Naval Facilities Engineering Systems Command
NAVFAC MID-ATLANTIC

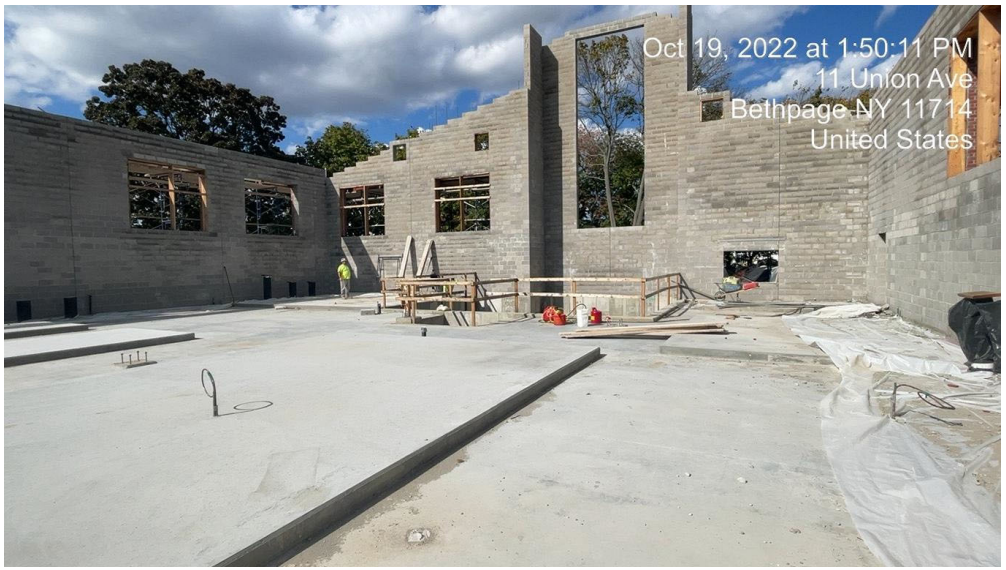
Department of Navy
Naval Weapons Industrial Reserve Plant
Restoration Advisory Board Meeting

NWIRP Bethpage Program Overview

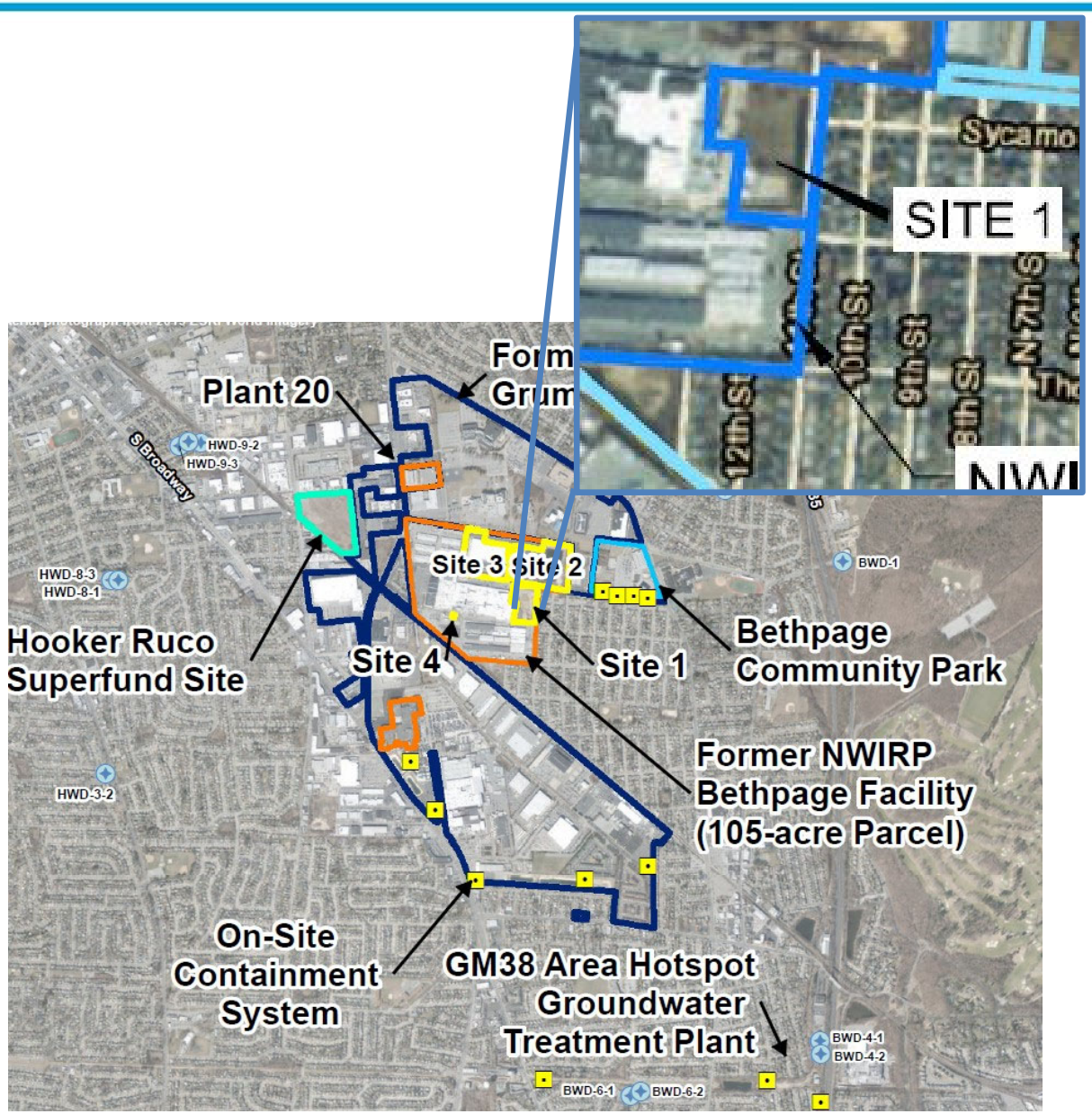
Presented by:
Scott Sokolowski, Remedial Project Manager
NAVFAC Mid-Atlantic
16 November 2022

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
- Data Collection and Property Access



Site 1



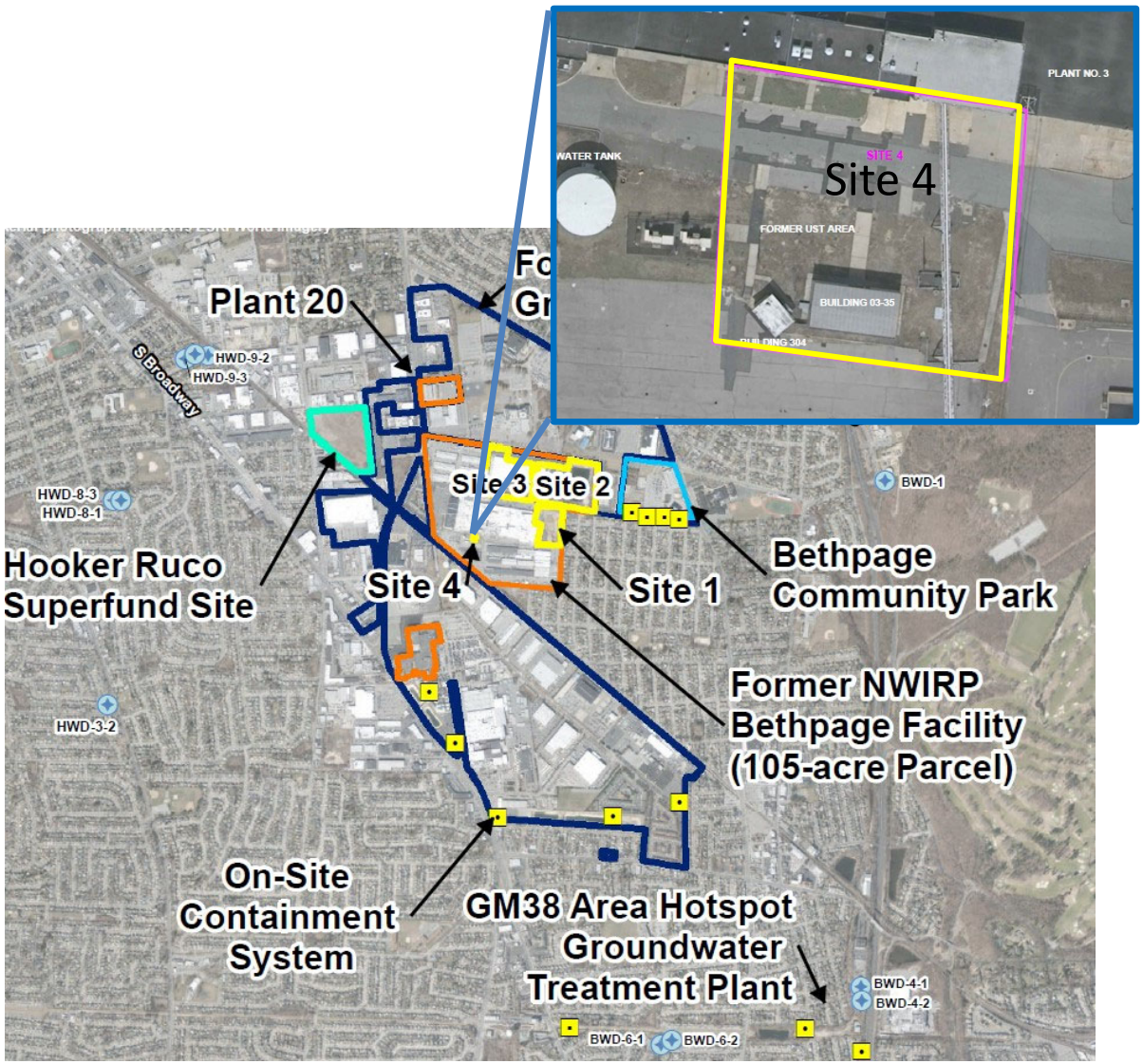
- Former drum marshalling area
- Soil removal actions completed in 2020
- All remedies are in place and operational
- Currently leased to Steel Equities from Nassau County

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

- Site 1 Fence Removal
- Tree Watering and Maintenance

Site 4



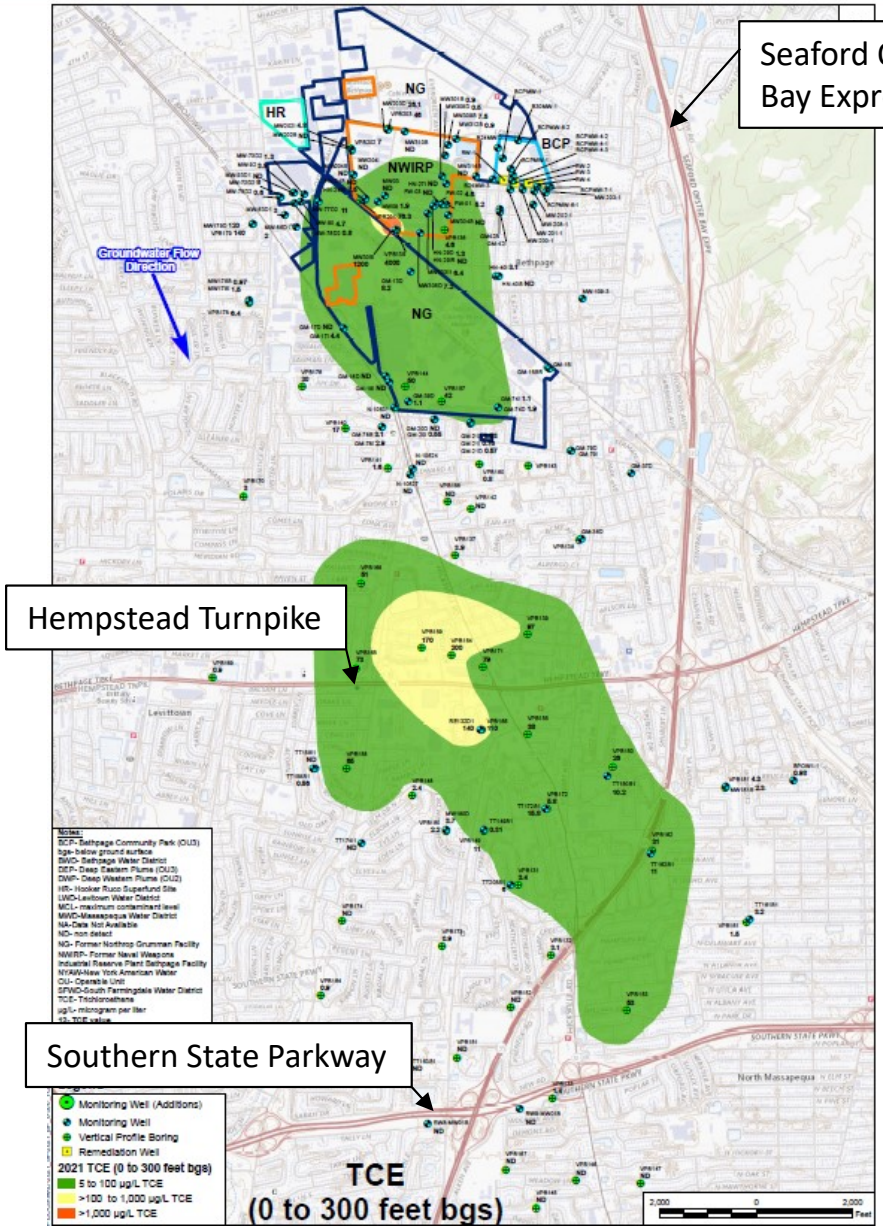
- Environmental concerns were first identified at Site 4 during a 1997 investigation by Northrop Grumman Corporation (NGC) that identified former USTs and petroleum-contaminated soil in the area.
- The steam injection pilot study was run from April 2019 to May 2020.
- Biosparge system has been operating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

Site 4 Update

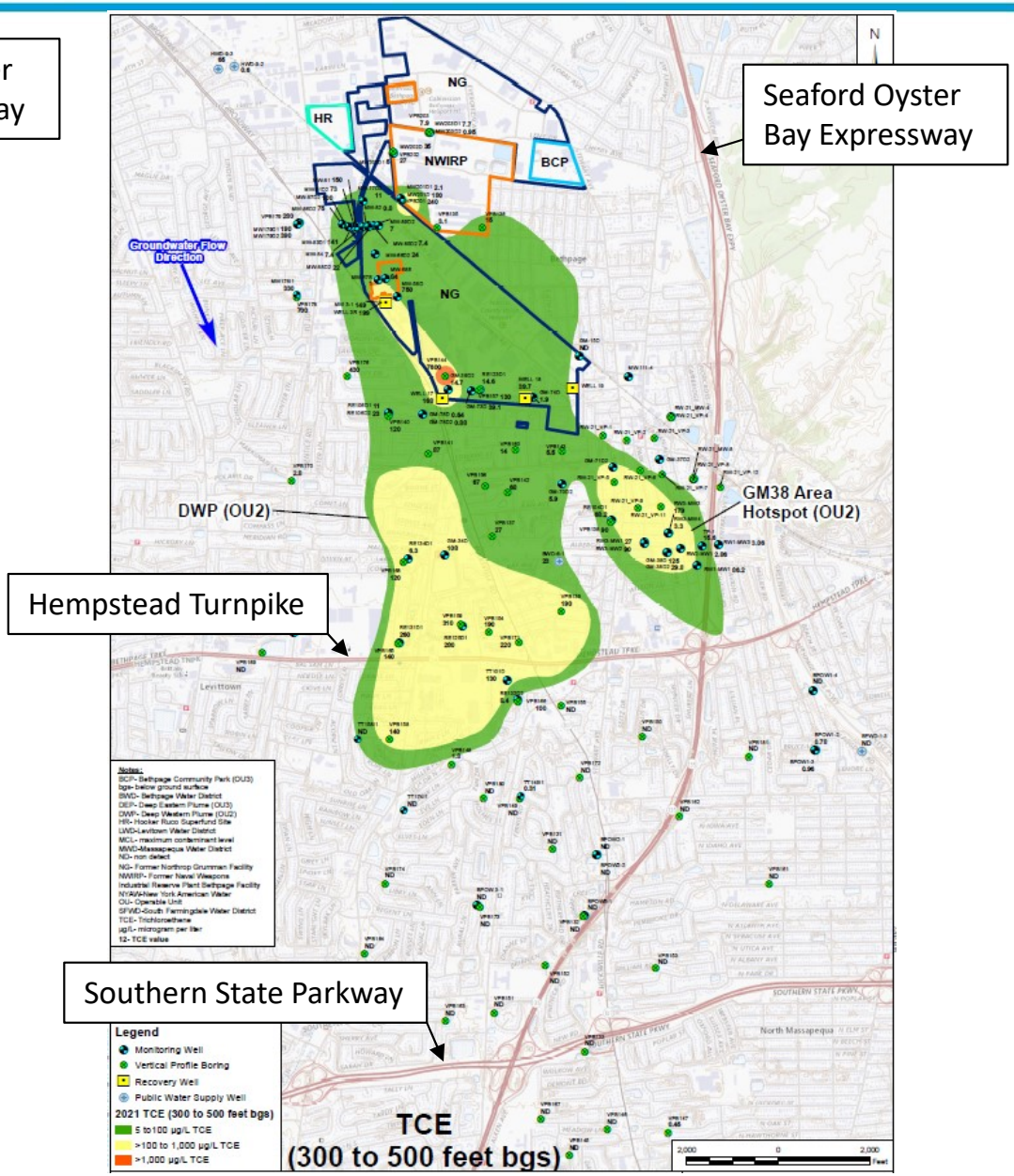
- The biosparge system will continue to operate for the next four years
- Conducting general site maintenance and upkeep

Navy-Northrop Grumman TCE Plume Maps

Shallow

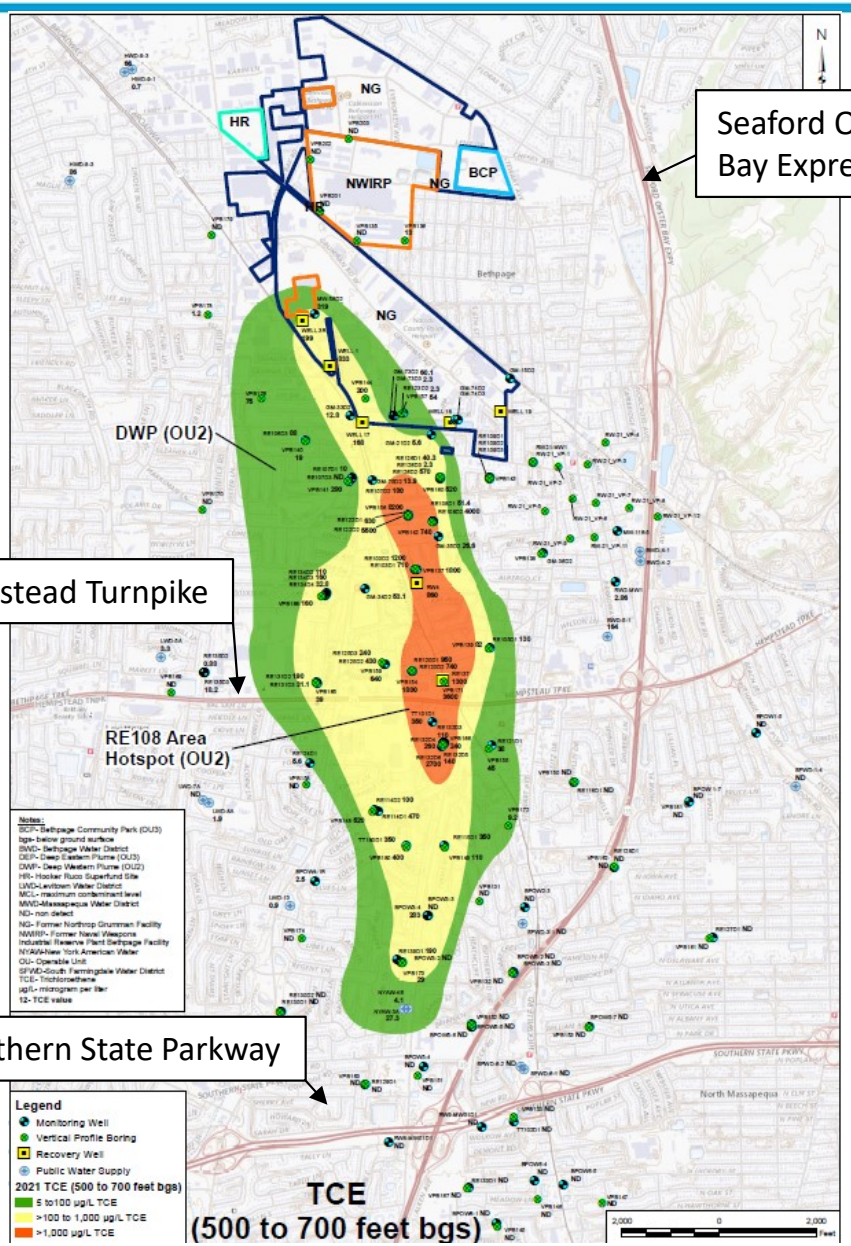


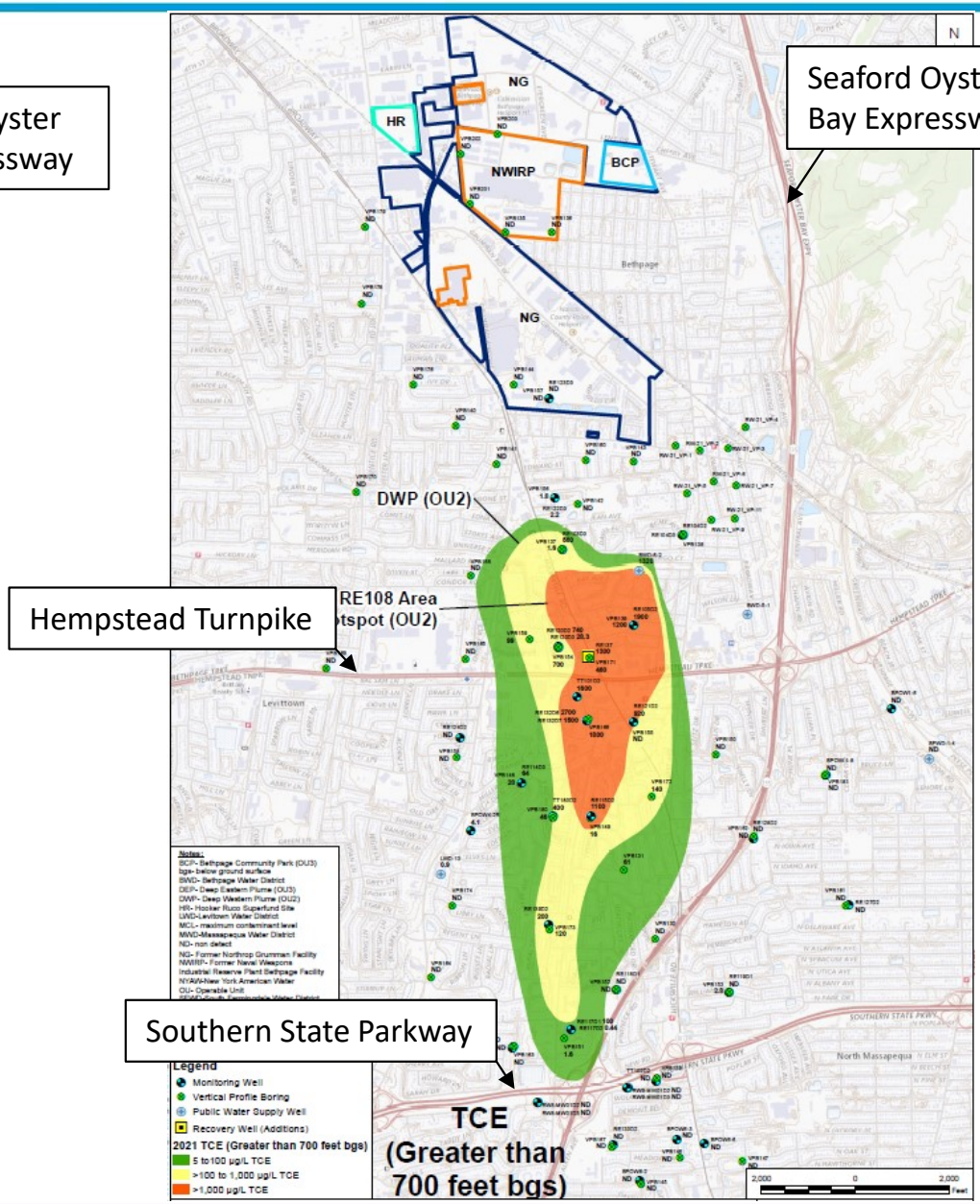
Intermediate



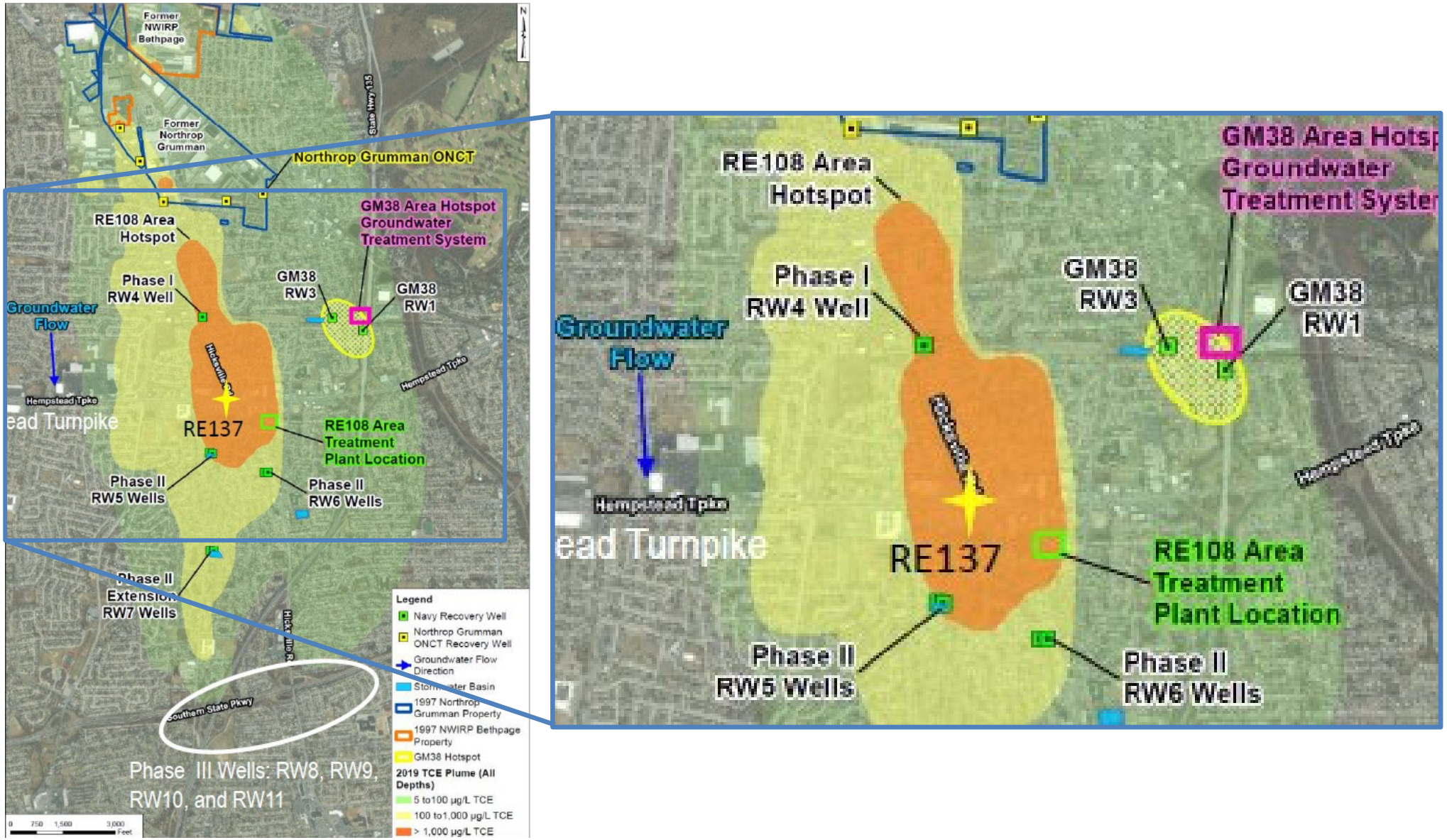
Navy-Northrop Grumman TCE Plume Maps

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 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 GM38 Groundwater Treatment Plant upgrade designs are in process. Treatment system upgrades will take place 2023-2024
  - 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
  - Phase II Recovery Wells 6A, 6B, 7A, and 7B have been completed. RW 5A and 5B drilling is in progress, the well will be complete by May 2023
  - 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 by April 2023 with full operation by August 2023

Data Collection and Property Access

- Data Collection
  - Regular groundwater monitoring activities
  - The 2nd data gap study will commence November/December 2022, this study focuses on evaluating the efficiency of the Navy's remedial efforts
- Property Access
  - The Navy is completing the access required for current groundwater investigations and remedial construction activities
  - The Navy is reviewing access requirements for 2023 and future projects, including pipeline work and the Phase III Groundwater Treatment Plant

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

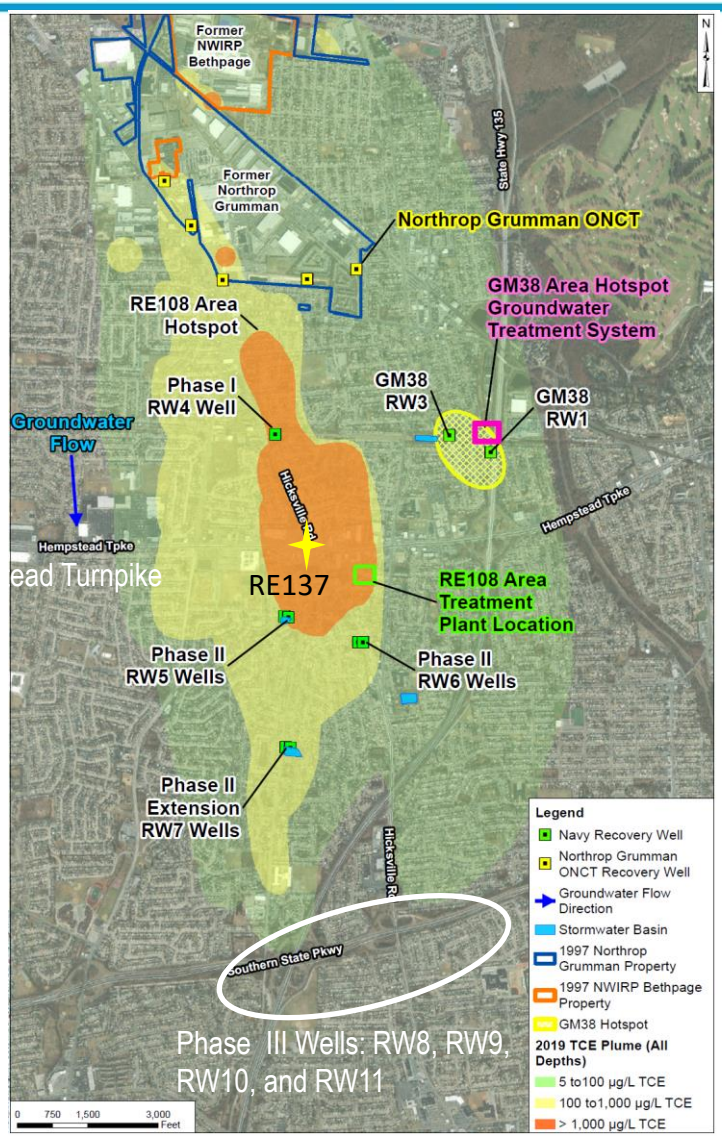
Presented by:
David Brayack, Project Manager
Tetra Tech
16 Nov 2022

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

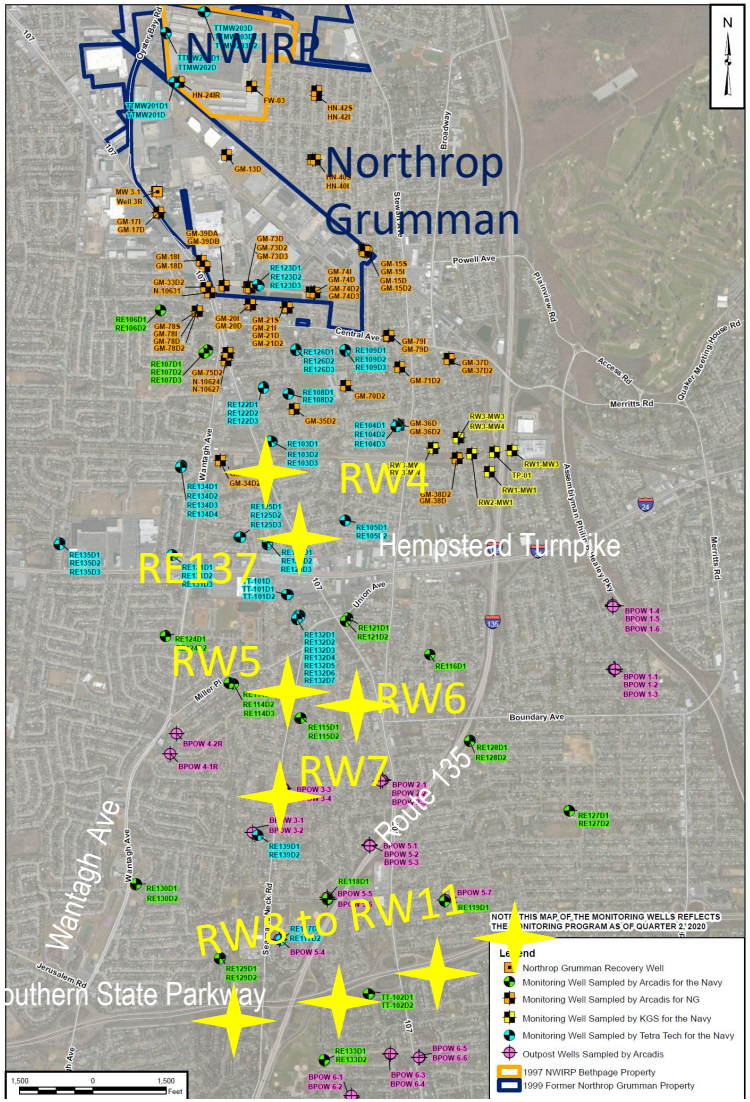
OU2 Groundwater Remediation Overview

- 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 – April 2021
- Navy RE137 Interim Treatment System – March 2022
- Navy Phase II Recovery Wells – 4 of 6 complete
- Navy Phase II Treatment System – under construction
- Navy Phase III Recovery Wells – 2 of 4 completed



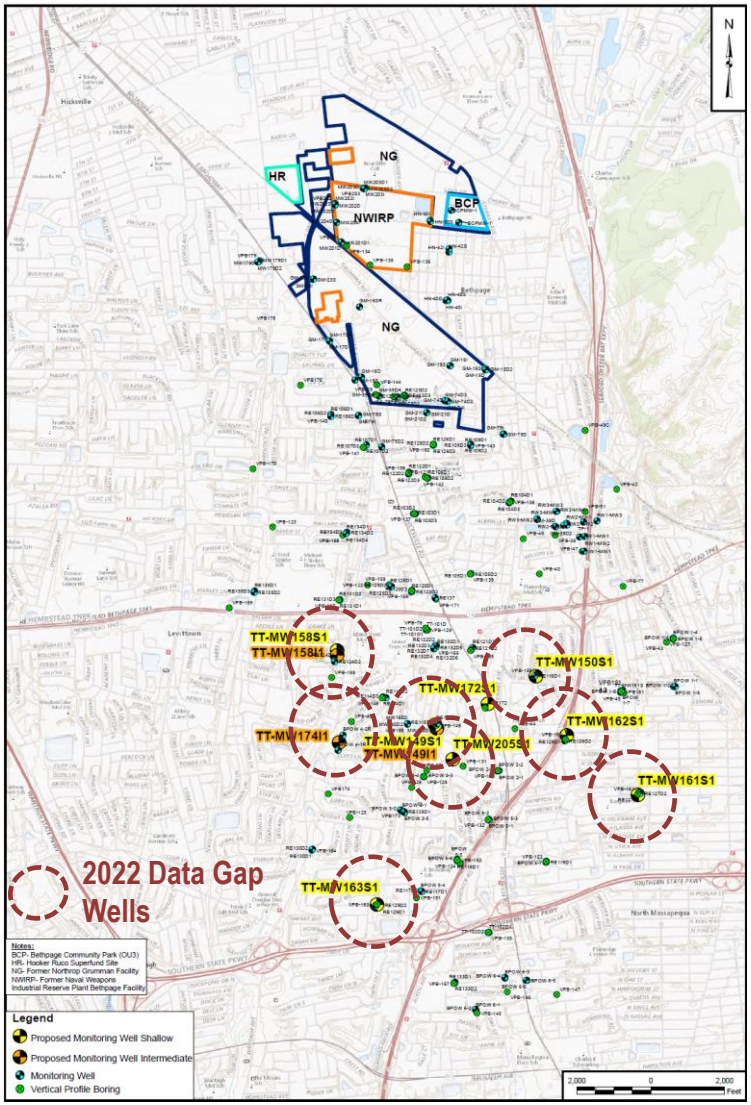
OU2 Groundwater Monitoring Program

- 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 (VOC) and 1,4-dioxane
- Recovery Wells RW4 and RE137 are installed and operating
- Recovery Wells RW6A/B, RW7A/B, RW8 and RW9 are installed
- Recovery Well RW5 in progress
- Recovery Wells RW10 and RW11, preliminary borings to start in late 2022



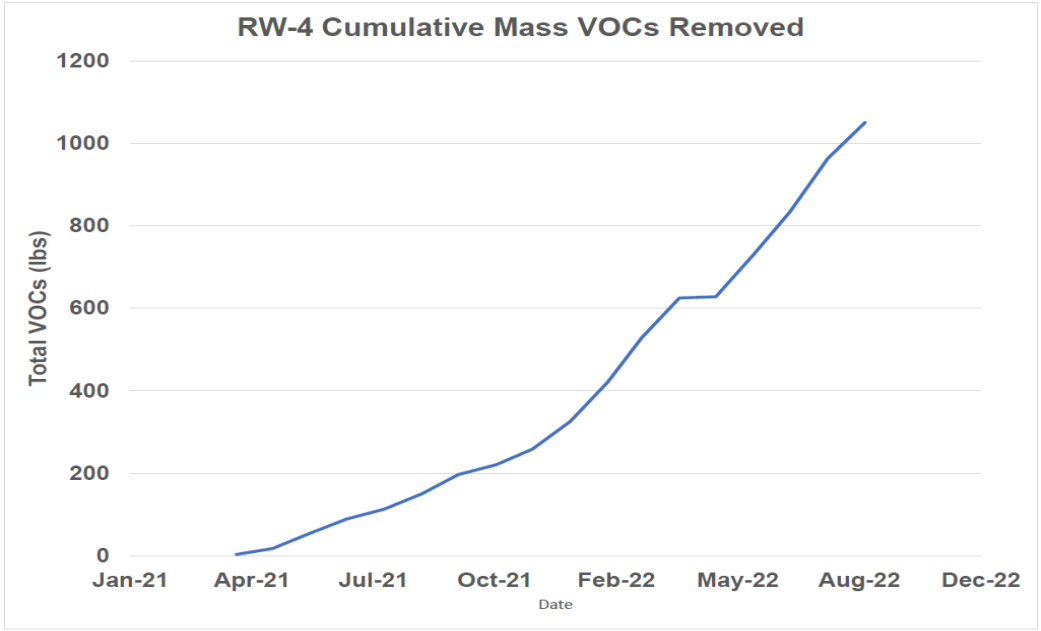
OU2 Groundwater Monitoring Program

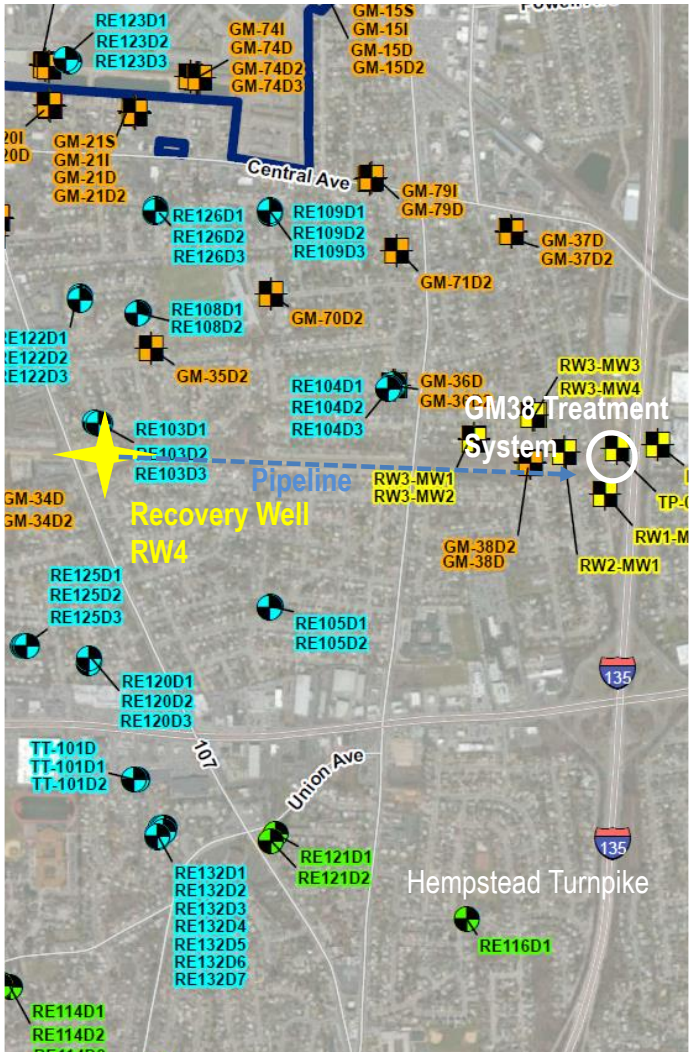
- New monitoring wells continue to be added as needed:
  - ➢Shallow and intermediate-depth groundwater data gap wells (200 to 350 feet below ground surface): completed in August 2022
- **Monitoring well program has shifted from plume delineation to support of plume cleanup**



OU2 Groundwater Monitoring – Recovery Well RW4 (Phase I)

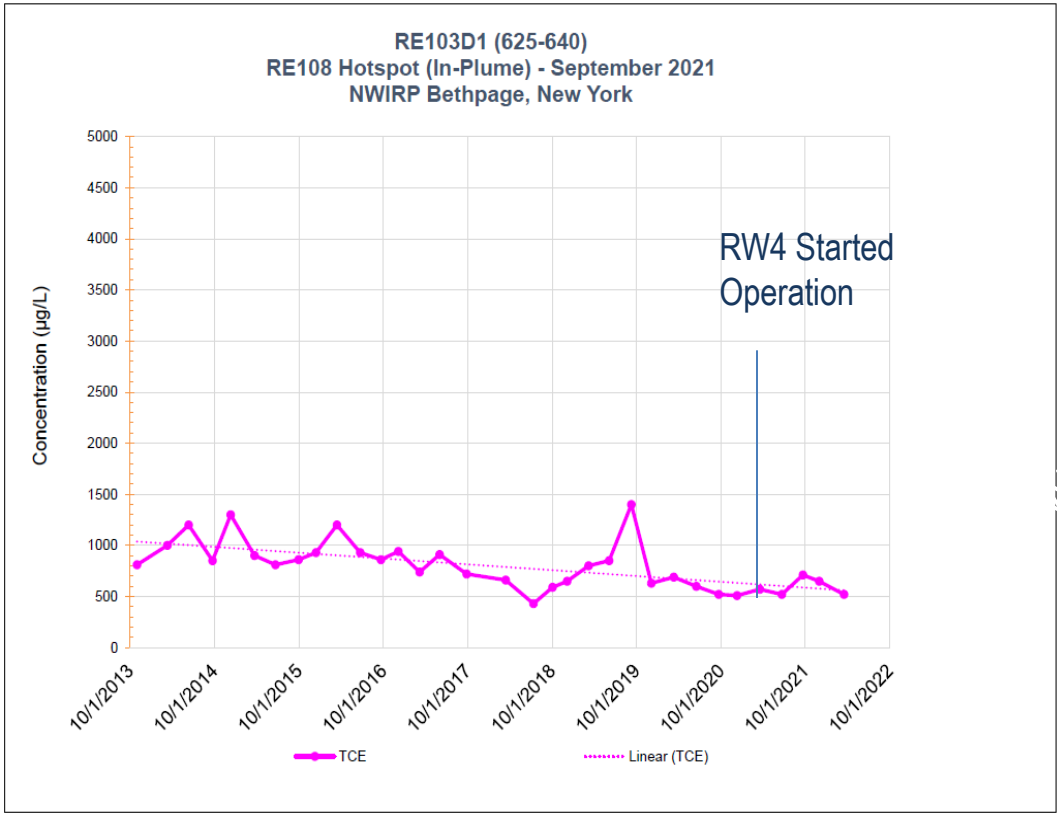
- Well and pipeline started operation in April 2021
- Trichloroethene (TCE) mass removal increasing with higher pumping rates and concentrations
- 129 Pounds of VOCs were removed in August 2022
- Groundwater is treated at GM38 Treatment System

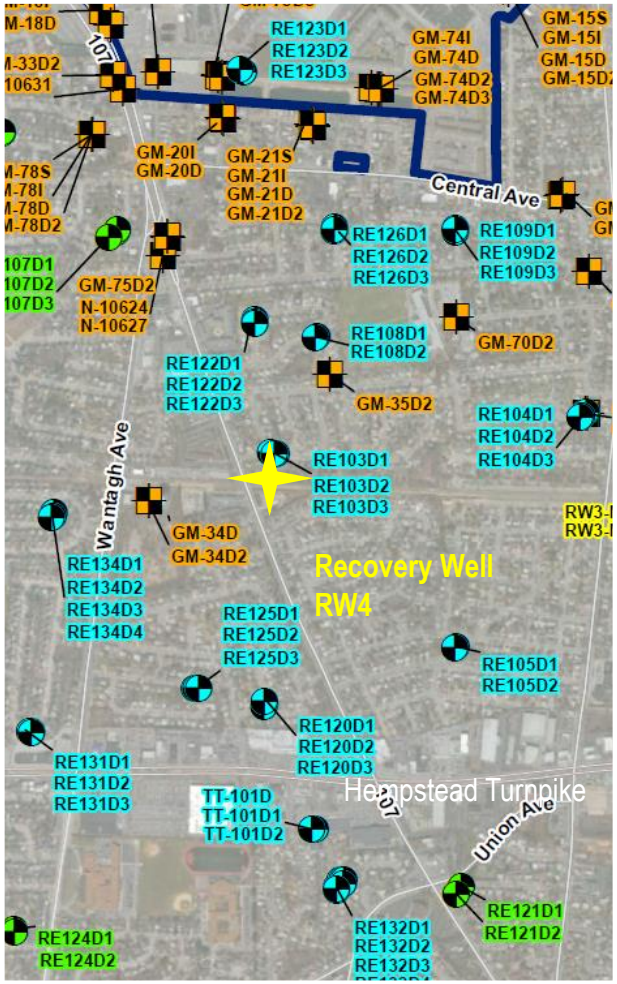




OU2 Groundwater Monitoring – Recovery Well RW4 (Phase I)

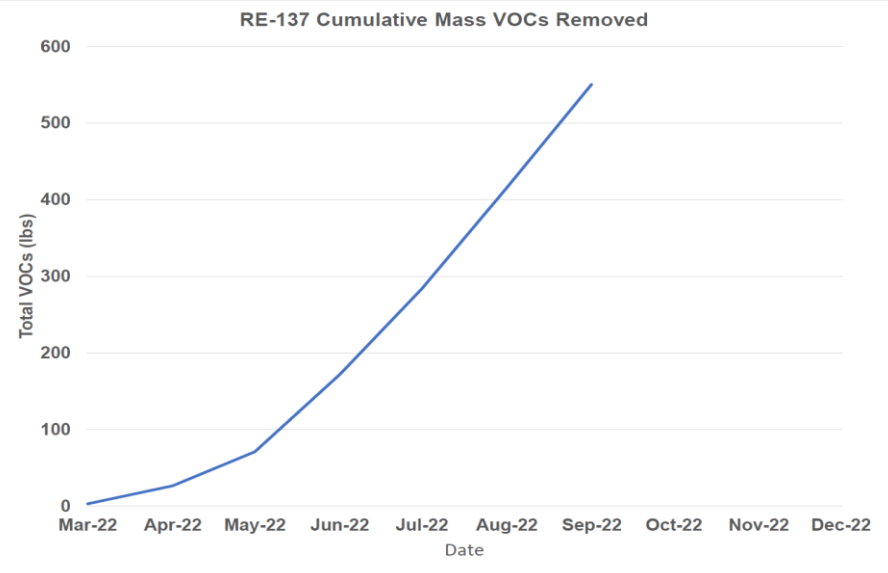
- Changes in water level and VOC concentrations in nearby monitoring wells are used to evaluate effectiveness of recovery wells
- Water level data is processed with computer modeling

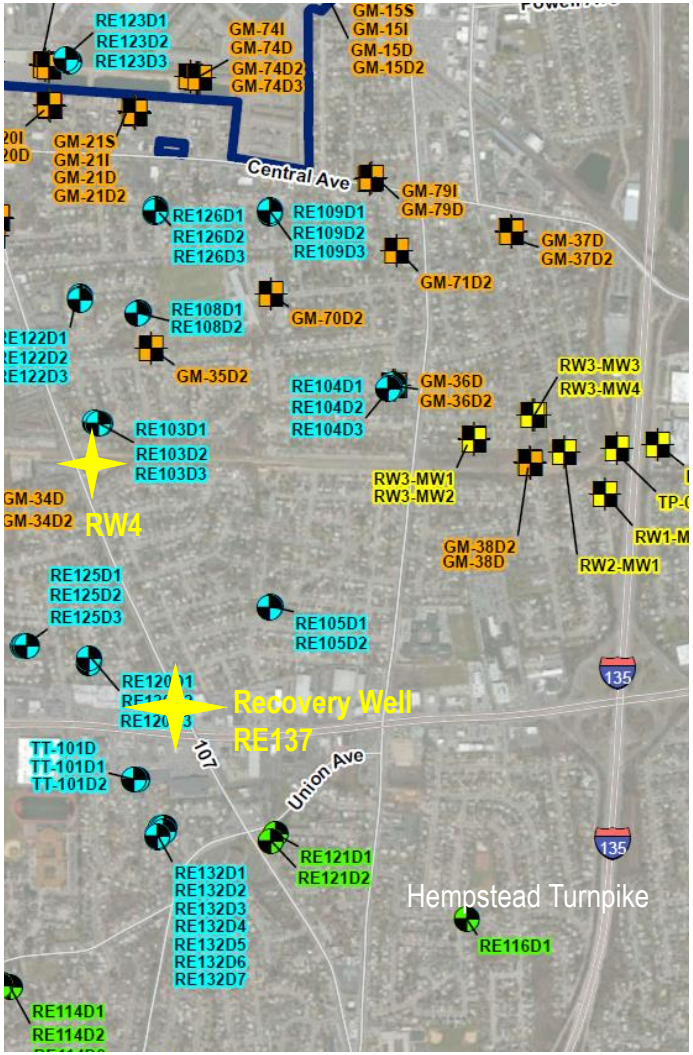




OU2 Groundwater Monitoring – Recovery Well RE137

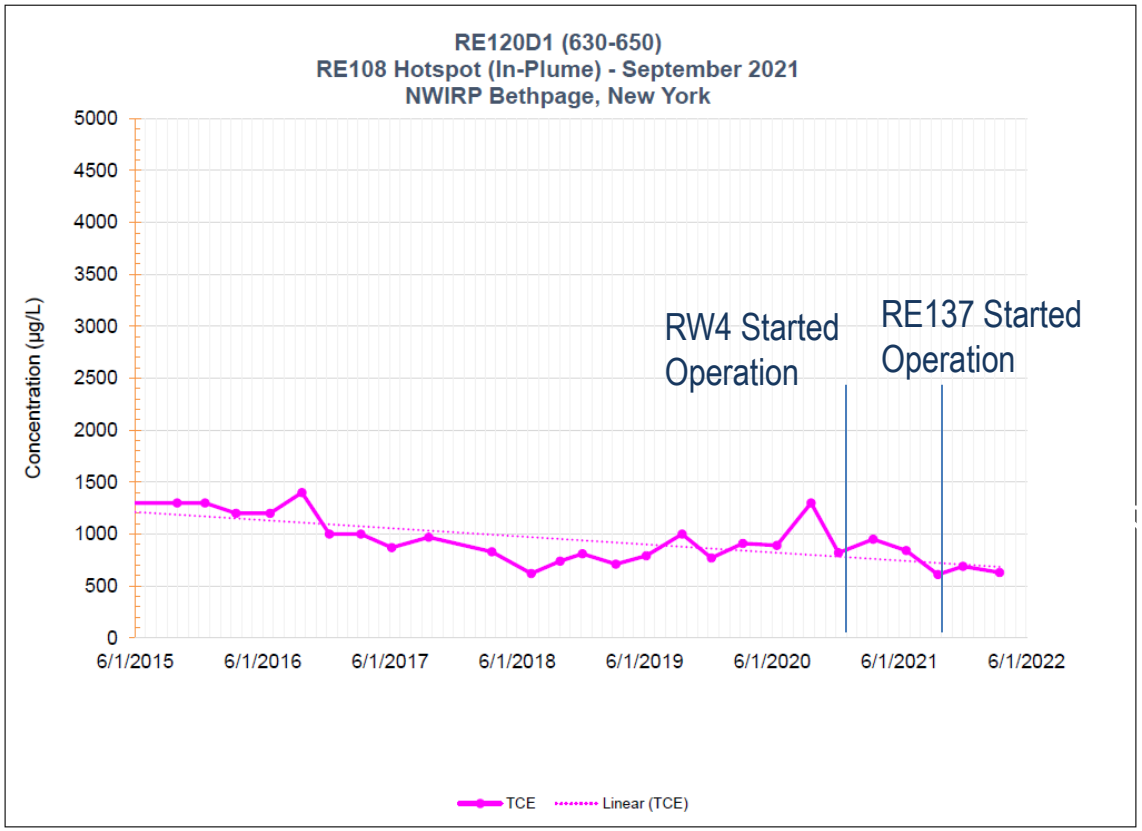
- Well started operation in March 2022
- Trichloroethene (TCE) mass removal increasing with higher pumping rates and concentrations
- Groundwater is treated locally using Advanced Oxidation Process (AOP) system and Granular Activated Carbon (GAC)
- 135 Pounds of VOCs were removed in Sept 2022

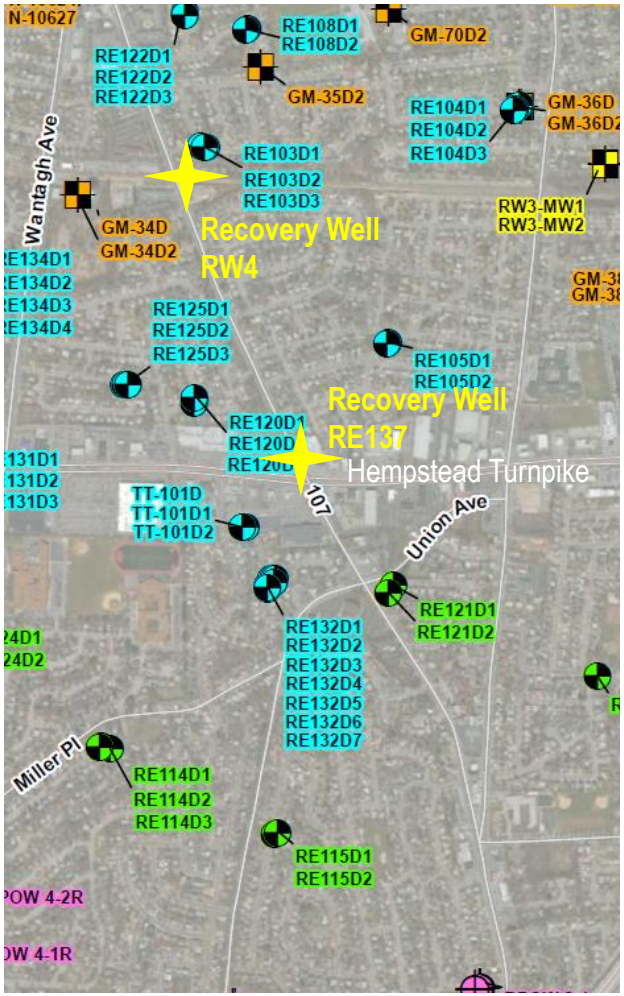




OU2 Groundwater Monitoring – Recovery Well RE137

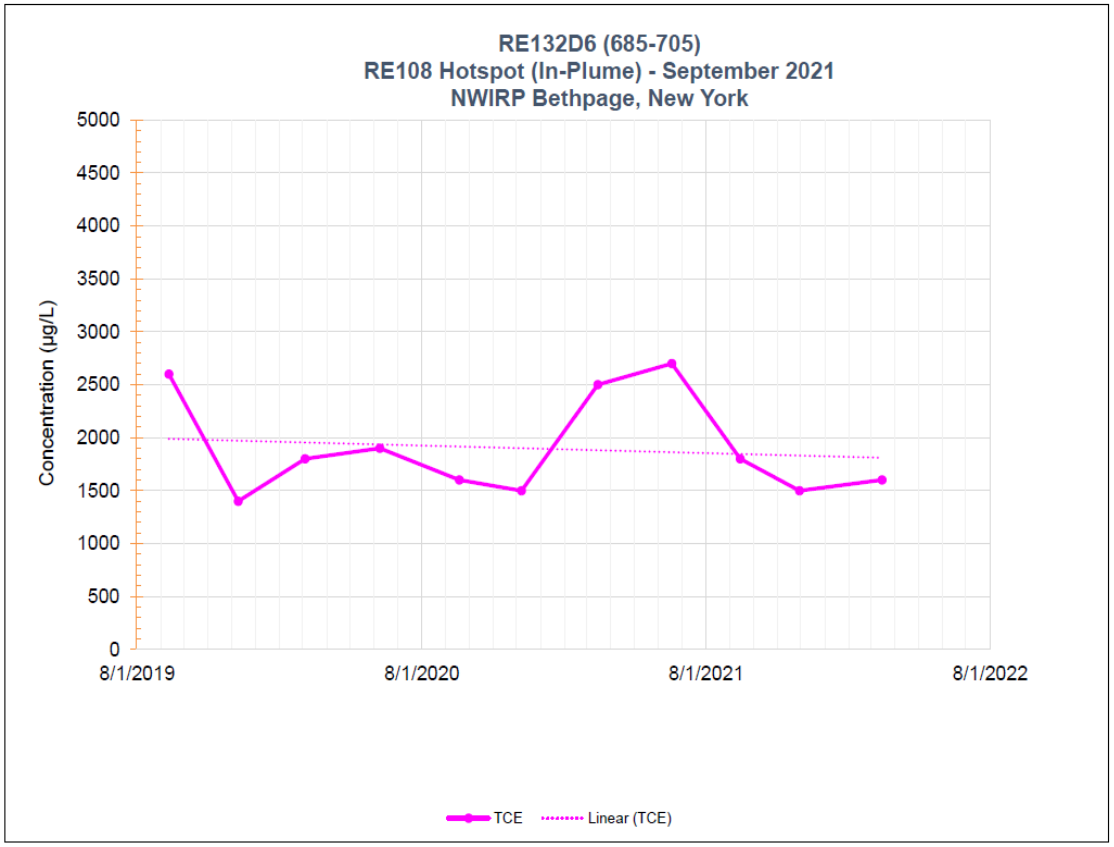
- Pilot testing – Startup in March 2022
- Planned operation through December 2023

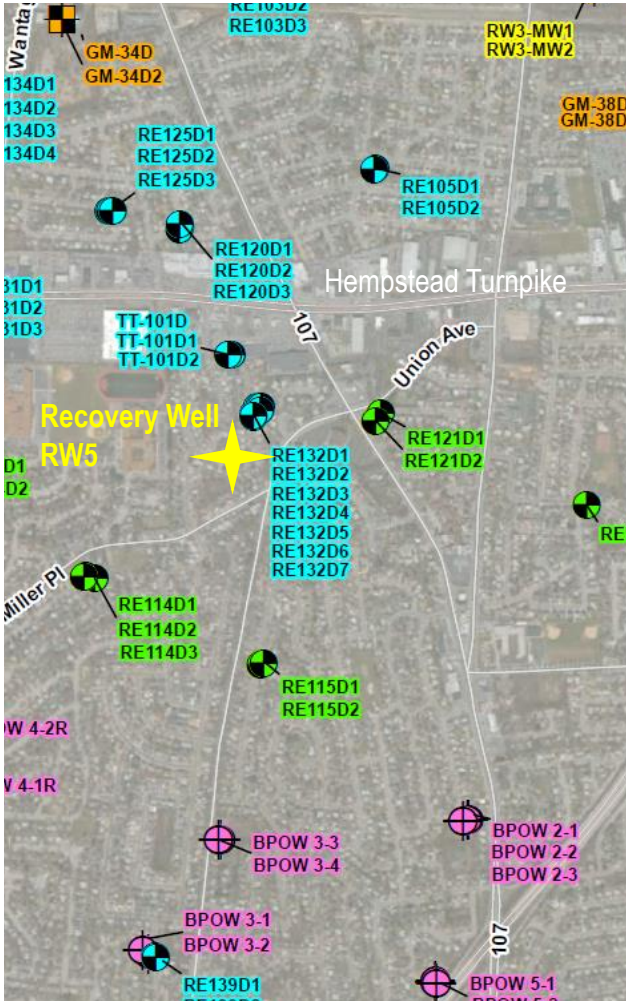




OU2 Groundwater Monitoring – Recovery Well RW5 (Phase II)

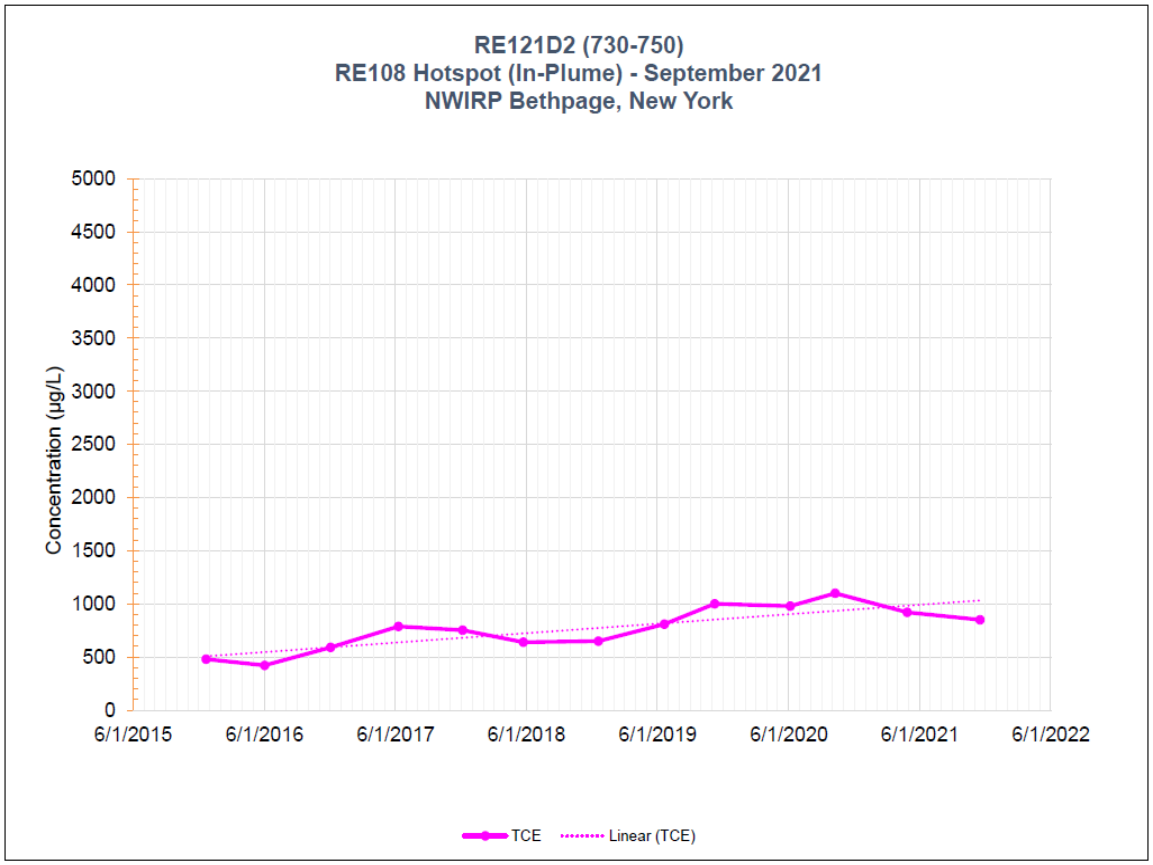
- RW5 installation (late 2022) and operation in 2023

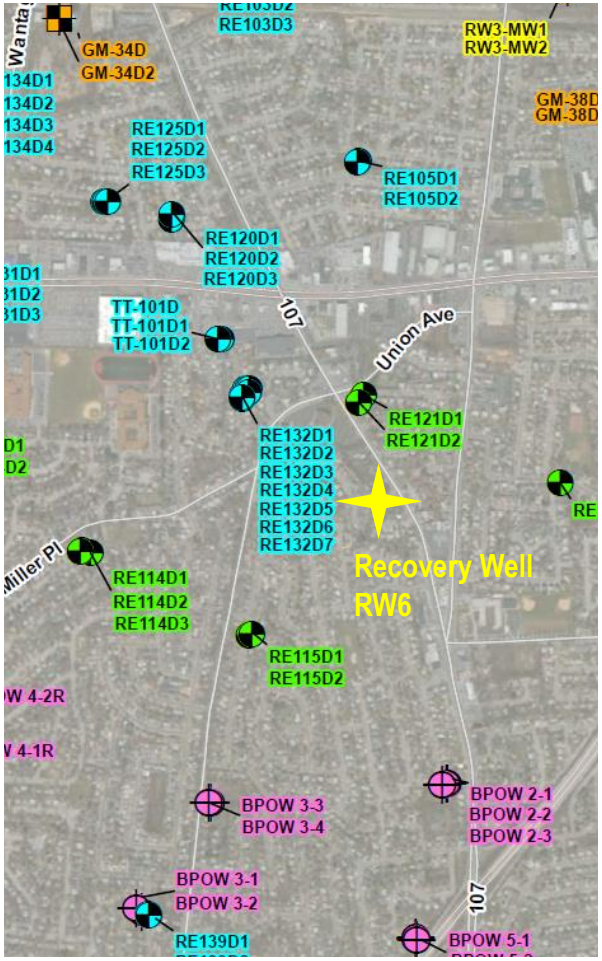




OU2 Groundwater Monitoring – Recovery Well RW6 (Phase II)

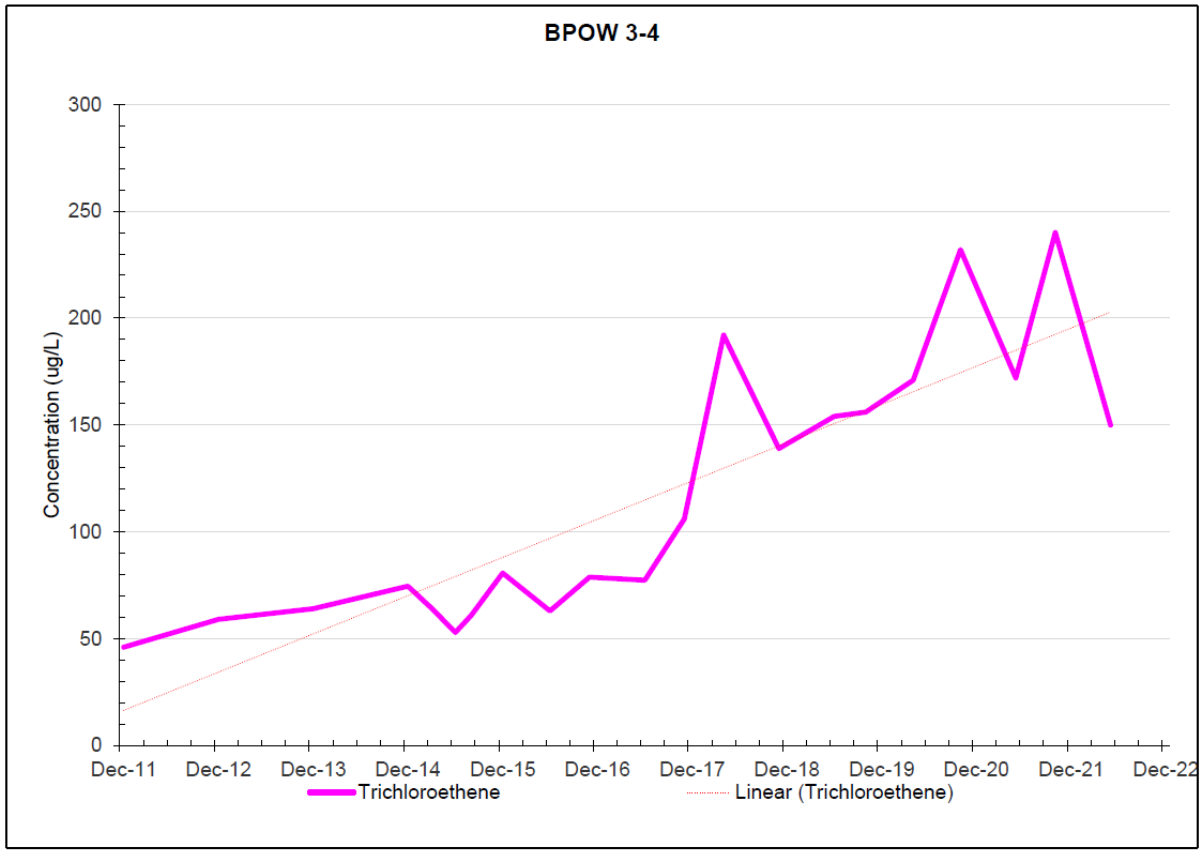
- RW6 is installed and planned for operation in early 2023

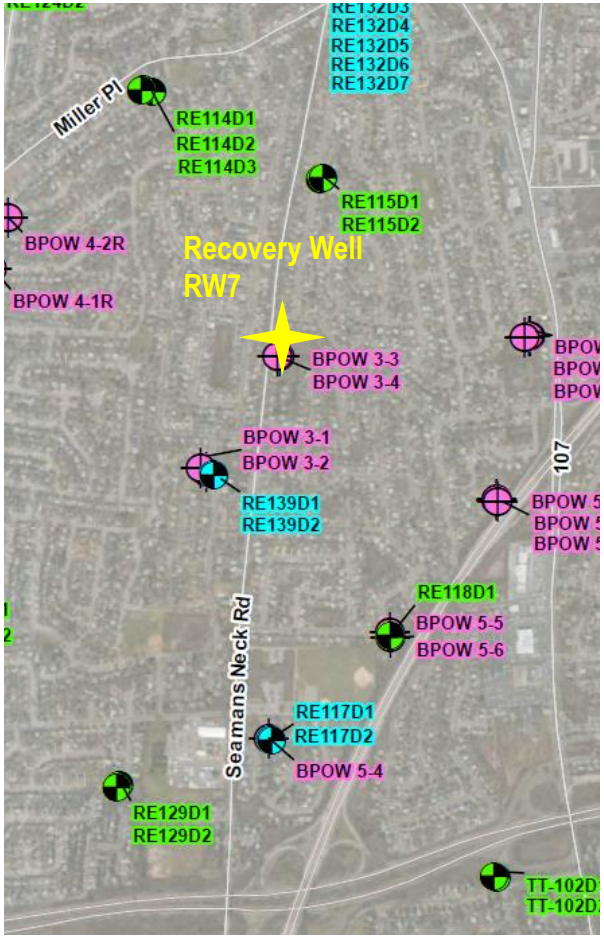




OU2 Groundwater Monitoring – Recovery Well RW7 (Phase II Extension)

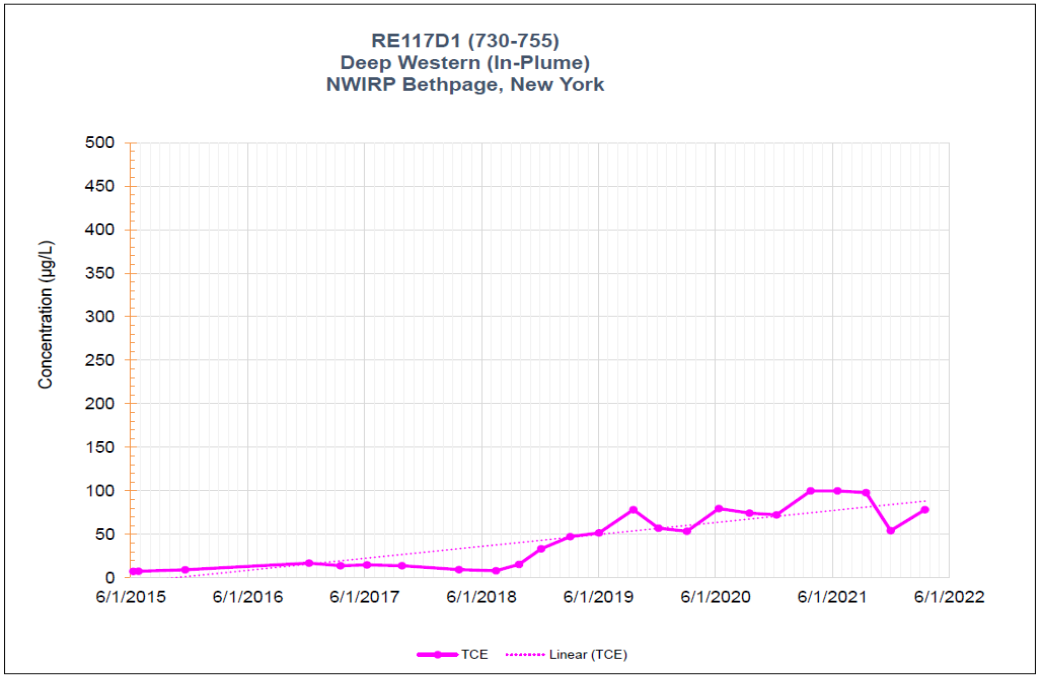
- RW7 is installed and planned for operation in early 2023

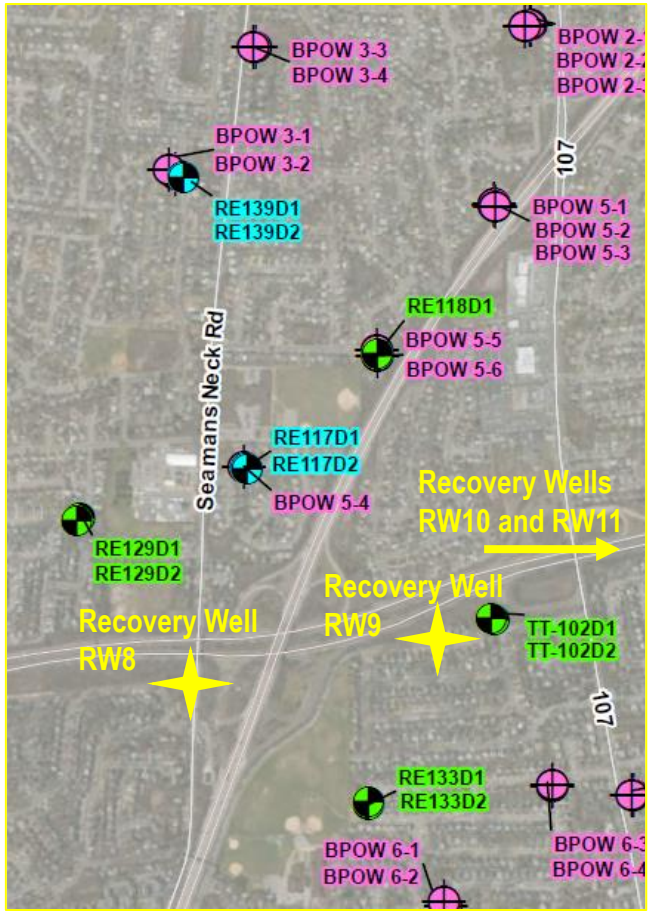




OU2 Groundwater Monitoring – Recovery Well RW8 to RW11 (Phase III)

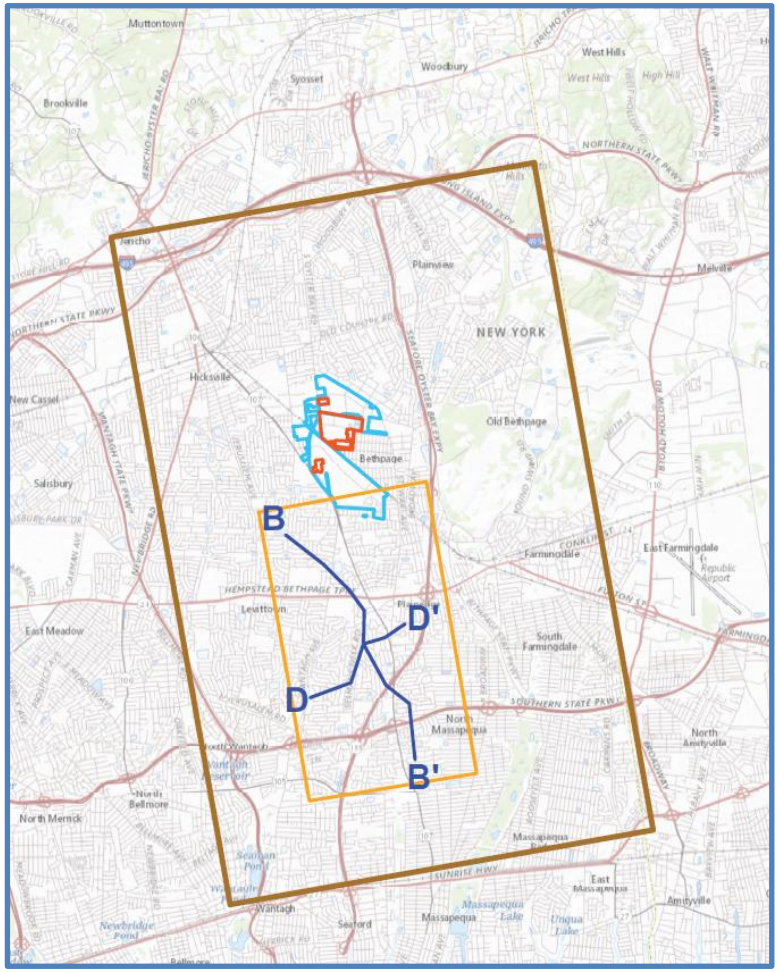
- Recovery Wells RW8 and RW9 target deep groundwater at monitoring well RE117
- RW8 and RW9 are installed, pumping tests in October and December 2022. System to be in operation in 2024
- RW10 and/or RW11 VPBs and monitoring wells to start late 2022





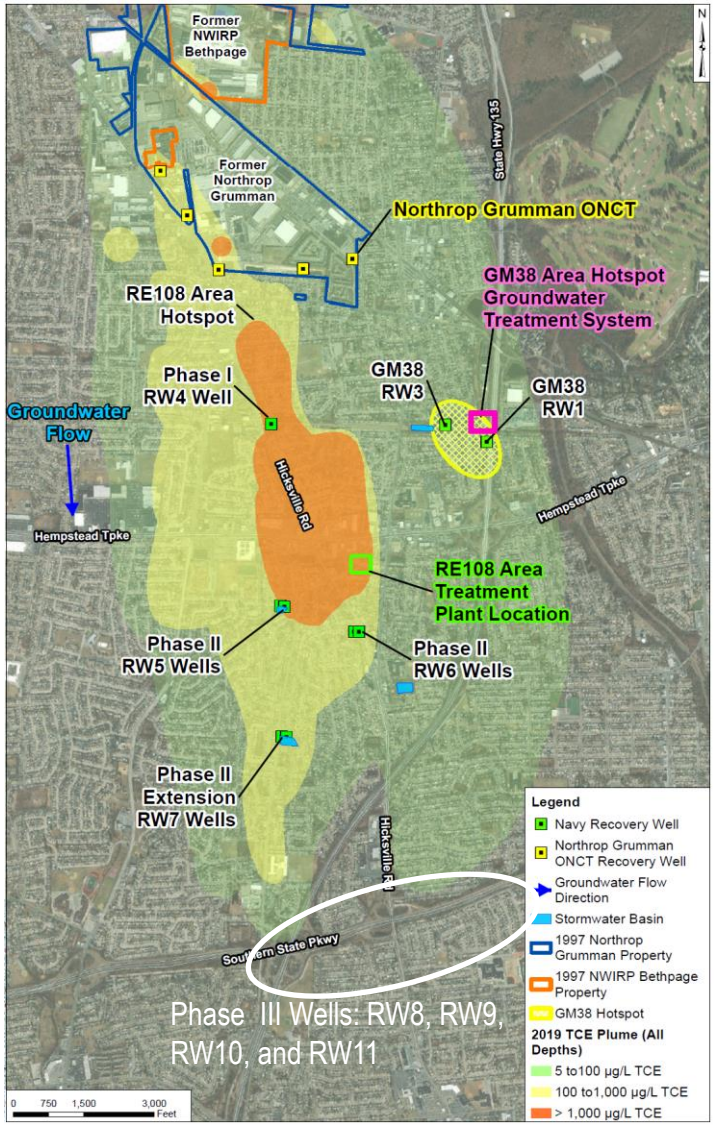
OU2 Groundwater Fate and Transport Modeling

- 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

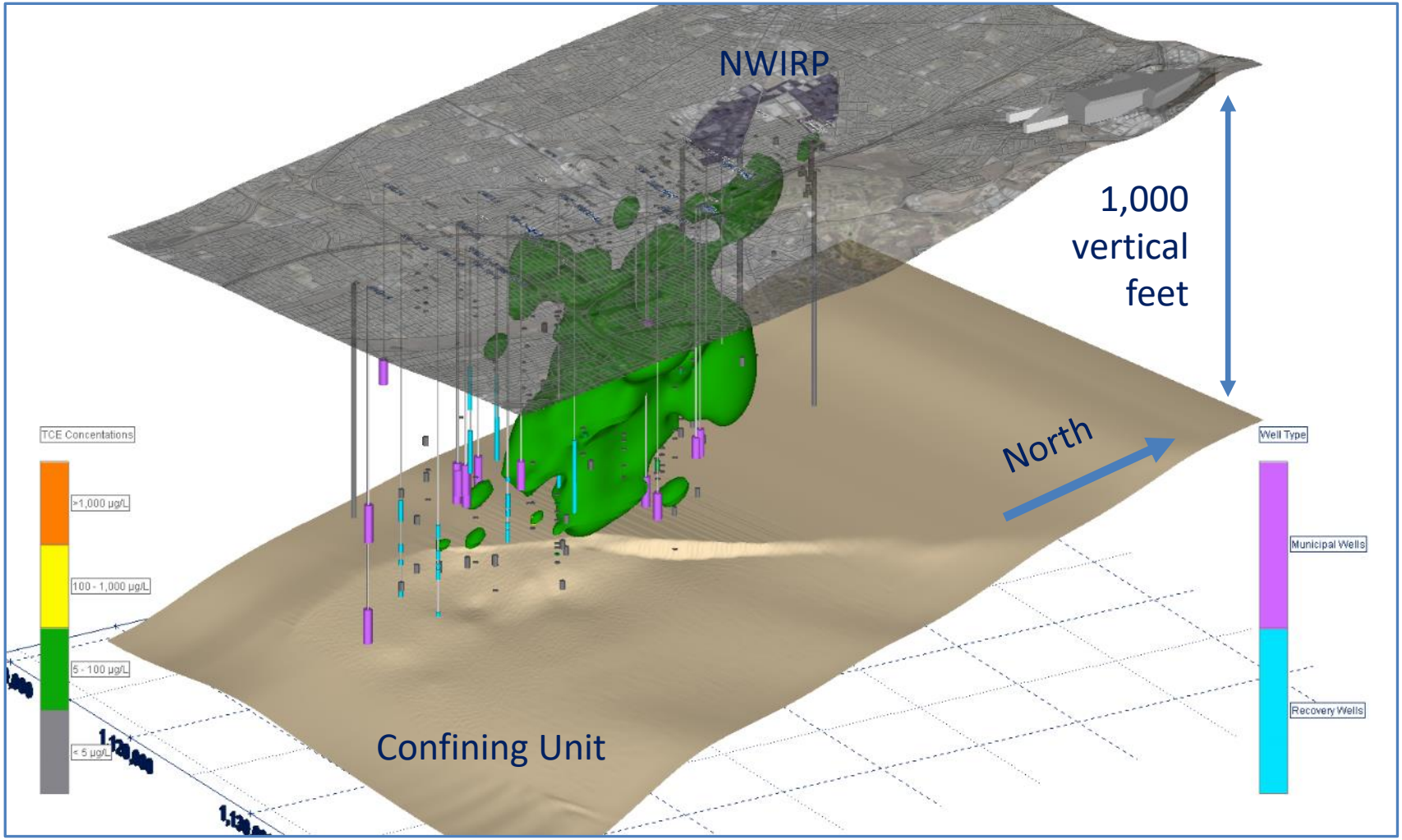


OU2 Groundwater Fate and Transport Modeling

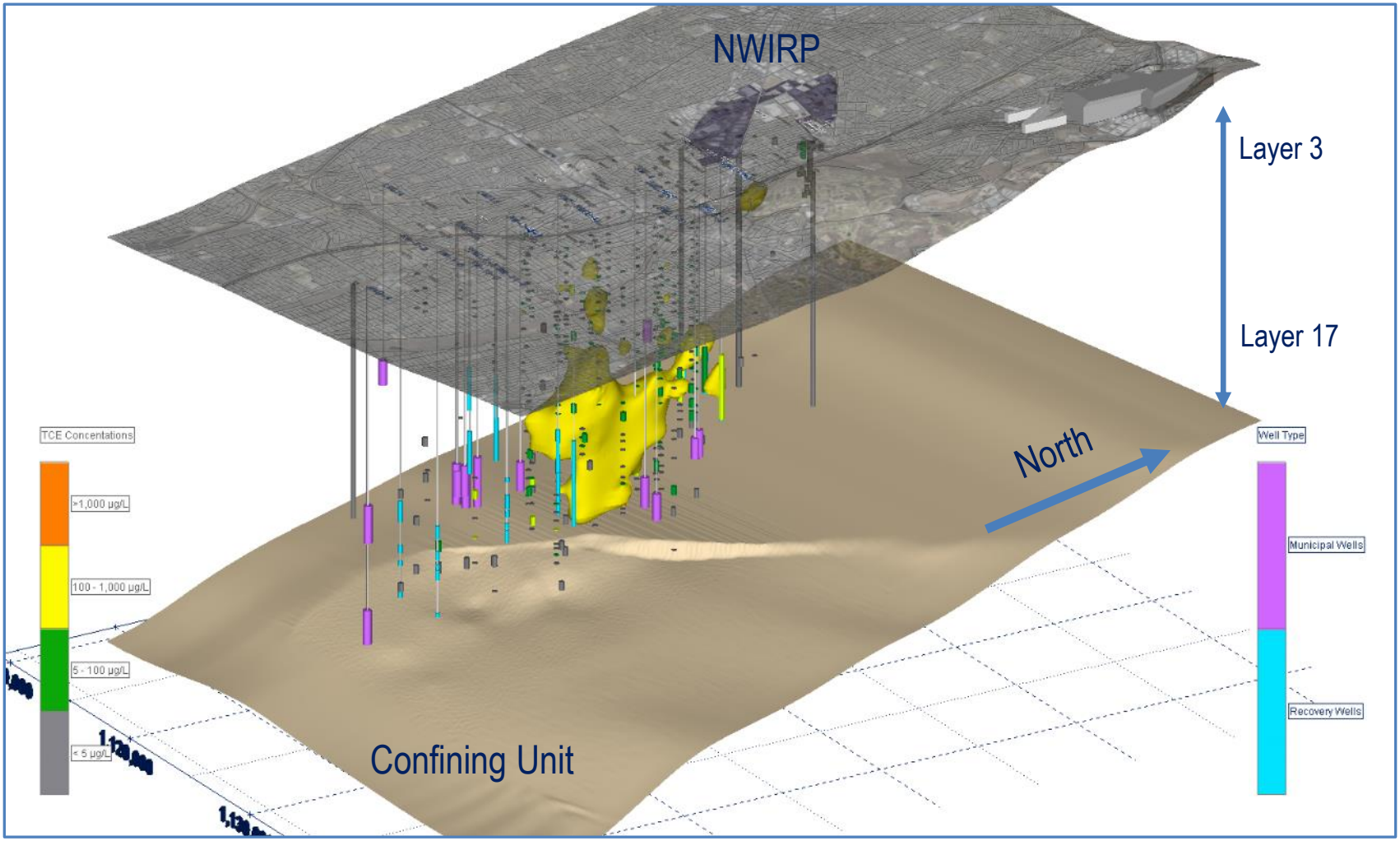
- Plume boundaries are shown using trichloroethene (TCE) as:
  - Green - 5 to 100 micrograms per liter (ug/L)
  - Yellow - 100 to 1,000 ug/L
  - Orange - greater than 1,000 ug/L
- Boundary likely includes non-OU2 contributors



OU2 Groundwater Fate and Transport Modeling – 3D TCE Plume



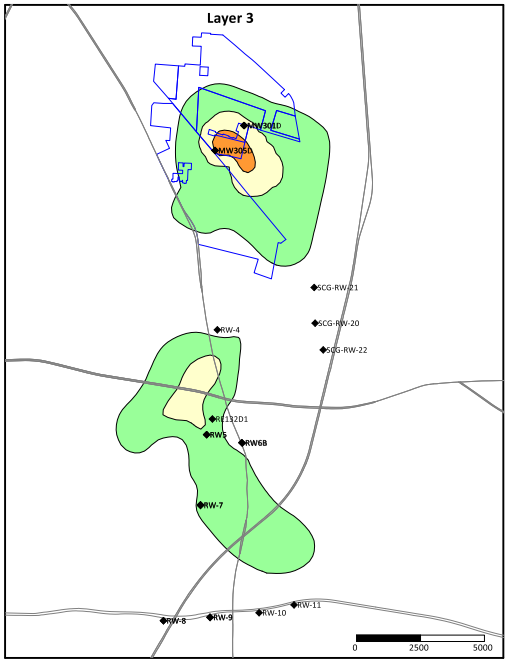
OU2 Groundwater Fate and Transport Modeling – 3D TCE Plume



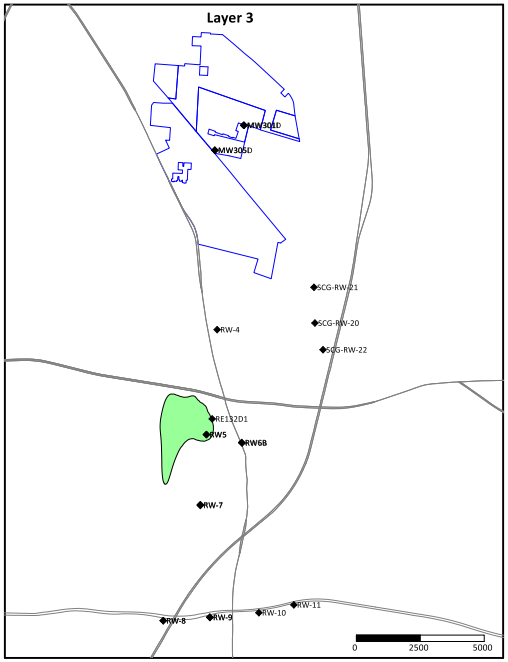
OU2 Groundwater Fate and Transport Modeling

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

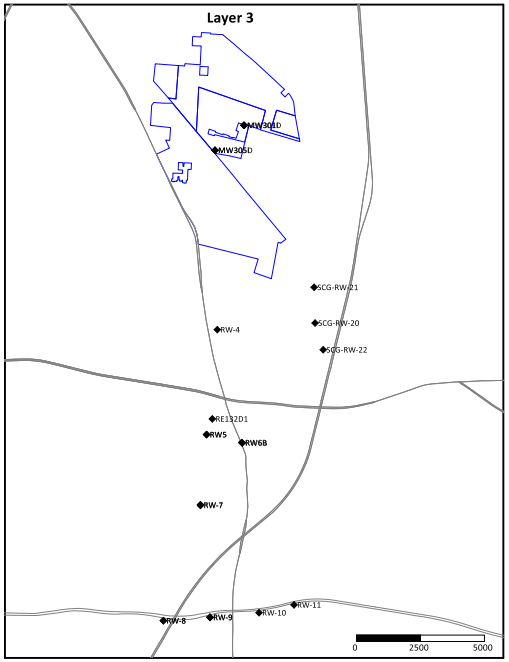
2020

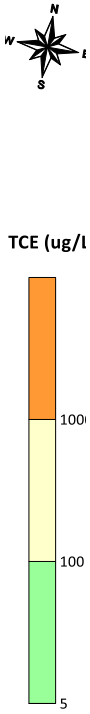


2050



2070

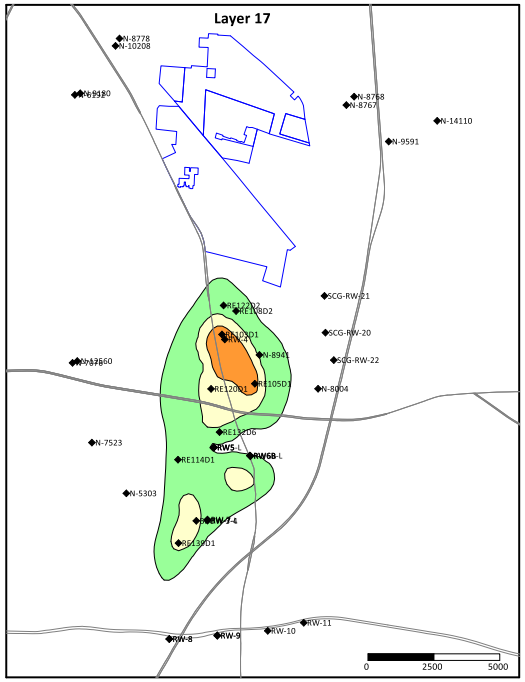




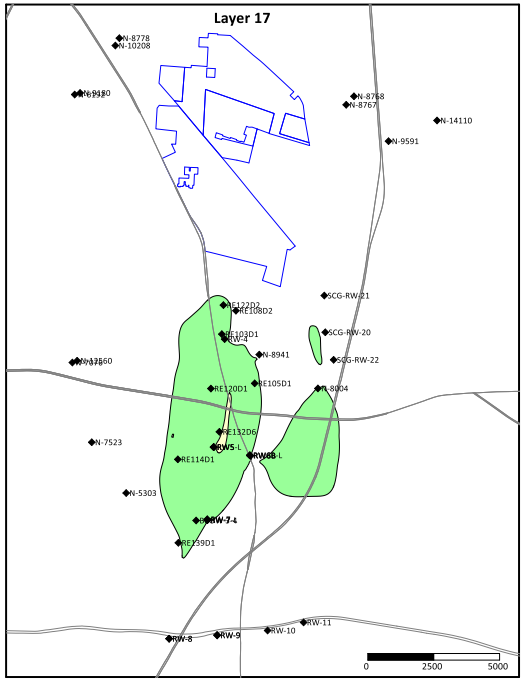
OU2 Groundwater Fate and Transport Modeling

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

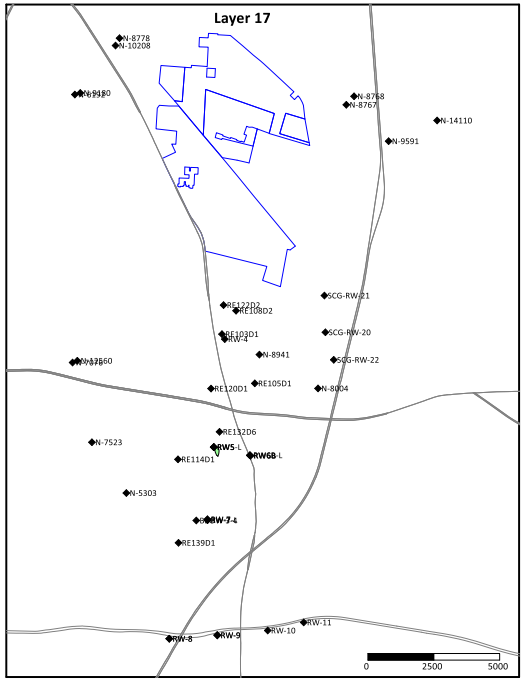
2020

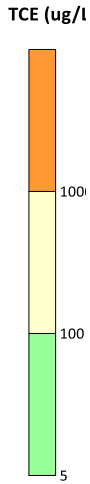


2050



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
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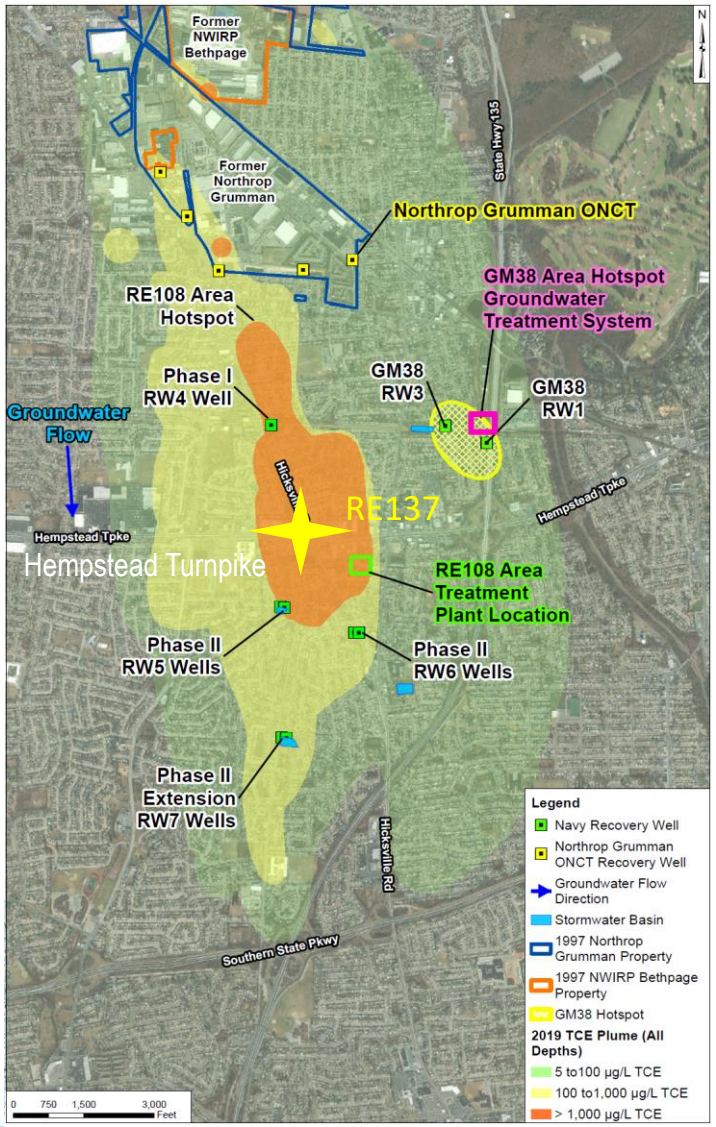
Recovery Well RE137 Interim Action Update

Presented by:
David Brayack, Project Manager
Tetra Tech
16 Nov 2022

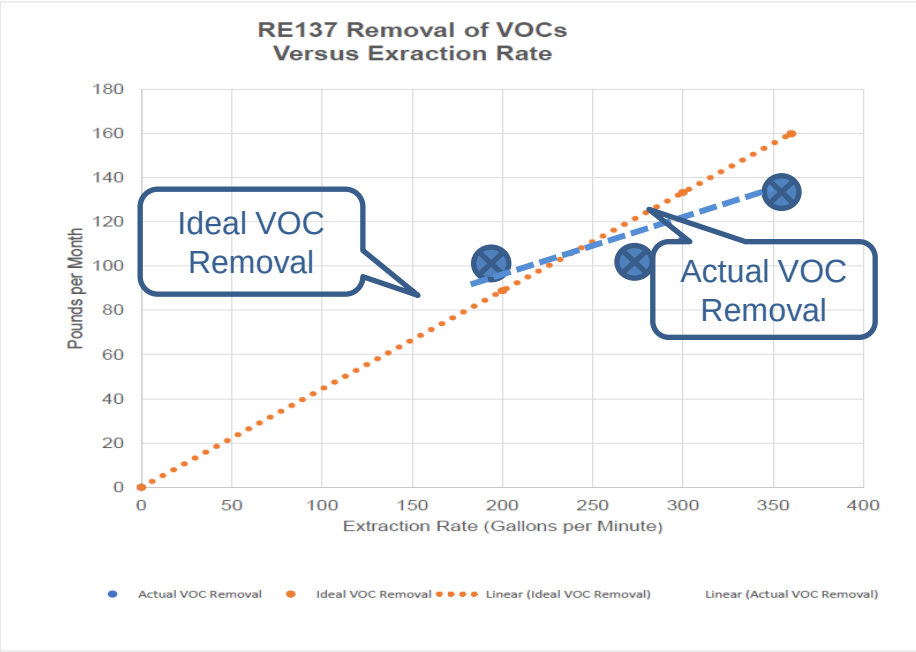
RE137 Pilot-Scale Testing

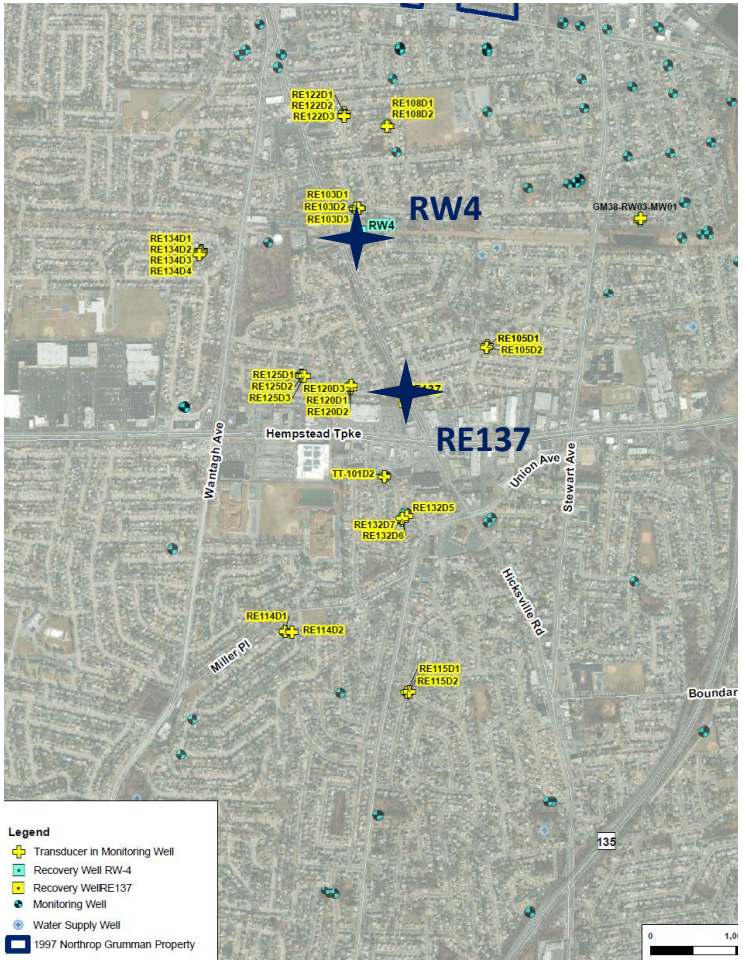
- RE137 was considered a groundwater recovery well for Phase II RE108 Area Hotspot Treatment System
- Well was determined to be too far north to intercept the hotspot, but could help slow down migration
- Current test to run for approximately 20 months, potentially longer
- Treatment consists of Advanced 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
- System has been very effective at removing VOCs from the aquifer (135 pounds in September 2022)
- 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
Tetrachloroethene	3.6	Not detected
Trichloroethene	1,930	Not detected

RAB Member Questions

Naval Facilities Engineering Systems Command
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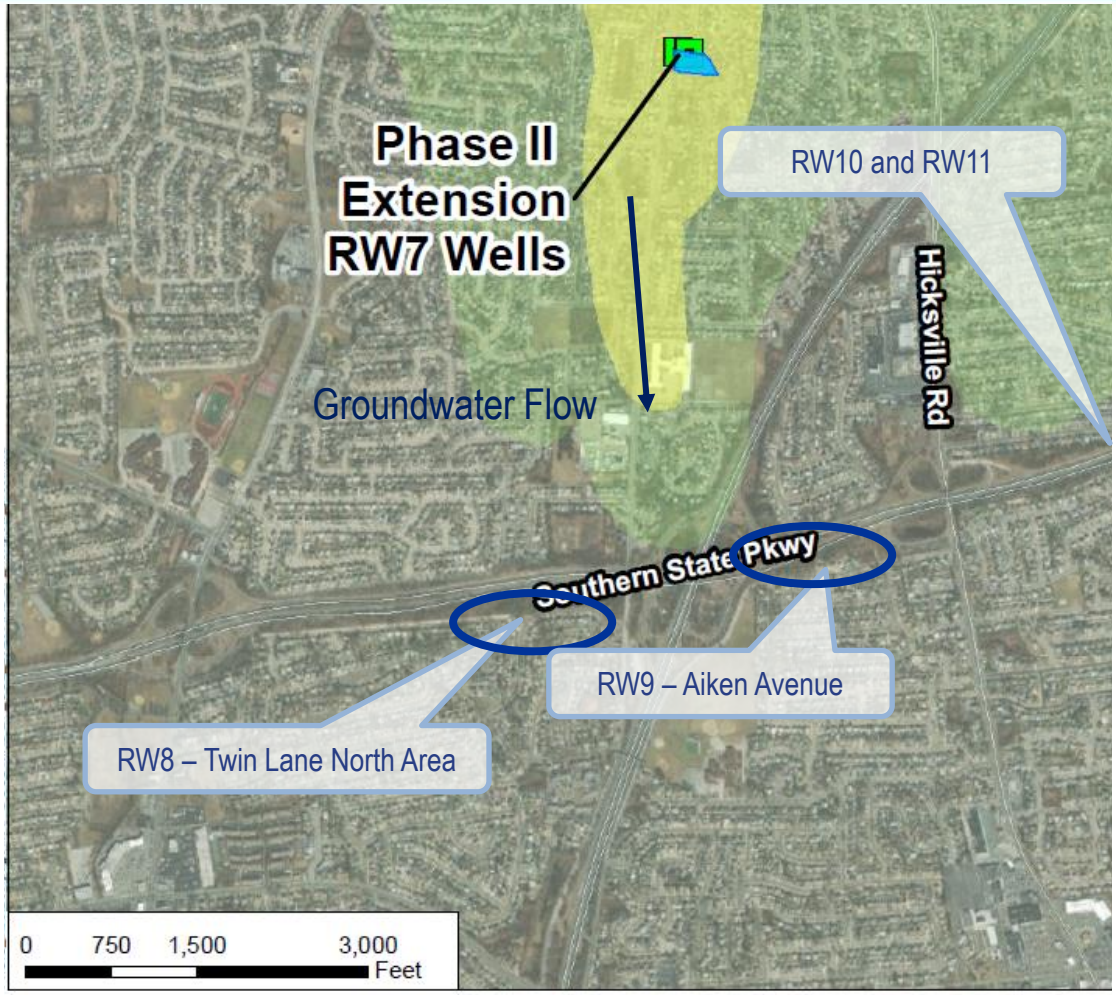
Restoration Advisory Board Meeting

Phase III (RW8 to RW11) – Southern Plume Intercept Treatment System Update

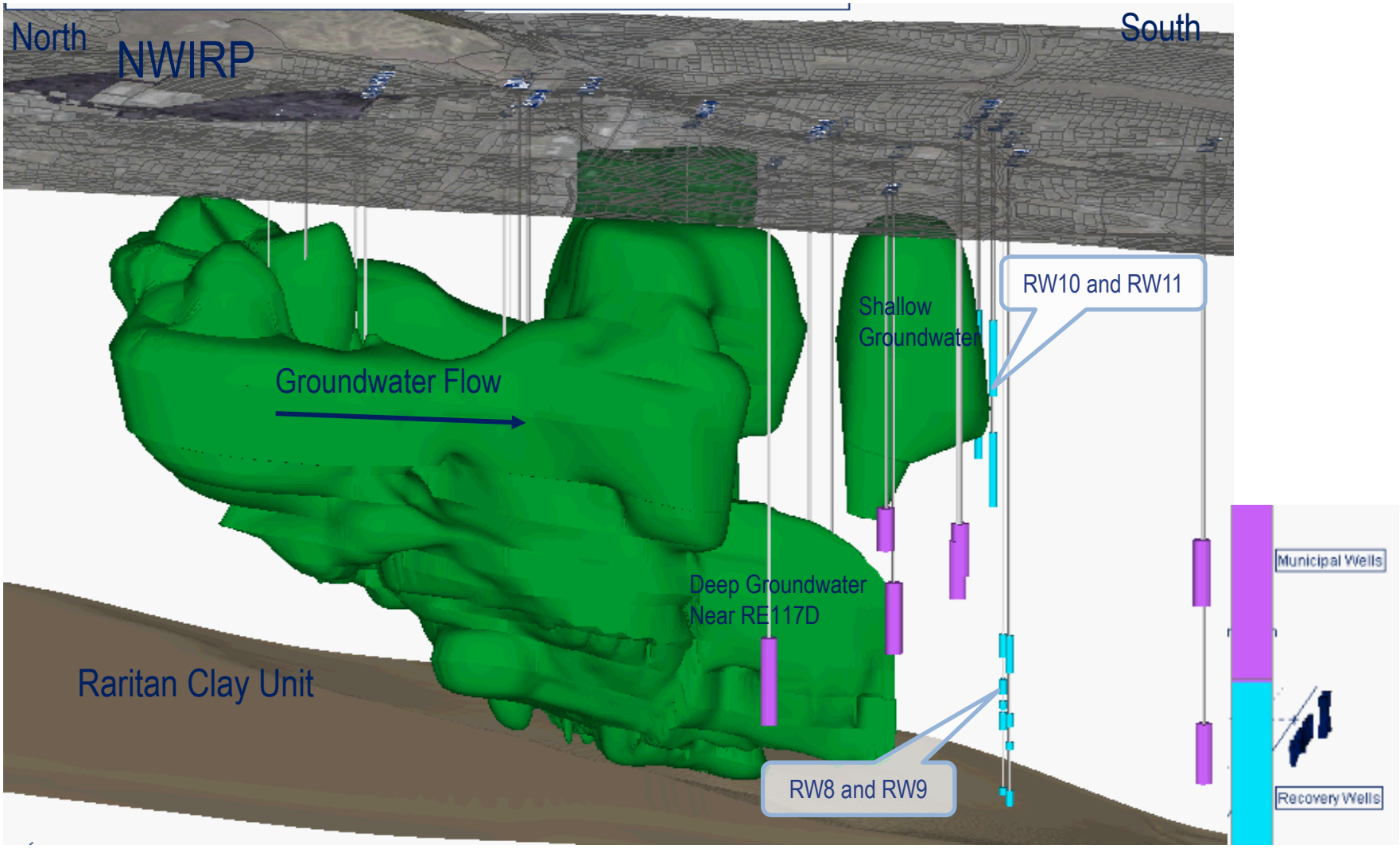
Presented by:
David Brayack, Project Manager
Tetra Tech
16 Nov 2022

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

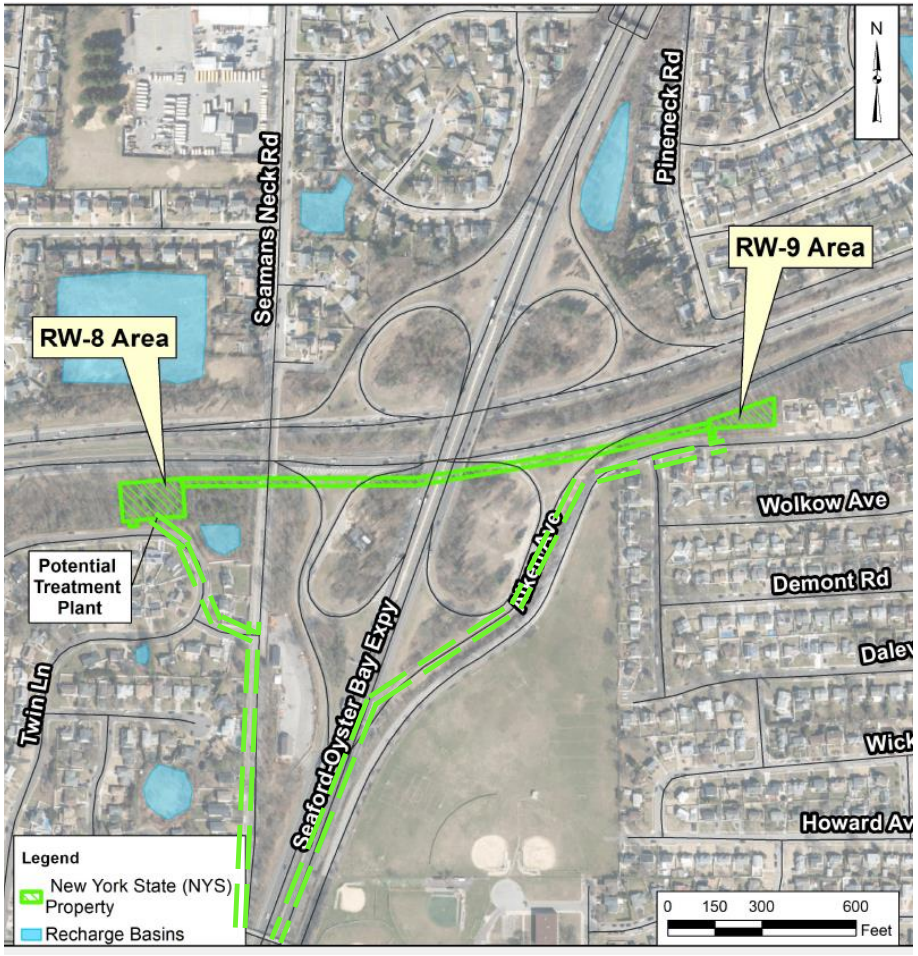


Phase III – Southern Plume Intercept Treatment System Update



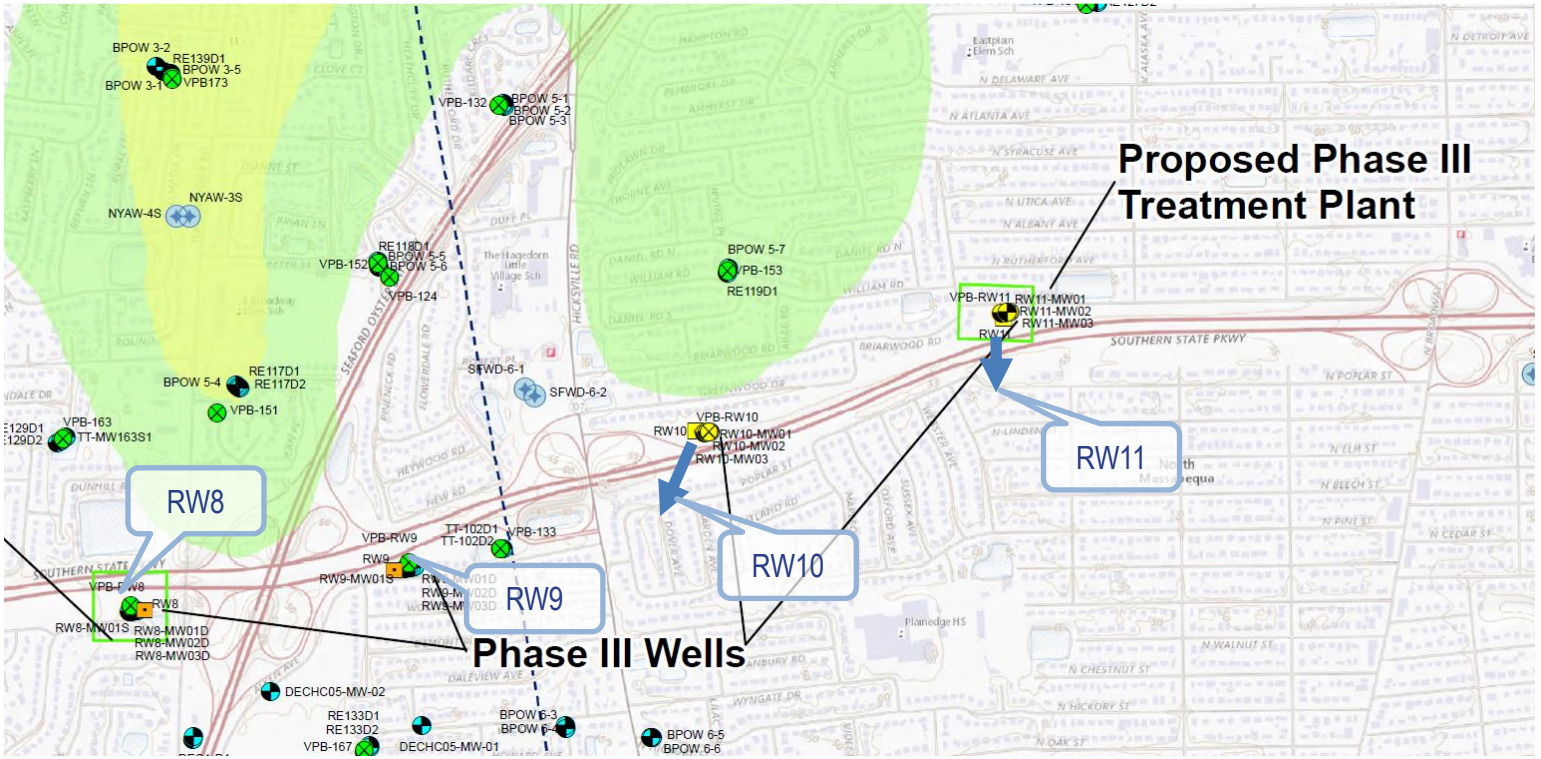
Phase III – Southern Plume Intercept Treatment System Update

- 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 pumping test completed in October 2022
- Recovery Well RW9 pumping test to be completed in early December 2022



Phase III – Southern Plume Intercept Treatment System Update

- November 2022, preparing to drill VPB and monitoring wells for RW10 and RW11
- Due to access issues and plume location, RW10 and RW11 and associated VPBs and monitoring wells moved south of Southern State
- Due to plume location and limited access, RW10/RW11 moved south of Southern State Pkwy



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 test conducted at 1,000 gallons per minute for three days (4.3 million gallons of water)
- 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
- 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
16 November 2022

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

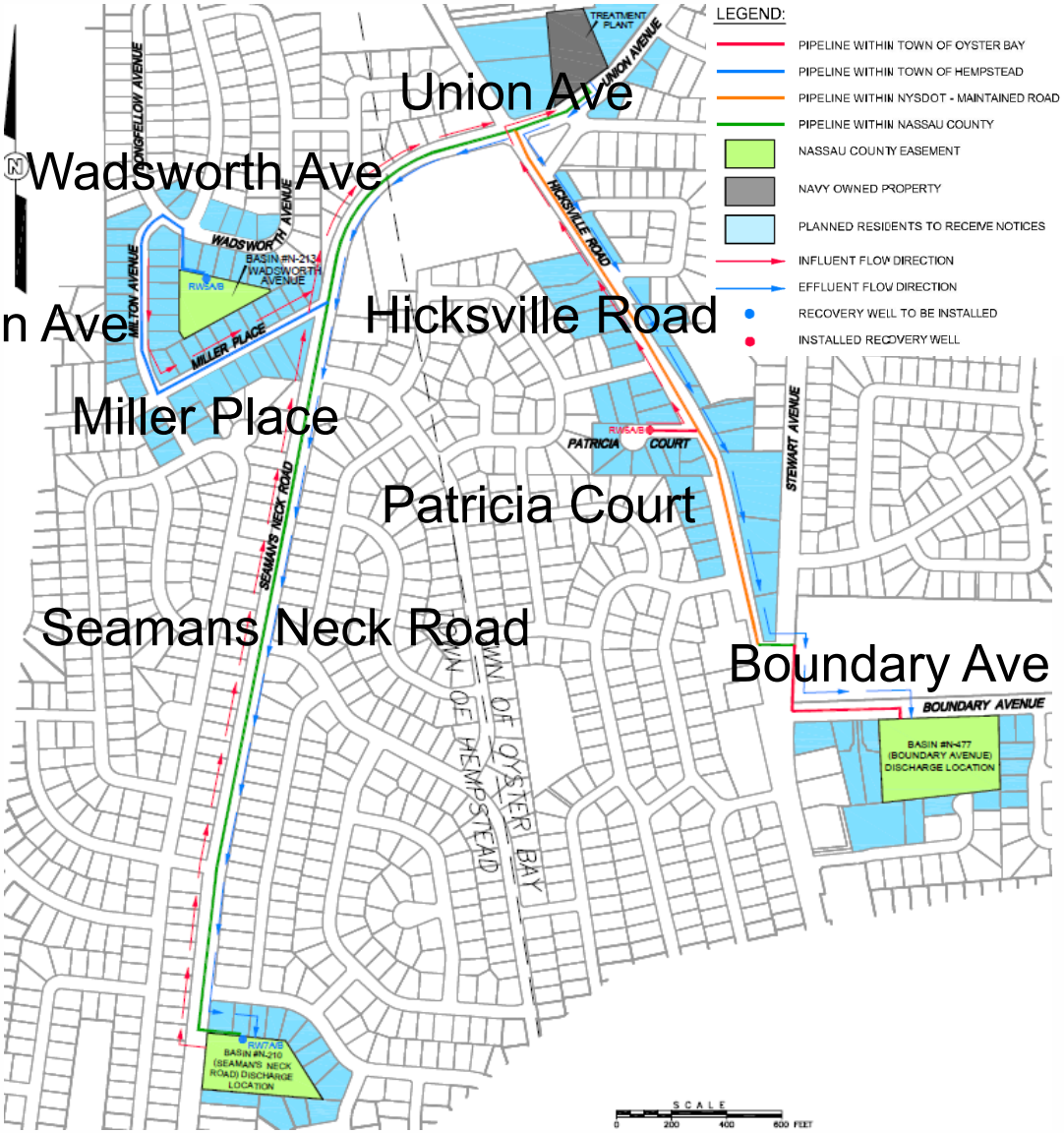
- To be constructed at 11 Union Avenue

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)



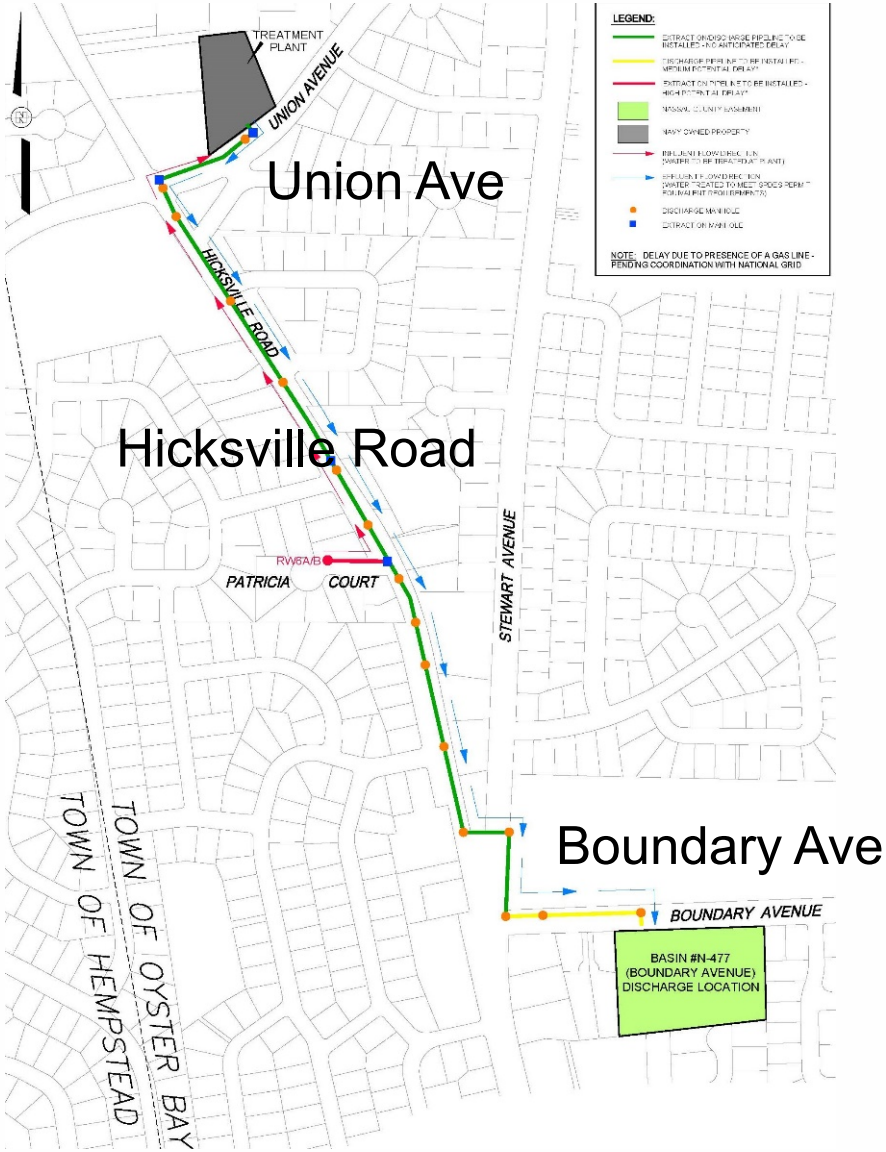
RE108 Area Hotspot Treatment System – Phase II System Installation Schedule of Pipeline Activities

Construction of Water Treatment Plant

- Under Construction approximately 60% constructed.
  - Subsurface Preparation and Concrete slab/equipment pads completed
  - Masonry Interior and Exterior Walls
  - Temporary Electrical Power Service

Installation of Influent and Effluent Pipelines

- RW 6A/6B Extraction Pipeline
- Effluent Pipeline to recharge basins N-477 (Boundary Avenue) and N-210 (Seaman's Neck Road) Started in April 2022 and installed approximately 500 Linear Feet (LF) of Reinforced Concrete Pipe (Effluent Conveyance Piping)
- Clean-out limited clearing at Basin N-477



RE108 AREA HOTSPOT TREATMENT SYSTEM – PHASE II – CONSTRUCTION UPDATE

The following are photographs of progress on the project:

October 2022. View of the building exterior Looking east.

October 2022. Interior of the building.

RE108 AREA HOTSPOT TREATMENT SYSTEM – PHASE II – CONSTRUCTION UPDATE

The following are photographs of progress on the project:

October 2022. Nassau County Basin N477 prior to clearing and grubbing activities. Looking west.

October 2022. Initial stages of clearing and grubbing within Nassau County Basin N477. Excavator being used to move cut organic debris to woodchipper. Looking north northwest.

RE108 AREA HOTSPOT TREATMENT SYSTEM – PHASE II – CONSTRUCTION UPDATE

Liquid Granular Activated Carbon Units 1 and 2.

T-700, Backwash Tank

RE108 AREA HOTSPOT TREATMENT SYSTEM – PHASE II – CONSTRUCTION UPDATE

Vapor Granular Activated Carbon Unit

C-510, Carbon Canister Unit

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

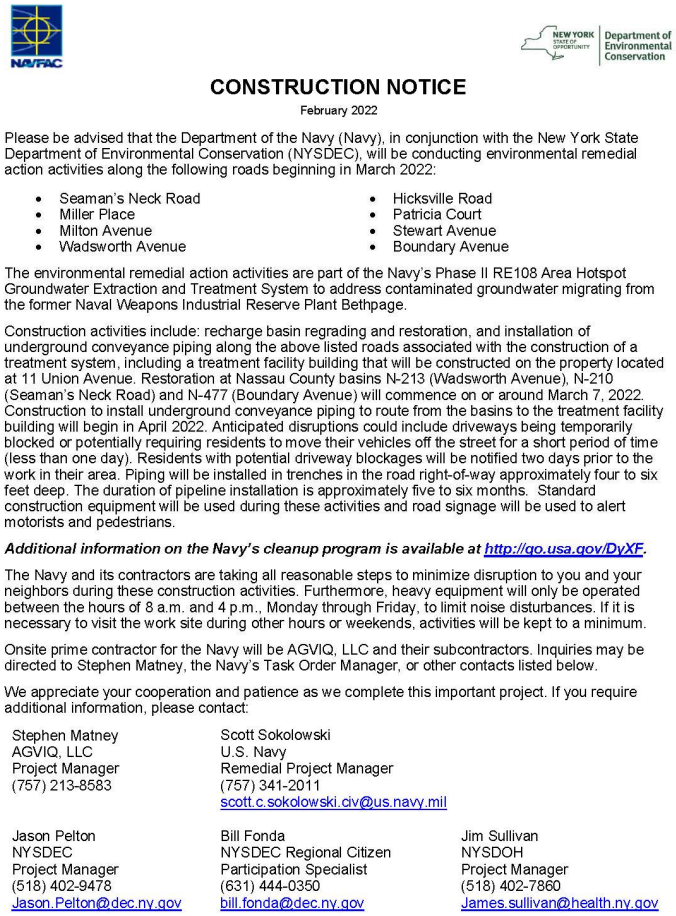
- April 2021 - Demolition, site grading, and seeding of 11 Union Avenue completed
- September 2021 -The 100 percent design was completed and issued for construction by Tetra Tech.
- March 2021 - Tetra Tech began recovery well installation.
  - RW6A/B located on Patricia Court in the Town of Oyster Bay
  - 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 – October 2022 Mobilization for construction of the Groundwater Treatment Plant at 11 Union Avenue and Pipeline Installation operations. Continues through 2023.
- Commissioning – Spring 2023.

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

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



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:

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U.S. Navy
Remedial Project Manager
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NYSDOH
Project Manager
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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