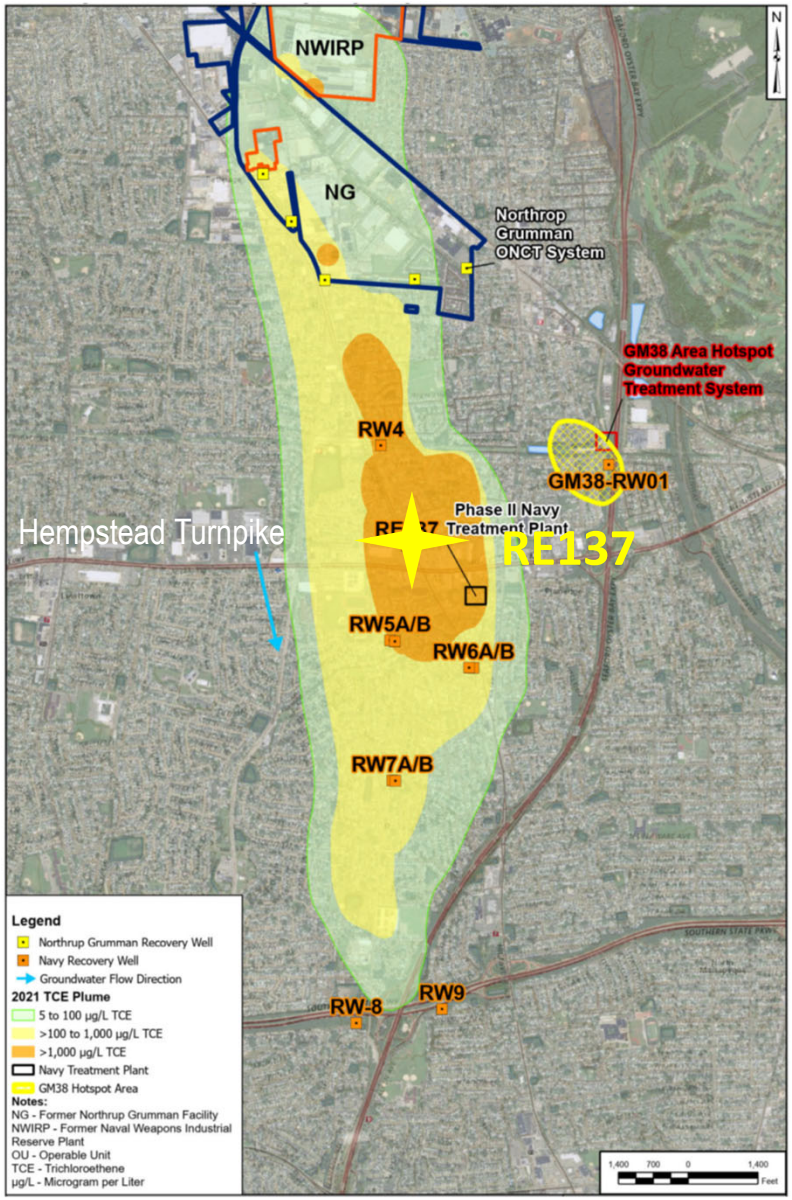
Recovery Well RE137 Interim Action Update

Presented by:
David Brayack, Project Manager
Tetra Tech
17 May 2023

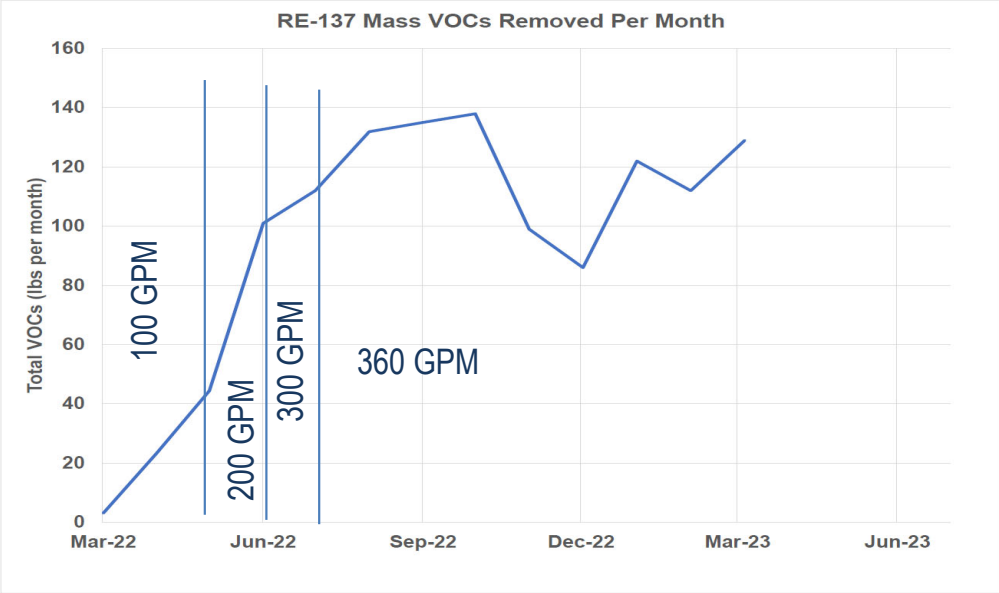
RE137 Pilot-Scale Testing

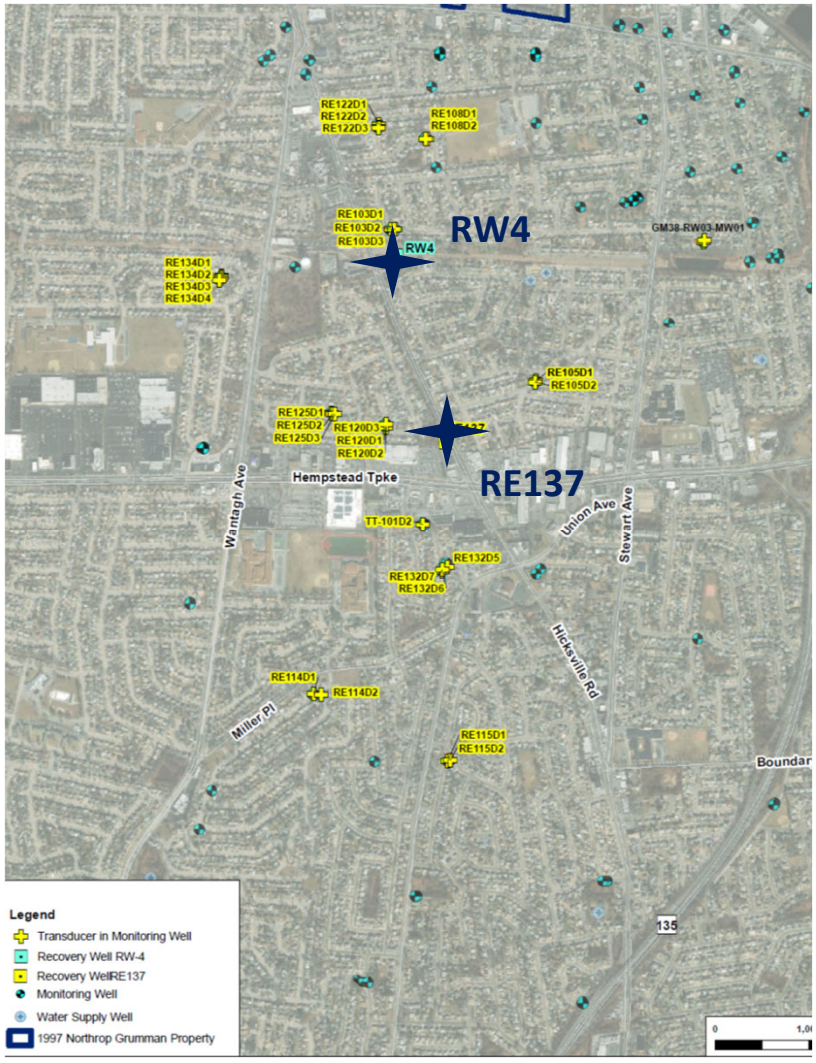
- RE137 was originally considered a groundwater recovery well for Phase II RE108 Area Hotspot Treatment System
- Well was determined to be too far north to intercept the hotspot, but could help slow down migration
- Current test to run for approximately 20 months, potentially longer
- Treatment consists of Advanced Oxidation Process (AOP) technology and granular activated carbon (GAC)
- Water is discharged into a local basin



RE137 Pilot-Scale Testing

- System is running at 190 million gallons per year (360 gallons per minute [GPM])
- System has been very effective at removing VOCs from the aquifer (Over 1,200 pounds since startup)
- Monitoring wells (yellow highlight) are being used to evaluate Recovery Wells RW4 and RE137
- Diminishing returns observed with higher extraction rate





RE137 Pilot-Scale Testing

RE137 Pilot-Scale Testing

- Performance Results: greater than 99 percent removal

Parameter	RE137 - Influent (micrograms per liter)	Treatment System Effluent (micrograms per liter)
1,4-dioxane (8260 SIM)	17	Not detected
1,1,2-Trichloroethane	1.1	Not detected
1,1-Dichloroethane	1	Not detected
1,1-Dichloroethene	6.9	Not detected
Carbon Tetrachloride	2.8	Not detected
Chloroform	1.4	Not detected
cis-1,2-Dichloroethene	3.9	Not detected
Freon 113	25.1	Not detected to 1.9
Tetrachloroethene	3.6	Not detected
Trichloroethene	1,930	Not detected

RAB Member Questions

Naval Facilities Engineering Systems Command
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Department of Navy
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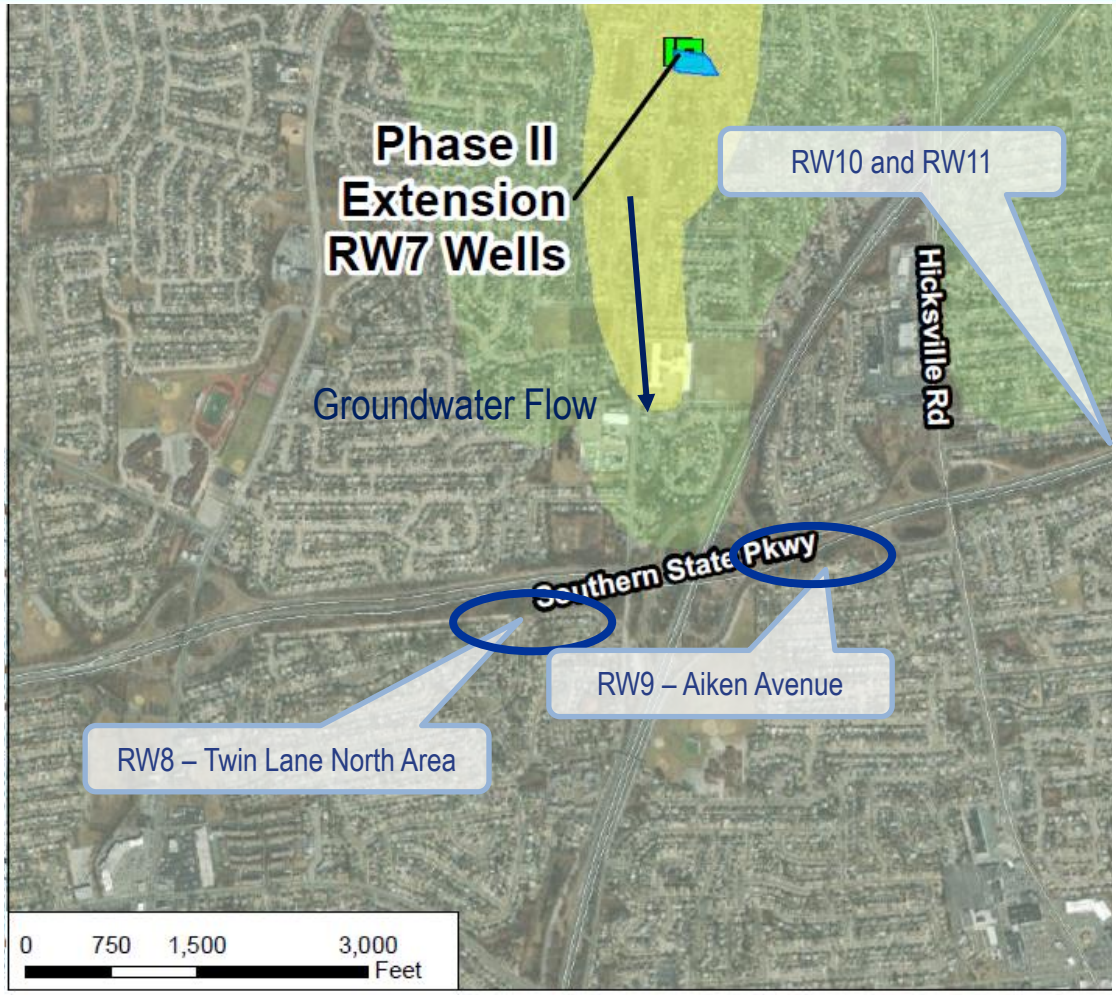
Phase III (RW8 to RW11) – Southern Plume Intercept Treatment System Update

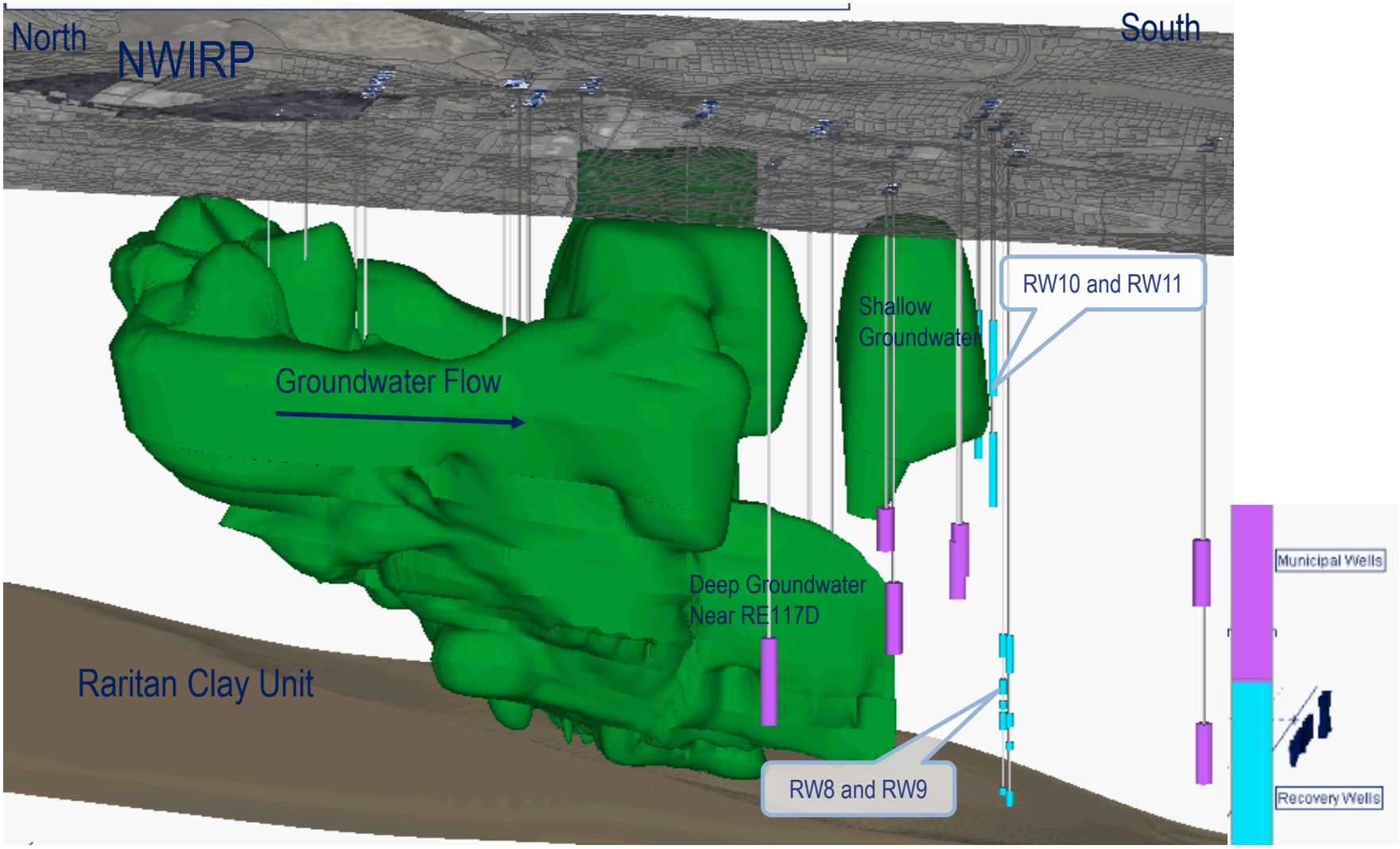
Presented by:
David Brayack, Project Manager
Tetra Tech 17 May 2023

Phase III – Southern Plume Intercept Treatment System Update

- Location based on extensive monitoring of plume migration and space available
- Phase III-A - RW8 and RW9 target deep groundwater that is not captured by Recovery Well RW7 – Initial focus on deep groundwater
- Phase III-B – Potential for RW10 and/or RW11 wells to the east, with a possibility of a separate treatment plant – shallow groundwater

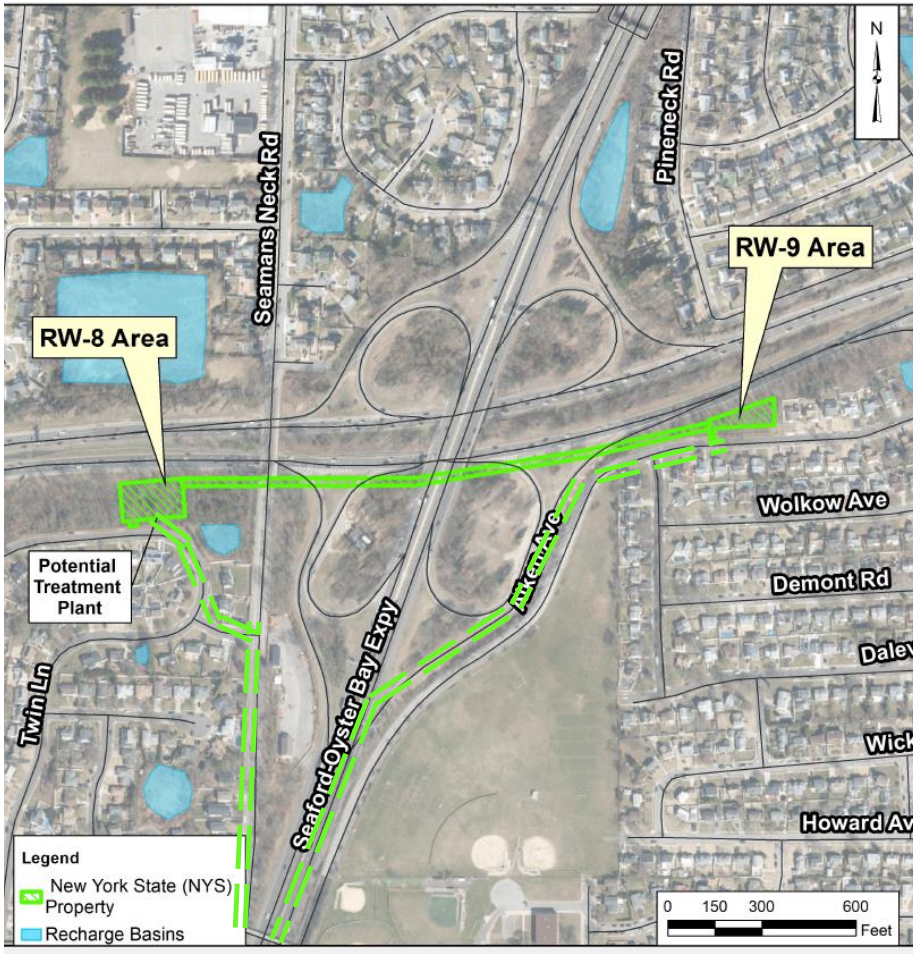


Phase III – Southern Plume Intercept Treatment System Update



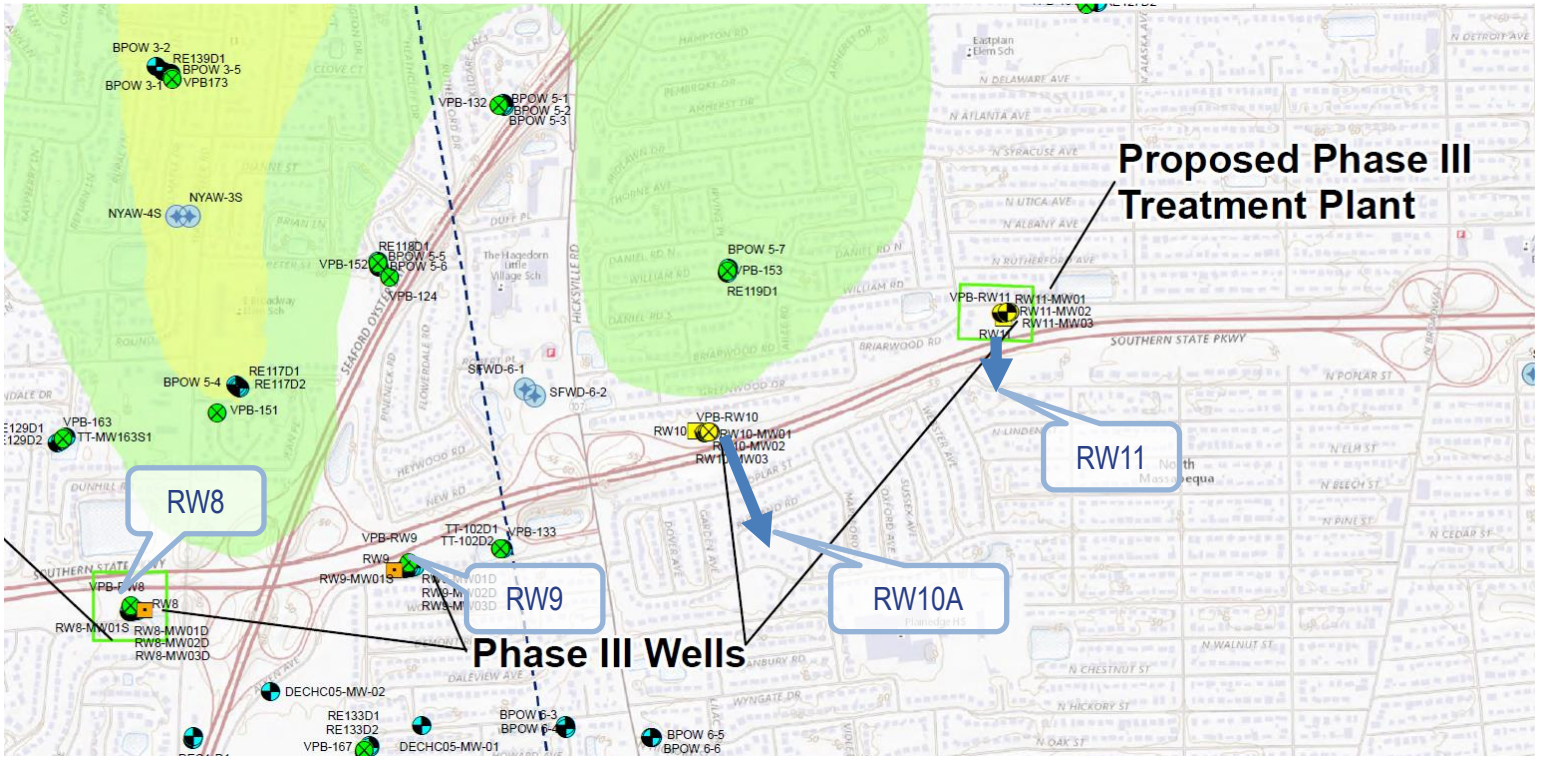
Phase III – Southern Plume Intercept Treatment System Update

- Phase III drilling started in March 2021
- RW8 and RW9: (2) vertical profile borings, (8) monitoring wells, and (2) recovery wells are complete
- Computer modeling runs to evaluate capture are complete
- Recovery Well RW8 and RW9 pumping tests completed in December 2022
- Computer modeling evaluation confirm locations and identify target pumping rates
- Two different piping routes being evaluated



Phase III – Southern Plume Intercept Treatment System Update

- RW10 VPB and monitoring wells are complete
- May 2023, preparing to drill VPB and monitoring wells for RW11
- Due to access issues, plume location, and computer modeling, RW10 and RW11 and associated VPBs and monitoring wells moved south of Southern State Parkway



Phase III – Southern Plume Intercept Treatment System, Recovery Well RW8 Area

Phase III – Southern Plume Intercept Treatment System, Recovery Well RW8 Pumping Test Equipment

- Pumping tests conducted at 1,000 gallons per minute for three days
- Although water was clean, filtration and granular activated carbon (GAC) was used to treat water prior to discharge
- Data is used to check model calibration and if necessary, modify the model calibration in this area

Phase III – Southern Plume Intercept Treatment System Update – Path Forward

- Phase III-A (RW8 and RW9) Treatment System design: 2022 to 2023
  - Surveying and basin infiltration testing underway
  - Preliminary setting for treatment plant location
  - Design for RW9 to RW8 pipeline in progress
- Treatment Plant construction and operation to start in 2024
- Phase III-B (RW10 and/or RW11) Treatment System approximately one year after Phase III-A System

Phase III – Southern Plume Intercept Treatment System Update – Path Forward

RAB Questions

NEXT: Phase II Remedial Action
Steve Matney, AGVIQ

Naval Facilities Engineering Systems Command
NAVFAC MID-ATLANTIC

Department of Navy
Naval Weapons Industrial Reserve Plant, Bethpage
Restoration Advisory Board Meeting

RE108 Phase II Groundwater Treatment Plant and Pipeline Construction and Operation

Presented by:
Stephen Matney, Project Manager
AGVIQ, LLC
17 May 2023

Presentation Topics

- RE108 Area Hotspot Treatment System - Phase II Overview
- RE108 Area Hotspot Treatment System – Phase II Status and Schedule
- Project Outreach and Monitoring
- Points of Contact
- Questions/Answers

RE108 Area Hotspot Treatment System – Phase II System Overview

Construction of Water Treatment Plant

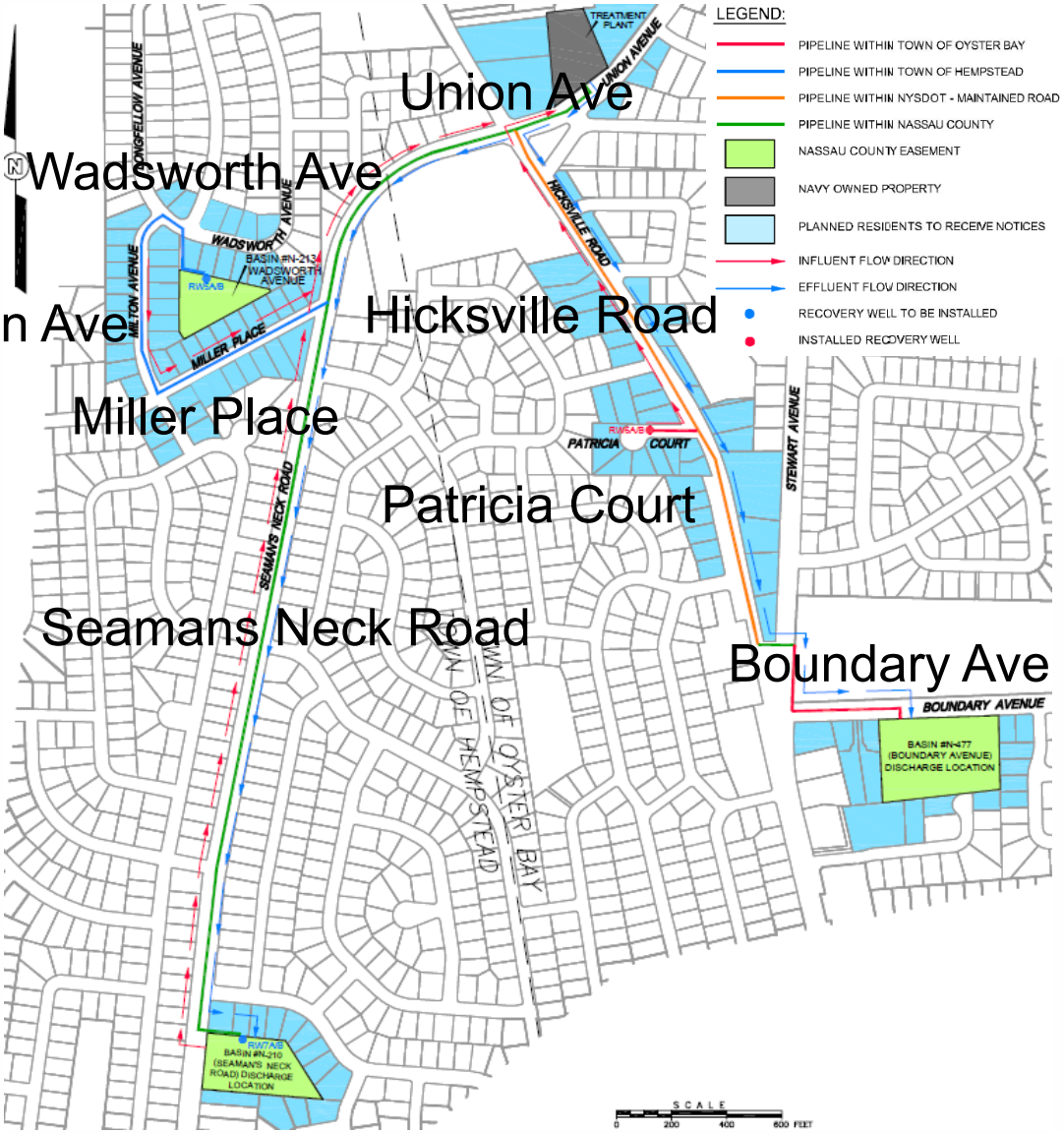
- To be constructed at 11 Union Avenue

Drilling and Installation of Recovery Wells (RWs)

- RW 5A/5B (Longfellow Avenue)
- RW 6A/6B (Patricia Court)
- RW 7A/7B (Seaman's Neck Road)

Installation of Influent and Effluent Pipelines

- RW 5A/5B Extraction Pipeline
- RW 6A/6B Extraction Pipeline
- RW 7A/7B Extraction Pipeline
- Effluent Pipeline to recharge basins N-477 (Boundary Avenue) and N-210 (Seaman's Neck Road)



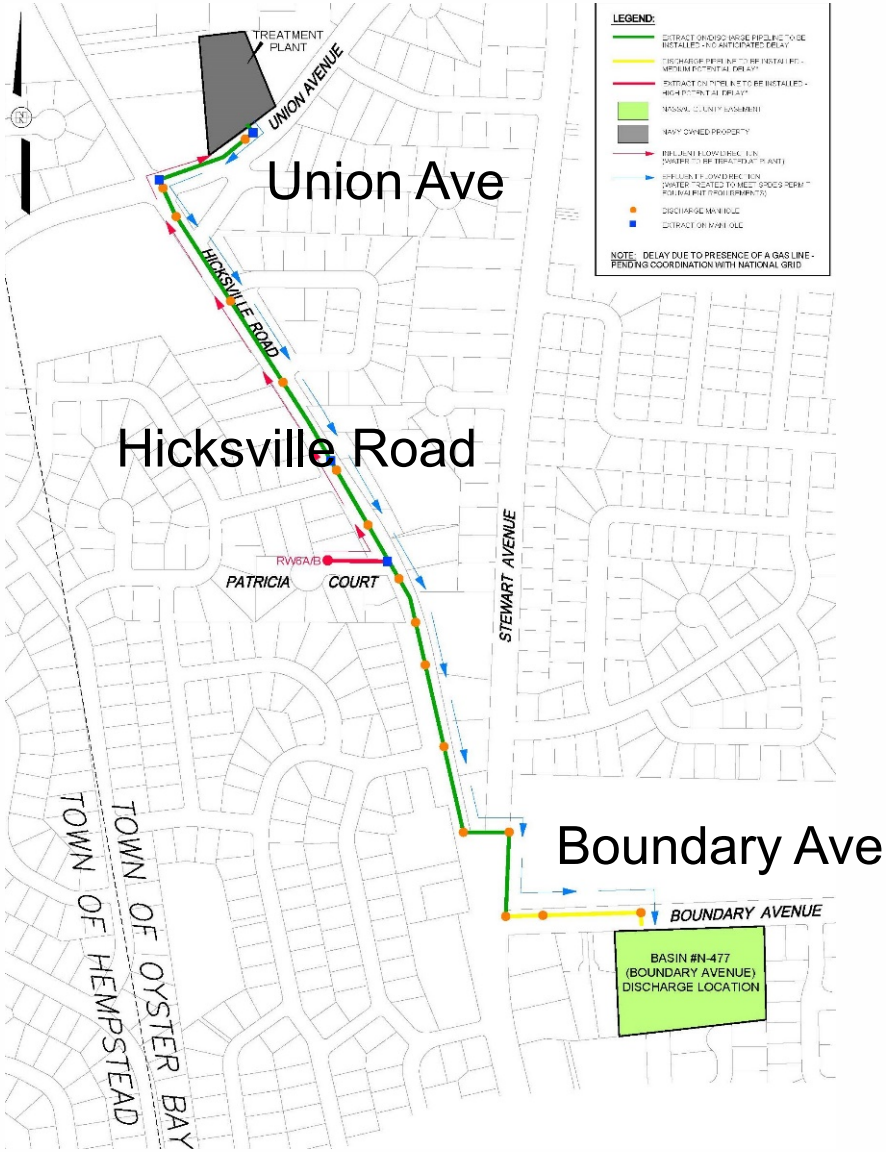
RE108 Area Hotspot Treatment System – Phase II System Installation Schedule of Pipeline Activities

Construction of Water Treatment Plant

- Under Construction approximately 77% constructed.
  - Groundwater Treatment Plant building fully enclosed and water tight.
  - Temporary Electrical Power Service Installation
  - Treatment Equipment Placement
  - Process Piping and equipment installation

Installation of Influent and Effluent Pipelines

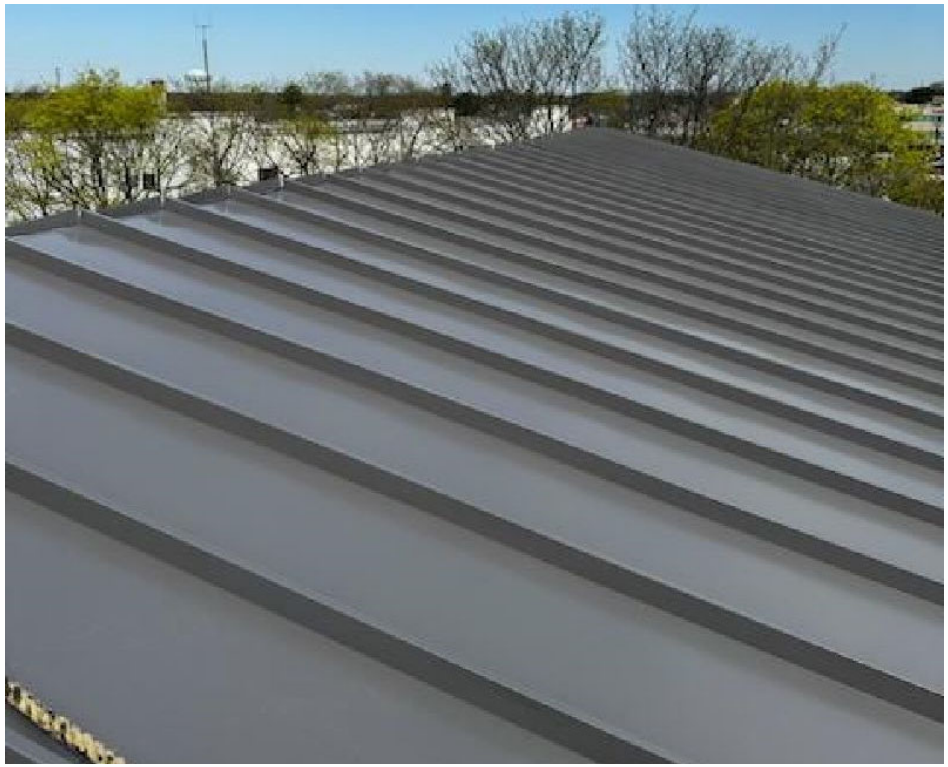
- RW 6A/6B Extraction Pipeline.
- Installed approximately 1,600 LF of Reinforced Concrete Pipe (Effluent) along Boundary to Stewart Avenues and making turn onto Hicksville Road.
- Starting the Extraction (Influent) High Density Polyethylene (HPDE) piping installation in Patricia Court to Hicksville Road.
- Continue Clean-out and limited clearing at Basin N-477.



RE108 AREA HOTSPOT TREATMENT SYSTEM – PHASE II – CONSTRUCTION UPDATE

The following are photographs of progress on the project:

April 2023. Metal roof panel installation. Looking northwest.



April 2023. Roof panel installation, elevated AST tower.

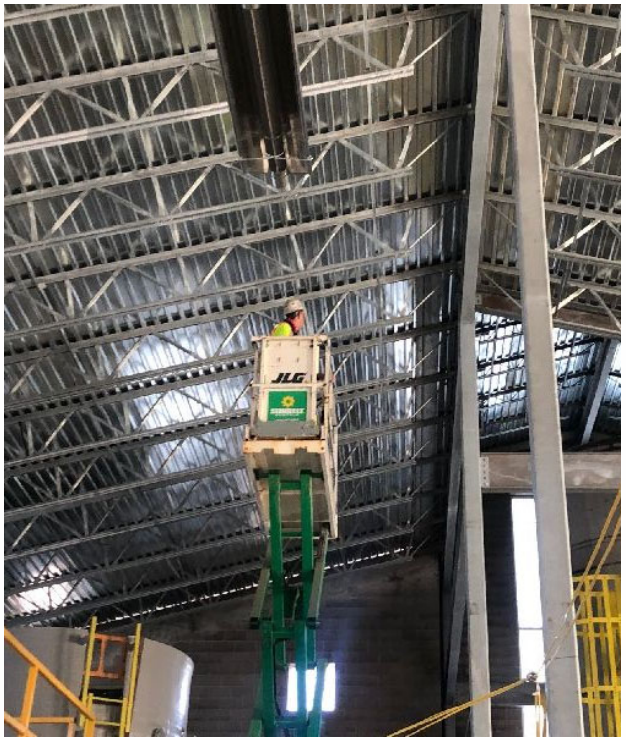
RE108 AREA HOTSPOT TREATMENT SYSTEM – PHASE II – CONSTRUCTION UPDATE

The following are photographs of progress on the project:

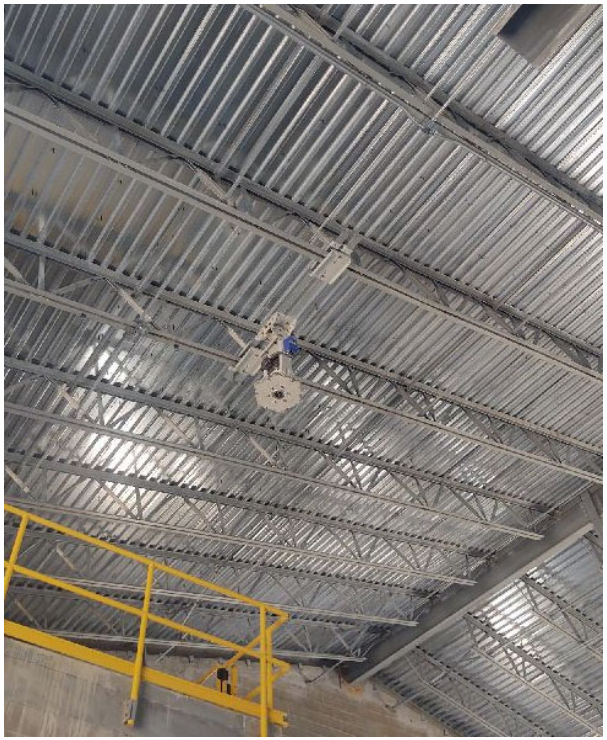
March 2023. Completed B17 outfall rip rap installation and surveying

RE108 AREA HOTSPOT TREATMENT SYSTEM – PHASE II – CONSTRUCTION UPDATE

The following are photographs of progress on the project:



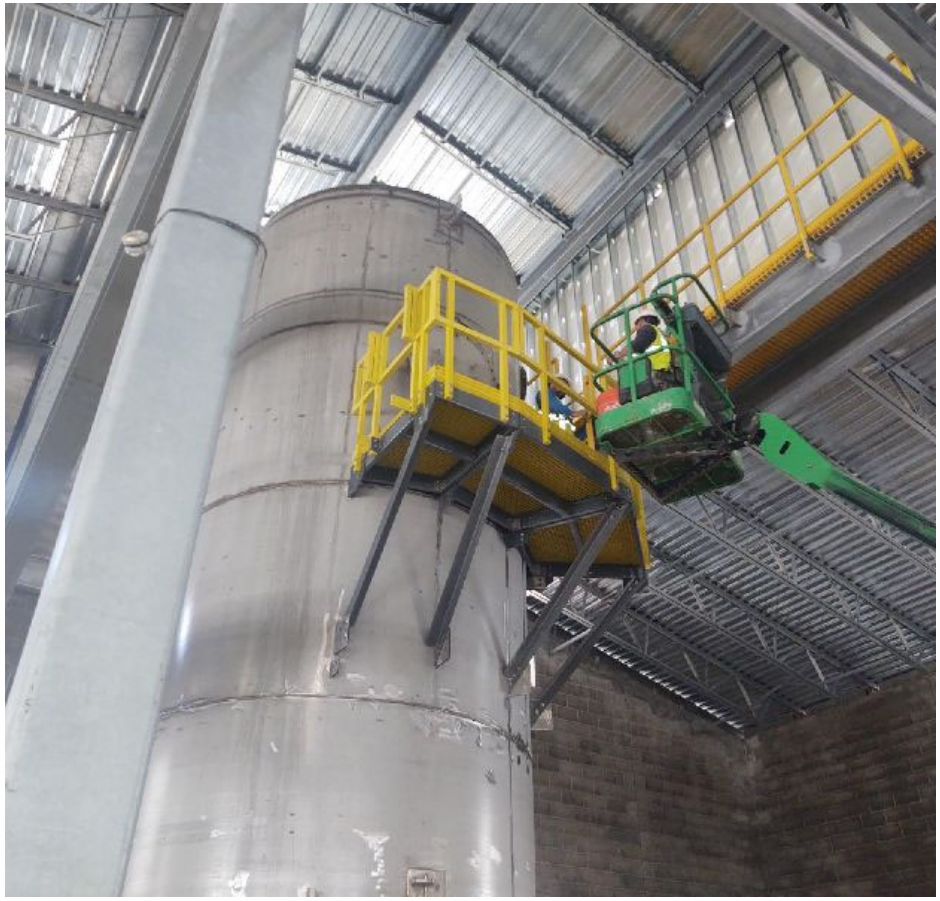
April 2023. Radiant heaters and FRP installation



April 2023. HVLS fan installation

RE108 AREA HOTSPOT TREATMENT SYSTEM – PHASE II – CONSTRUCTION UPDATE

The following are photographs of progress on the project:



April 2023. AST ladder and access platform

RE108 AREA HOTSPOT TREATMENT SYSTEM – PHASE II – CONSTRUCTION UPDATE

The following are photographs of progress on the project:

March 2023. GWTP concrete electrical duct bank formwork

April 2023. GWTP electrical box and stub ups installed

RE108 Area Hotspot Treatment System – Phase II System Status and Schedule

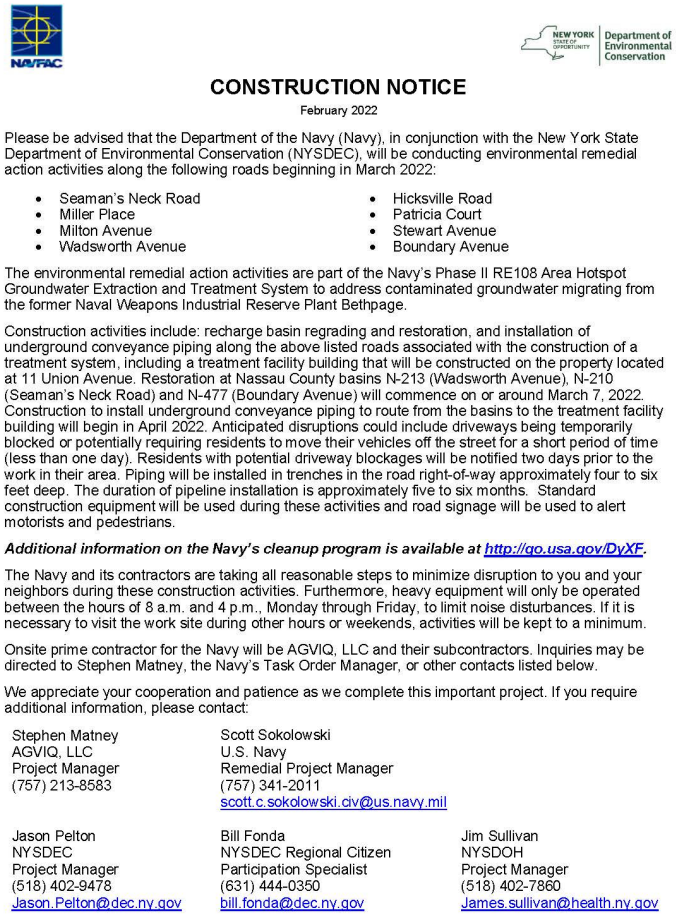
- April 2021 - Demolition, site grading, and seeding of 11 Union Avenue completed
- September 2021 -The 100 percent design was completed and issued for construction by Tetra Tech.
- March 2021 - Tetra Tech began recovery well installation.
  - RW6A/B located on Patricia Court in the Town of Oyster Bay
  - RW7A/B located at Nassau County stormwater basin N-210
  - RW5A/5B located at Nassau County stormwater basin N-213 (drilling in progress)
- December 2021 – April 2023 Mobilization for construction of the Groundwater Treatment Plant at 11 Union Avenue and Pipeline Installation operations. Continues through 2023.
- Commissioning – Summer 2023.

RE108 Area Hotspot Treatment System – Phase II System Status and Schedule

Project Activities	Estimated Dates
Construction of Water Treatment Plant	December 2021 – July 2023
Drilling and Installation of Recovery Wells	March 2021 – May 2023
Installation of Conveyance Pipelines	April 2022 – September 2023
Commissioning Operations	June 2023 – July 2023

Project Outreach and Monitoring

- AGVIQ and NAVFAC intend to conduct periodic construction update meetings, as necessary, with representatives from the Town of Oyster Bay and the Town of Hempstead, property owners, and nearby residents.
- October 2021 – AGVIQ and NAVFAC hand-delivered Construction Notices to buildings/residents surrounding 11 Union Avenue and will hand-deliver Construction Notices to residences in close proximity of the pipeline work prior to start of construction.
- February 2022 - AGVIQ and NAVFAC hand-delivered Construction Notices to buildings/residents along the affected streets in close proximity of the pipeline work.
- October 2022 - AGVIQ and NAVFAC hand-delivered Construction Notices to buildings/residents along the affected streets in close proximity of the pipeline work.
- April 2023 - AGVIQ and NAVFAC hand-delivered Construction Notices to buildings/residents along the affected streets in close proximity of the pipeline work.



NAVFAC

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

CONSTRUCTION NOTICE

February 2022

Please be advised that the Department of the Navy (Navy), in conjunction with the New York State Department of Environmental Conservation (NYSDEC), will be conducting environmental remedial action activities along the following roads beginning in March 2022:

- Seaman's Neck Road
- Miller Place
- Milton Avenue
- Wadsworth Avenue
- Hicksville Road
- Patricia Court
- Stewart Avenue
- Boundary Avenue

The environmental remedial action activities are part of the Navy's Phase II RE108 Area Hotspot Groundwater Extraction and Treatment System to address contaminated groundwater migrating from the former Naval Weapons Industrial Reserve Plant Bethpage.

Construction activities include: recharge basin regrading and restoration, and installation of underground conveyance piping along the above listed roads associated with the construction of a treatment system, including a treatment facility building that will be constructed on the property located at 11 Union Avenue. Restoration at Nassau County basins N-213 (Wadsworth Avenue), N-210 (Seaman's Neck Road) and N-477 (Boundary Avenue) will commence on or around March 7, 2022. Construction to install underground conveyance piping to route from the basins to the treatment facility building will begin in April 2022. Anticipated disruptions could include driveways being temporarily blocked or potentially requiring residents to move their vehicles off the street for a short period of time (less than one day). Residents with potential driveway blockages will be notified two days prior to the work in their area. Piping will be installed in trenches in the road right-of-way approximately four to six feet deep. The duration of pipeline installation is approximately five to six months. Standard construction equipment will be used during these activities and road signage will be used to alert motorists and pedestrians.

Additional information on the Navy's cleanup program is available at http://go.usa.gov/DyXF.

The Navy and its contractors are taking all reasonable steps to minimize disruption to you and your neighbors during these construction activities. Furthermore, heavy equipment will only be operated between the hours of 8 a.m. and 4 p.m., Monday through Friday, to limit noise disturbances. If it is necessary to visit the work site during other hours or weekends, activities will be kept to a minimum.

Onsite prime contractor for the Navy will be AGVIQ, LLC and their subcontractors. Inquiries may be directed to Stephen Matney, the Navy's Task Order Manager, or other contacts listed below.

We appreciate your cooperation and patience as we complete this important project. If you require additional information, please contact:

Stephen Matney
AGVIQ, LLC
Project Manager
(757) 213-8583

Scott Sokolowski
U.S. Navy
Remedial Project Manager
(757) 341-2011
scott.c.sokolowski.civ@us.navy.mil

Jason Pelton
NYSDEC
Project Manager
(518) 402-9478
Jason.Pelton@dec.ny.gov

Bill Fonda
NYSDEC Regional Citizen
Participation Specialist
(631) 444-0350
bill.fonda@dec.ny.gov

Jim Sullivan
NYSDOH
Project Manager
(518) 402-7860
James.sullivan@health.ny.gov

Project Outreach and Monitoring (continued)

- The Navy and its contractors will take all reasonable steps to minimize disruption to the neighbors
  - Heavy equipment operations are limited to the hours between 8:00 AM and 5:00 PM to limit noise disturbance
  - Affected school bus schedules will be identified and construction operations modified, as appropriate, to limit interruption and safety risks to the students
  - Noise and dust monitoring will be conducted at the perimeter of the work zones

Points of Contact

Point of Contact	Name	Contact Information
Navy Remedial Project Manager	Scott Sokolowski	scott.c.sokolowksi.civ@us.navy.mil
NYSDEC Project Manager	Jason Pelton	jason.pelton@dec.ny.gov
AGVIQ Project Manager	Stephen Matney	smatney@tikigaq.com

Questions and Answers
RAB Members