TETRA TECH

December 12, 2018

Mr. Jason Pelton
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau A, 12th Floor
625 Broadway
Albany, New York 12233-7015

Reference: CLEAN Contract No. N62470-16-D-9008
Contract Task Order WE13

Subject: December 2018 Letter Work Plan, On-Property Vertical Profile Boring
And Monitoring Well Installation Program,
Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, New York

Dear Mr. Pelton:

On behalf of the Department of the Navy, Tetra Tech is submitting responses to comments received from New York State Department of Environmental Conservation (NYSDEC) on the October 2018 On-Property Letter Work Plan, Vertical Profile Boring and Monitoring Well Installation Program, Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, New York and the revised work plan. This work plan provides the details for installation of vertical profile borings (VPBs) and monitoring wells.

If you have any questions or would like a paper copy of the document, please contact Mr. Brian Murray, NAVFAC Mid-Atlantic, at brian.s.murray@navy.mil or (757) 341-0491.

Sincerely,

David D. Brayack, P.E.
Project Manager

Enclosures: Reponses to NYSDEC comments on October 2018, On-Property Letter Work Plan
Property Vertical Profile Boring and Monitoring Well Installation Program,
NWIRP Bethpage, New York

December 2018 Letter Work Plan, On-Property Vertical Profile Boring
And Monitoring Well Installation Program, NWIRP Bethpage, New York

Distribution:
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**RESPONSE TO NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION COMMENTS DATED NOVEMBER 27, 2018 ON THE OCTOBER 2018 ON-PROPERTY LETTER WORK PLAN VERTICAL PROFILE BORING AND MONITORING WELL INSTALLATION PROGRAM NAVAL WEAPONS INDUSTRIAL RESERVE PLANT BETHPAGE, NEW YORK**

**Comment 1:** Consistent with earlier VPB and monitoring well installation work plans and NYSDEC DER 10, A community air monitoring plan (CAMP) must be followed during installation of the VPBs and monitoring wells. Earlier VPB work plans indicated that "details of the CAMP are provided in the Health and Safety Plan - Site 1 OU-2 Off Site TCE Groundwater Plume Investigation (Resolution Consultants, 2012) which follows procedures outlined by the New York State Department of Environmental Conservation (NYSDEC) DER 10"

**Response 1:** The CAMP will be followed during installation of VPBs and monitoring wells. A reference to the CAMP will be added to the Air Monitoring section of the work plan.

**Comment 2:** In the Vertical Profile Boring section, please follow the procedure that has been applied during earlier drilling programs to confirm the presence of the Raritan Clay layer. Specifically, Verification of the Raritan Clay formation will be confirmed when three consecutive 5 foot split spoon samples are representative of a significant clay unit.

**Response 2:** The following sentence will be added to the end of the fourth bullet under Vertical Profile Borings: “Verification of the Raritan Clay formation will be confirmed when three consecutive 5-foot split spoon samples are collected of a significant clay unit.”

**Comment 3:** For clarification, in the Vertical Profile Boring Section on Page 1, the first two bullets should really indicate that the samples being collected are groundwater samples.

**Response 3:** Text in the first two bullets under Vertical Profile Borings have been revised to clarify that the samples being collected are groundwater samples.

**Comment 4:** Similar to earlier work plans, please add a Decontamination section and a Data Validation section.

**Response 4:** Separate sections will be added to the work plan that discuss decontamination and data validation.

**Comment 5:** The Well Development Section indicates that "All development water will be managed as investigation-derived waste (IDW) as described under Management of Investigation Derived Waste". However, there is no section on Management of Investigation Derived Waste.

**Response 5:** A section describing the management of IDW for this investigation will been added.

**Comment 6:** Under the Reporting section, please indicate that Form 1 results from the analytical lab will be provided as soon as the data are available. For consistency, I suggest submitting a summary report that contains documentation that is similar to the existing reporting approach.

**Response 6:** The following sentence will be included under the Reporting section “Validated data will be provided as it becomes available.”

**Comment 7:** Will this work include sampling of the monitoring wells following well development? If so, please include a section on sampling and laboratory analysis. For groundwater samples collected from permanent monitoring wells, please include 1,4-dioxane analysis by USEPA Method 8270 SIM.

**Response 7:** The monitoring wells will be sampled after well development has been completed. Each well will be allowed to stabilize a minimum of 2-weeks after development before sampling. A section will be added to the work plan discussing groundwater sampling from the newly installed wells.

**DECEMBER 2018 ON-PROPERTY LETTER WORK PLAN**
**VERTICAL PROFILE BORING AND MONITORING WELL INSTALLATION PROGRAM**
**NAVAL WEAPONS INDUSTRIAL RESERVE PLANT**
**BETHPAGE, NEW YORK**

## INTRODUCTION

The Navy is installing vertical profile borings (VPBs) and monitoring wells at three on-property locations to support ongoing delineation and monitoring of the Operable Unit (OU) 2 volatile organic compound (VOC) plume at Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage (Figure 1). The purpose of this on-property VPB and monitoring well installation program is to help address data gaps in the western and northern portion of the OU 2 plume. This work is being conducted under the Naval Facilities Engineering Command Mid-Atlantic Comprehensive Long-Term Environmental Action Navy Contract (Number N6247016D9008; Task Order WE13).

The installation of VPBs will provide lithology data and chemical (VOC) data through down hole geophysical logging and collection and analysis of groundwater grab samples. Groundwater monitoring wells will also be installed at each VPB location. The wells will be shallow (water table), intermediate-depth (approximately 100 to 150 feet below ground surface [bgs]), and deep (greater than 150 feet bgs). These monitoring wells will be used to evaluate the presence and migration of VOC- and other chemicals that may be present in the groundwater. Groundwater sampling and analysis is addressed under other work plans for this project.

The monitoring wells installed to a depth of less than 150 feet bgs will be constructed using hollow stem augers with the screen interval based on the local lithology and the depth of other similar wells at the facility. Deeper wells will be installed using mud rotary with the screen interval based on the VPB data and the depth of other similar wells at the facility. The proposed VPB and monitoring well cluster locations are presented on Figure 2. The drilling and analytical program is summarized Table 1 and discussed below.

## VERTICAL PROFILE BORINGS

BP-VPB-201, -202, and -203 will be installed in on-property locations to the Raritan Clay layer to a depth of approximately 800 feet bgs. During the VPB installation, groundwater grab samples will be collected via a hydropunch-type sampler. The groundwater samples will be tested for pH, temperature, specific conductivity, oxidation reduction potential, dissolved oxygen, and turbidity as volume permits. Soil and groundwater samples will be collected from each VPB at the following depths:

- Discrete groundwater samples will be collected from the VPBs at depths spaced at 50-foot intervals from 50 to 200 feet bgs: (four samples per boring).
- Discrete groundwater samples will be collected from the VPBs at depths spaced at 20-foot intervals from 220 to the bottom of the boring (approximately 800 feet bgs).
- The groundwater samples will be analyzed via method SW846-8260B.

- Split spoon soil samples will be collected during the boring to evaluate various lithologies encountered during the drilling and to confirm the presence of the Raritan Clay layer. Verification of the Raritan Clay formation will be confirmed when three consecutive 5-foot split spoon samples are collected of a significant clay unit.
- Once the boring completion depth is reached, a natural gamma geophysical log will be performed from the ground surface to the bottom of the boring. This log will be used in combination with the split spoon sample and drilling mud observations to determine subsurface lithology. The boring will then be abandoned using a cement/bentonite grout.

Additional down-hole geophysical surveys may be conducted in the VPB to evaluate the effectiveness of alternative techniques in helping describe lithology and contaminant flow.

**MONITORING WELL INSTALLATION**

Initially, three on-property monitoring wells (one shallow and two intermediate-depth) will be installed at BP-VPB-202 and -203 using a hollow stem auger (HSA) technique. Deeper wells (greater than 150 feet bgs) are also anticipated to be installed using a mud rotary technique at BP-VPB-201, -202, and -203, following completion of the VPBs.

The procedure for installing the shallow and intermediate-depth wells is as follows:

- At the planned location of BP-VPB-202 and -203, install a soil boring to 150 feet bgs using HSA. Limited volumes of water and bentonite may be used to help control running sand.
- Perform a natural gamma geophysical log from the ground surface to the boring termination depth. Based on lithology and the depth of nearby well screen intervals (e.g., MW311I and HN-24I), select a screen interval for the intermediate-depth well at each location (approximately 120 to 150 feet bgs).
- Use sand and/or bentonite/cement grout to backfill the boring to approximately five feet below the bottom of the targeted screen interval. The use sand and/or grout will be based on formation material. The grout will be placed using a tremie. The remainder of the boring to the bottom of the screen will be backfilled with sand.
- Install the well to the targeted screen depth as indicated below.
- A shallow monitoring well will also be installed in a separate boring at BP-VPB-202. The shallow well will be installed with the screen extending 2 feet above the water table and 8 feet below the water table.
- Shallow and intermediate-depth monitoring wells are already present at the planned location of BP-VPB-201. Additional deeper wells may be installed at indicated below.

The construction details for the shallow and intermediate-depth monitoring wells are as follows:

- The wells will be 2-inch diameter, schedule 40 National Sanitation Foundation (NSF)-grade polyvinyl chloride (PVC) well casing and screen.
- Screens will be 10 feet in length with a 10 slot (0.010 inches) screen.

- After setting the well screen and casing, a gravel pack (#1 quartz sand) will be placed within the boring annulus to a minimum of 10 feet above top of screen.
- A 5-foot thick fine sand layer (#0 quartz sand) will be placed in the annulus on top of the gravel pack.
- A 4-foot thick minimum bentonite seal will be installed above the fine sand layer.
- A bentonite/cement grout will be installed within the annular space above the bentonite seal.
- Wells will be completed at grade using a 12-inch diameter, locking curb box in place over the wells. A fine sand will be installed above the top of the box to drain.
- A 0.5-foot thick concrete apron measuring 2 feet by 2 feet square will be installed around each well.
- Well locks will be used to secure the wells. Final well construction details will be documented on well construction log sheets.

The construction details for monitoring wells greater than 150 feet bgs are as follows:

- The well borings will be installed using a mud rotary technique.
- Split spoon samples will be collected at 5-foot intervals in the screen interval of each well for lithology.
- Additional split spoon samples may be collected in fine-grained soils that are in contact with VOC-contaminated groundwater and could be acting as a reservoir for solvents. These soil samples would be identified during the VPB program and analyzed for VOCs. The soil samples will be analyzed via method SW846-5035/8260B.
- The wells will be 4-inch diameter, schedule 80 National Sanitation Foundation (NSF)-grade polyvinyl chloride (PVC) well casing and screen.
- Screens will be 10 to 20 feet in length with a 10 slot (0.010 inches) screen.
- After setting the well screen and casing, a gravel pack (#1 quartz sand) will be placed within the boring annulus to a minimum of 10 feet above top of screen (150 to 365 feet bgs), 20 feet above the top of screen (365 to 530 feet bgs), or 25 feet above the top of screen (greater than 530 feet bgs).
- A 5-foot thick (150 to 365 feet bgs), 10-foot thick (365 to 530 feet bgs), or 15-foot thick (greater than 530 feet bgs) fine sand layer (#0 quartz sand) will be placed in the annulus on top of the gravel pack.
- A 4-foot thick minimum bentonite seal will be installed above the fine sand layer.
- A bentonite/cement grout will be installed within the annular space above the bentonite seal.
- Wells will be completed at grade using a 12-inch diameter, locking curb box in place over the wells. A fine sand will be installed above the top of the box to drain.
- A 0.5-foot thick concrete apron measuring 2 feet by 2 feet square will be installed around each well.
- Well locks will be used to secure the wells. Final well construction details will be documented on well construction log sheets.

## WELL DEVELOPMENT

Wells will be developed no sooner than 24 hours after installation. Wells less than 150 feet bgs will be developed using a combination of pumping and mechanical surging. Wells greater than 150 feet bgs will be developed using a combination of air lifting and mechanical surging. Field parameters (pH, temperature, specific conductivity, oxidation reduction potential, dissolved oxygen, and turbidity) will be monitored and recorded throughout well development. Development will continue until drilling mud is not observed and the well produces clear, sediment-free water, to the extent practicable. In compliance with NYSDEC policy, wells will be developed until turbidity is less than 50 NTUs.

Well development will also include purging stagnant water from the well above the screen interval and rinsing the interior well casing above the water table using only water from that well. The well will be covered with a clean well cap.

All development water will be managed as investigation-derived waste (IDW) as described under Management of Investigation Derived Waste.

## INVESTIGATION DERIVED WASTE

IDW generated during this program will include soil cuttings, groundwater, and decontamination fluids. All IDW will be containerized, characterized, and temporarily stored at a central staging area. IDW will be disposed of properly based on waste characterization results. It is anticipated all IDW will be non-hazardous. IDW generated during this investigation will follow procedures outlined in Tetra Tech Standard Operating Procedure (SOP) SA-7.1 Decontamination of Field Equipment and Management of Investigation Derived Waste (Tetra Tech, 2016) and United States Environmental Protection Agency (EPA) Guide to Management of Investigation-Derived Wastes (OSWER, 1992).

## DECONTAMINATION

A centrally-located decontamination pad at NWIRP Bethpage will be used to decontaminate drilling equipment and tooling. All decontamination fluids will be collected from the pad and managed as IDW. Decontamination activities conducted during this investigation will follow procedures outline in Tetra Tech SOP SA-7.1 Decontamination of Field Equipment and Management of Investigation Derived Waste.

## AIR MONITORING

A Community Air Monitoring Program (CAMP) will be followed during installation of VPBs and groundwater monitoring wells. The CAMP follows procedures outlined by the New York State Department of Environmental Conservation (NYSDEC) DER-10. The CAMP supporting the NWIRP Bethpage On-Property drilling program is provided as a supplemental document to the project Health and Safety Plan. Field activities conducted during this investigation will not result in generation of airborne particulate matter, which would trigger particulate monitoring as outlined in the CAMP.

During drilling activities, two air samples per boring will be collected and analyzed for VOCs using EPA Method TO-15. Air samples will be collected using SUMMA canisters over an approximate 8-hour period. One air sample will be collected near/downwind of the drill rig and

one air sample will be collected upwind of the drill rig. During drilling activities, a photonization detector (PID) will be used to evaluate potential VOC emissions.

**SITE SURVEY**

The location of each vertical profile boring and all newly installed monitoring wells will be surveyed by a New York State licensed surveyor.

**MONITORING WELL SAMPLING**

Monitoring wells will be sampled after completion of well development. Each well will be allowed to stabilize for a minimum of 14-day prior to sampling. Wells will be sampled in accordance with the procedures outlined in the Final Letter Work Plan, 2018 On-Property VOC and 1,4-Dioxane Groundwater Investigation, Facility Wide, NWIRP Bethpage, NY (Tetra Tech, 2018). Groundwater samples will be analyzed for VOCs via Method 8260 and 1,4-dioxane via Method 8270 SIM.

**FIELD DOCUMENTATION**

Field documentation required to support this project will consist of the following items:

- Field notebook.
- Boring log for each boring.
- Groundwater and soil sample log sheets.
- Well completion form for each well.
- Well development record.

**DATA VALIDATION**

Groundwater analytical data collected from the VPBs and monitoring wells will undergo full data validation in accordance with United States Environmental Protection Agency (USEPA) data validation guidelines. Validated analytical data will be provided as it becomes available.

**REPORTING**

A data summary report will be developed summarizing field activities and validated analytical results. Figures and tables will be used to present the analytical data. The report will include log sheets documenting VPB and monitoring well drilling, well construction and development, and groundwater sampling. The data validation reports will also be included in the report.

**REFERENCES**

Office of Solid Waste and Emergency Response (OSWER), 1992. Guide to Management of Investigation-Derived Wastes, April.

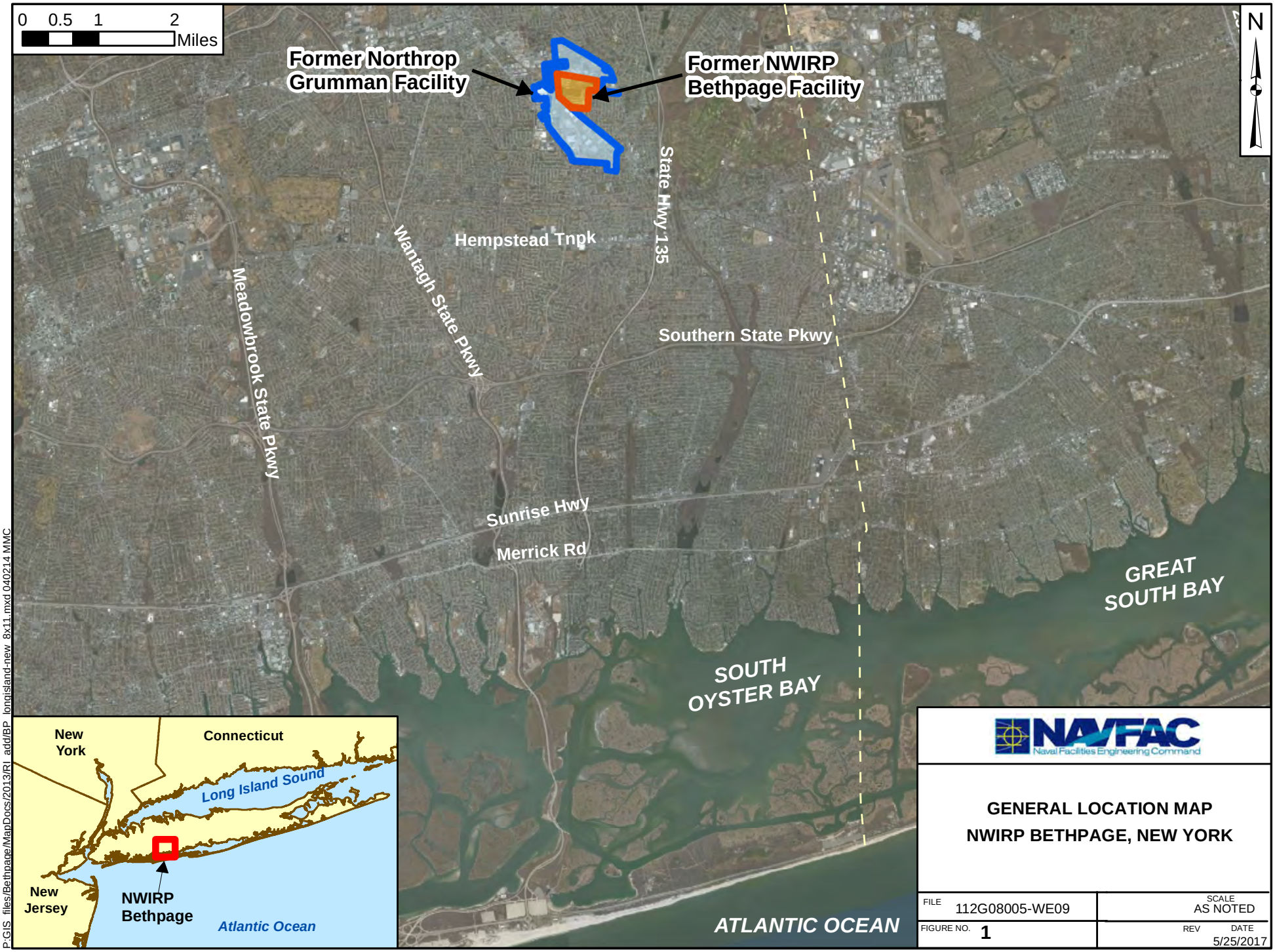
Tetra Tech, 2016. Standard Operating Procedure SA-7.1 Decontamination of Field Equipment and Management of Investigation Derived Waste, July.

Tetra Tech, 2018. Final Letter Work Plan, 2018 On-Property VOC and 1,4-Dioxane Groundwater Investigation, Facility Wide, NWIRP Bethpage, NY, April.

**TABLE 1**
**DECEMBER 2018 LETTER WORK PLAN ON-PROPERTY**
**VERTICAL PROFILE BORING AND MONITORING WELL ANALYTICAL PROGRAM**

| Matrix | Station Identification | Sample Identification | Depth/ Sampling Interval |
|---|---|---|---|
| Groundwater | VPB201 | BP-VPB201-GW-XXXX | 50-foot intervals from 50 to 200 feet bgs; 20-foot interval greater than 200 feet bgs. |
| Air | VPB201 | BP-VPB201-AIR-DW-MMDDYY | Breathing zone |
| Air | VPB201 | BP-VPB201-AIR-UW-MMDDYY | Breathing zone |
| Soil | BP-TT-MW201 | BP-MW-201-SO-XXXX | Fine-grained material identified based on VPB results. |
| Groundwater | VPB202 | BP-VPB202-GW-XXXX | 50-foot intervals from 50 to 200 feet bgs; 20-foot interval greater than 200 feet bgs. |
| Air | VPB202 | BP-VPB202-AIR-DW-MMDDYY | Breathing zone |
| Air | VPB202 | BP-VPB202-AIR-UW MMDDYY | Breathing zone |
| Soil | BP-TT-MW202 | BP-MW-202-SO-XXXX | Fine-grained material identified based on VPB results. |
| Groundwater | VPB203 | BP-VPB203-GW-XXXX | 50-foot intervals from 50 to 200 feet bgs; 20-foot interval greater than 200 feet bgs. |
| Air | VPB203 | BP-VPB203-AIR-DW--MMDDYY | Breathing zone |
| Air | VPB203 | BP-VPB203-AIR-UW-MMDDYY | Breathing zone |
| Soil | BP-TT-MW203 | BP-MW-203-SO-XXXX | Fine-grained material identified based on VPB results. |

Groundwater duplicates of 1 in 10 samples. Matrix spike/matrix spike duplicates of 1 in 20 samples.
Trip blank of one per cooler. Equipment blank of one per piece of deconed equipment per week.
VPB - vertical profile boring. MW - monitoring wells. SO - soil. GW - groundwater. DW - down wind. UP - up wind.
MMDDYY - month, day, year. XXXX - top and both of sample interval in feet bgs.
bgs - below ground surface.
Groundwater samples are to be analyzed via SW846-8260B.
Soil samples are to be analyzed via SW846-5035/8260B.
Air samples are to be analyzed via TO-15.

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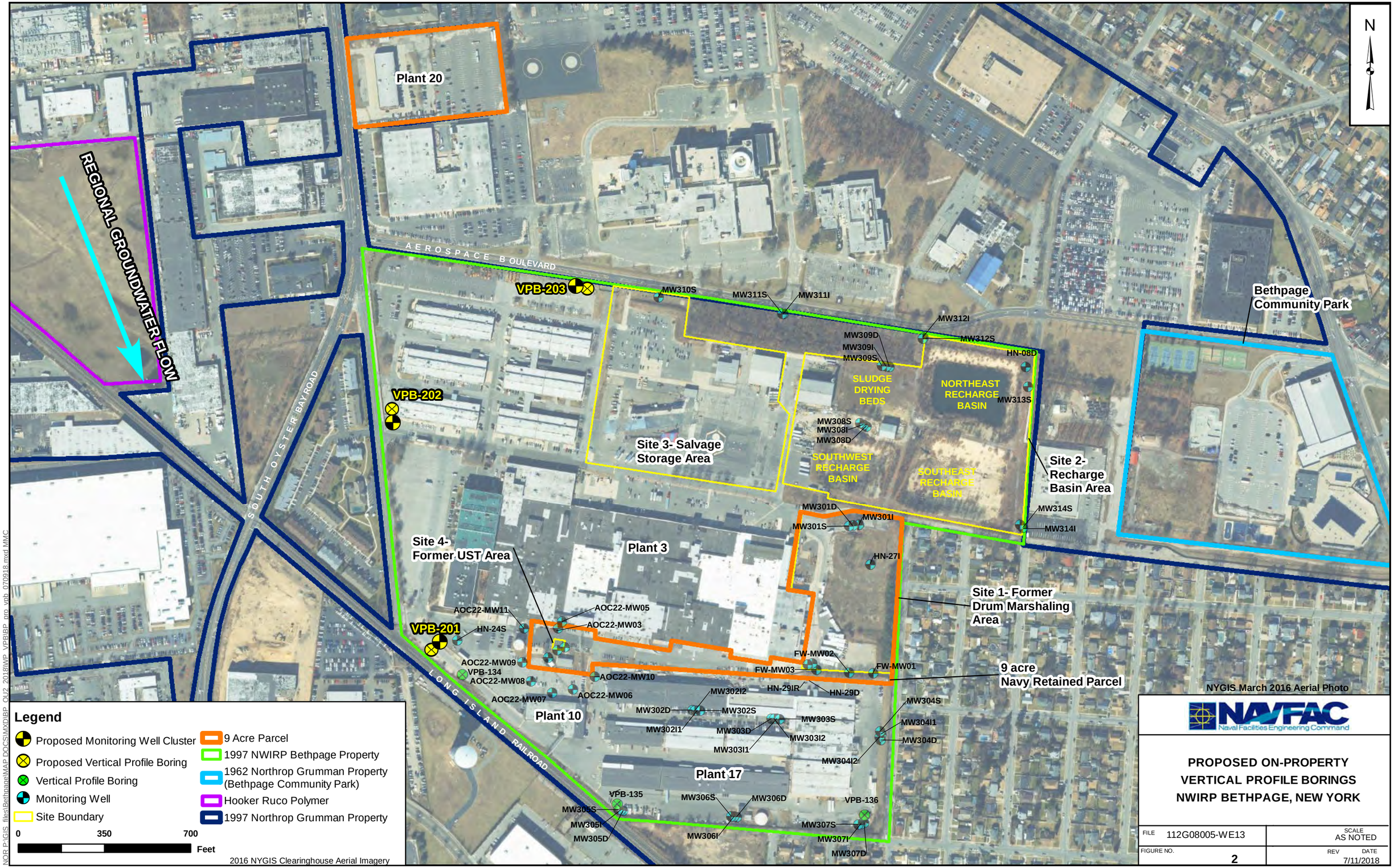
NAVFAC Naval Facilities Engineering Command

**GENERAL LOCATION MAP**
**NWIRP BETHPAGE, NEW YORK**

| FILE | SCALE |
|---|---|
| 112G08005-WE09 | AS NOTED |
| FIGURE NO. **1** | REV / DATE 5/25/2017 |




## Legend

- Proposed Monitoring Well Cluster
- Proposed Vertical Profile Boring
- Vertical Profile Boring
- Monitoring Well
- Site Boundary
- 9 Acre Parcel
- 1997 NWIRP Bethpage Property
- 1962 Northrop Grumman Property (Bethpage Community Park)
- Hooker Ruco Polymer
- 1997 Northrop Grumman Property

0 350 700 Feet

2016 NYGIS Clearinghouse Aerial Imagery

NAVFAC Naval Facilities Engineering Command

# PROPOSED ON-PROPERTY VERTICAL PROFILE BORINGS NWIRP BETHPAGE, NEW YORK

| FILE | 112G08005-WE13 | SCALE | AS NOTED |
|---|---|---|---|
| FIGURE NO. | 2 | REV | DATE 7/11/2018 |

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