LETTER WORK PLAN
2018 POLY- AND PERFLUOROALKYL SUBSTANCES (PFAS)
GROUNDWATER INVESTIGATION
FACILITY WIDE
NWIRP BETHPAGE, NEW YORK

Introduction

The Navy is conducting an investigation to evaluate the potential release of poly- and perfluoroalkyl substances (PFAS) by using the existing groundwater network located at the former Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, New York (Figures 1 and 2). This groundwater network is used to evaluate the release and cleanup of volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), and/or metals in groundwater resulting from operations at NWIRP Bethpage. This letter work plan was prepared by Tetra Tech, Inc. (Tetra Tech) under the Naval Facilities Engineering Command (NAVFAC) Atlantic Comprehensive Long-Term Environmental Action Navy (CLEAN) under Contract Number N62470-16-D-9008 Task Order WE09. Groundwater testing of representative wells at Site 1 – Former Drum Marshalling Area, Site 2 – Recharge Basin Area, Site 3 – Salvage Storage Area, and Site 4 – Former Underground Storage (UST) Area will be used to evaluate for presence and magnitude of PFAS. Surface water in infiltration ponds from various on- and off-property sources at the Site 2 - Recharge Basin Area will also be evaluated for PFAS. There are fourteen PFAS compounds that are accredited under the United States Environmental Protection Agency (U.S. EPA) Method 537. Two of the PFAS compounds, perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), have public health advisories (HAs). One PFAS, perfluorobutanesulfonic acid (PFBS) has a U.S. EPA Regional Screening Level (RSL). The remaining eleven Method 537 compounds do not have criteria but will also be evaluated during this investigation. The objectives of this Investigation are as follows:

1. Are PFAS in NWIRP Bethpage Site groundwater and if present, do they exceed current EPA HAs or the RSL?
2. If present, are PFAS associated with former plating activities at Plant 3 or other former activities at NWIRP?
3. If present, are there continuing sources of PFAS to Site groundwater through the recharge basins from on-property or off-property sources?

Plant 3 was the main manufacturing plant at NWIRP Bethpage beginning in the 1940s. Production lines at Plant 3 were used for a variety of aircraft metal treatment and finishing procedures, including chemical surface preparation, electroplating, chemical milling, alodine treatment, and process inspection. PFAS may have been used as an active ingredient in the chemical fume suppressant system during electroplating applications and if used, may be present in industrial waste streams generated at Plant 3.

In accordance with applicable regulations, Plant 3 concentrated industrial wastes were reportedly disposed of via a licensed vendor for disposal. Dilute rinse waters were discharged to cesspools and dry wells located around Plant 3 and groundwater recharge basins (Site 2), which are used to channel surface water

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back into groundwater. Other areas that may have been impacted by a potential indirect release are the sludge drying beds at Site 1 – Former Drum Marshalling Area and Site 2 – Recharge Basin Area. The western portion of NWIRP Bethpage, Site 4 – Former Underground Storage (UST) Area, could have been impacted by potential direct leaking of drains at Plant 3. The Industrial Wastewater Treatment Plant (IWTP) at Plant 3 was completed in 1984 and treated waste rinse waters containing metals, hexavalent chromium, and phenols. In 1996, manufacturing operations ended at the facilities. A review of Site history did not indicate the presence of any large scale releases. PFAS has not been investigated at NWIRP Bethpage.

To address the objectives, this Work Plan includes groundwater sample collection from the existing monitoring well network at the former NWIRP Bethpage (Figure 2) and surface water from the Recharge Basin Area. Proposed sampling locations are presented on Figure 3 and the rationale for sample selection is summarized on Table 1. The well details, nomenclature, and analysis are summarized on Table 2.

Well Development

Monitoring wells selected for PFAS evaluation at NWIRP Bethpage, with the exception of AOC22-MW10 and –MW11, have not been purged since or before 2013. In order to ensure that formation water is being sampled and turbidity has reached an acceptable level or stabilized, wells will be developed prior to being sampled. An extended purge of the well will be conducted (three screen volumes). Development water will be managed as investigation derived waste (IDW) as discussed below. The wells will be sampled after redevelopment by low-flow methods as detailed below.

Groundwater Sampling

Groundwater sampling will be conducted at select wells from the existing monitoring well network throughout the facility. Monitoring well locations selected for sampling are presented on Figure 3, and the rationale is summarized on Table 1.

A peristaltic pump or a down-hole pump with high-density polyethylene (HDPE) tubing will be used for groundwater sample purging and collection activities, in combination with a continuous flow-through cell suitable for taking water quality measurements. Turbidity measurements will be made using a separate field turbidity meter specifically designated to measure turbidity only. Depending on the groundwater parameters, two to five screen volumes may be purged. The groundwater monitoring wells will be analyzed as indicated on Table 2.

Surface Water Sampling

Surface water will be collected at the inlet of the northeast recharge basin, inlet to the southwest recharge basin, and from the manhole (Figure 3) to evaluate if there are other potential sources of PFAS that are impacting shallow groundwater. During a storm event (greater than a ¼ inch), surface water samples will be collected at the inlet of the northeast and southwest recharge basins and the manhole as practical.

During a non-storm event, surface water will be collected from the inlet of the northeast recharge basin only because it receives a continuous flow of water from an unknown source on the former Northrop Grumman property to the North and treated groundwater from Bethpage Community Park Operable Unit 3 treatment system. Surface water samples will be analyzed as indicated on Table 2.

Quality Control Samples

Quality assurance (QA) and quality control (QC) samples will be collected for groundwater, and surface water samples. Duplicate samples will be collected at 10 percent (1 per 10 samples). Matrix spike (MS) and matrix spike duplicate (MS/MSD) samples (i.e., triple volume) will be collected at a rate of 5 percent (1 per 20 samples). MS/MSDs will receive the same sample ID as the respective parent samples, and the triple volume will be noted in the field log book and on chain-of-custody form. An equipment blank will be collected once per day that samples are collected with reusable equipment. A field reagent blank will be collected once per day that groundwater and surface water samples are collected.

Equipment Decontamination

Reusable sampling equipment decontamination will consist of washing using a non-phosphate detergent followed by a rinse with PFAS-free water provided by the laboratory. IDW will be captured, containerized and stored at Site 2.

Waste Management

IDW will include water from well development and purge, and equipment decontamination fluids. Water from monitoring wells stored in a tank will be tested for PFAS. If the PFAS concentration exceeds the EPA HA, they will be treated onsite with granular activated carbon. Waste profiling will be performed prior to discharge to the sanitary sewer system. The IDW will be discharged once approval is received from the State. It is anticipated that all waste generated will be non-hazardous.

If used, granular activated carbon will be retained at the staging area for use during subsequent events. Effluent samples from the carbon will be collected for every 5,000 gallons of water treated and at the end of each sample event to evaluate remaining capacity of the carbon for treating PFAS. The carbon will be disposed off-site.

Reporting

A Data Summary Report will present results from the sampling event and evaluate results by direct comparison to U.S. EPA HAs and RSL. Recommendations will be made on whether to proceed with additional action, risk assessment, or no action.

TABLES

TABLE 1
GROUNDWATER SAMPLING LOCATIONS AND SAMPLE RATIONALE
FACILITY WIDE PFAS INVESTIGATION
NWIRP BETHPAGE, NEW YORK

Well ID	Area of NWIRP Bethpage			2004-2013 Results				Screen Interval (feet bgs)	Depth (feet bgs)	2018 PFAS Sampling	Rationale for Sample Selection[3]		
	Upgradient	Downgradient	Potential Release from Plant 3[1]	VOCs[2]	PCBs	Total Chromium	Hexavalent Chromium				Objective 1	Objective 2	Objective 3
Site 1 - Former Drum Marshalling Area													
FW-MW01				E	E	NX	ND	48.5-63.5	63.5	No			
FW-MW02				E	NX	NX	ND	49-64	64	No			
FW-MW03				E	E	NX	ND	52-67	67	No			
HN-MW27I				NS	E	NX	NX	120-130	130	No			
HN-MW27S				NS	NS	NS	NS	44.3-54.3	54.3	No			
HN-MW29D				NS	NS	NS	NS	210-220	220	No			
HN-MW29IR				NX	E	NX	NX	120-130	130.5	No			
MW301D			✓	NX	E	NX	NX	210-220	220	Yes	✓		✓
MW301I			✓	ND	E	NX	NX	130-140	140	Yes	✓		✓
MW301S			✓	NS	E	NX	NX	51-61	61	Yes	✓		✓
MW302D				E	E	NX	ND	203-213	213	No			
MW302I1				NX	E	NX	ND	110-120	120	No			
MW302I2				NX	E	NX	NX	140-150	150	No			
MW302S				NX	E	NX	NX	41-51	51	No			
MW303D				NX	E	NX	E	208-218	218	No			
MW303I1				E	E	NX	NX	95-105	105	No			
MW303I2				NX	E	NX	ND	146-156	156	No			
MW303S				NX	NX	NX	NX	46-56	56	No			
MW304D				ND	E	NX	ND	180-190	190	No			
MW304I1				E	E	NX	NX	102-112	112	No			
MW304I2		✓		NX	E	E	E	140-150	150	Yes	✓		
MW304S				NS	NS	NX	NX	43-53	53	No			
MW305D				E	NX	NX	ND	286-296	296	Yes	✓		
MW305I		✓		E	E	NX	NX	190-200	200	Yes	✓		
MW305S		✓		NS	NS	NX	ND	40-50	50	Yes	✓		
MW306D		✓		NX	E	NX	ND	284-294	294	Yes	✓		
MW306I		✓		NX	E	NX	ND	189-199	199	Yes	✓		
MW306S		✓		NX	E	NX	NX	50-60	60	Yes	✓		
MW307D		✓		NS	E	NX	NX	276-286	286	Yes	✓		
MW307I		✓		NX	E	NX	ND	188-198	198	Yes	✓		
MW307S		✓		NX	NS	NX	ND	40.5-50.5	50.5	Yes	✓		
Site 2 - Recharge Basin and Site 3 - Salvage Storage Area													
MW308D			✓	NX	ND	NX	NX	250-260	260	Yes	✓	✓	✓
MW308I			✓	NS	NX	NX	ND	156-166	166	Yes	✓	✓	✓
MW308S			✓	NX	NX	NX	ND	54-64	64	Yes	✓	✓	✓
MW309D			✓	NX	NS	NX	ND	252-262	262	Yes	✓	✓	✓
MW309I			✓	NX	NX	NX	NX	160-170	170	Yes	✓	✓	✓
MW309S			✓	NX	E	NX	NX	53-63	63	Yes	✓	✓	✓

TABLE 1
GROUNDWATER SAMPLING LOCATIONS AND SAMPLE RATIONALE
FACILITY WIDE PFAS INVESTIGATION
NWIRP BETHPAGE, NEW YORK

Well ID	Area of NWIRP Bethpage			2004-2013 Results				Screen Interval (feet bgs)	Depth (feet bgs)	2018 PFAS Sampling	Rationale for Sample Selection[3]		
	Upgradient	Downgradient	Potential Release from Plant 3[1]	VOCs[2]	PCBs	Total Chromium	Hexavalent Chromium				Objective 1	Objective 2	Objective 3
MW310S	✓			NS	NS	NX	NX	57.5-67.5	67.5	Yes	✓		✓
MW311I	✓			NX	NX	NX	ND	160-170	170	No			
MW311S	✓			NS	NX	NX	NX	55-65	65	Yes	✓		✓
MW312I	✓			NS	NX	NX	NX	160-170	170	No			
MW312S	✓			NS	NS	NX	ND	53-63	63	Yes	✓		✓
MW313S	✓			NS	NS	NX	ND	53-63	63	Yes	✓		✓
MW314I			✓	NS	NX	NX	NX	144-154	154	Yes	✓		✓
MW314S			✓	NS	NX	NX	ND	55-65	65	Yes	✓		✓
Site 4 - Former Underground Storage Tank Area (West End of Plant 3)													
AOC22-MW02				NS	NS	NS	NS	46 - 66	66	No			
AOC22-MW03				E	NS	NX	NS	45.5 - 65.5	65.5	No			
AOC22-MW05				E	NS	NX	NS	47 - 67	67	No			
AOC22-MW06				NX	NX	NX	ND	52-62	62	No			
AOC22-MW07				NX	NS	NX	NS	52-62	62	No			
AOC22-MW08				NS	NS	NX	NS	52-62	62	No			
AOC22-MW09				E	NS	NX	NS	52-62	62	No			
AOC22-MW10			✓	E	NX	E	E	49-59	60	Yes	✓	✓	
AOC22-MW11			✓	NX	NS	NX	NX	53-63	64	Yes	✓	✓	
HN-MW24I			✓	NA	NA	NA	NA	148-158	158	Yes	✓	✓	
HN-MW24S			✓	NA	NA	NA	NA	49-59	59	Yes	✓	✓	
Surface Water Locations													
Manhole	✓		✓	NS	NS	NS	NS	NA	NA	Yes	✓		✓
Northeast Recharge Basin	✓		✓	NS	ND	NX	NX	NA	NA	Yes	✓		✓
Southwest Recharge Basin	✓		✓	NS	NX	NX	NX	NA	NA	Yes	✓		✓
Southeast Recharge Basin				NS	NS	NS	NS	NS	NA	No			

Shaded cells - hexavalent chromium analysis performed with a field test kit results.
bgs- below ground surface
E - Exceedance of the New York State Department of Health (NYSDOH) or United States Environmental Protection Agency (U.S. EPA) Maximum Contaminant Level (MCL).
NA - not available or not applicable.
ND - not detected.
NS- not sampled.
NX - no exceedance.
PCBs - polychlorinated biphenyls.
VOCs - volatile organic compounds.

1. Groundwater could have been impacted by releases as a result of activities at Plant 3. Indirect releases may have occured to the recharge basins and/or sludge drying beds. Potential direct releases may have occurred drains (AOC22-MW10, AOC22-MW11, HN-MW24S, and HN-MW24I).

2. VOCs: cis-1,2-dichloroethene, chlorofom, dichloroethane, tetrachloroethene, 1,1,1-trichloroethane, trichloroethene, toulene

3. The objectives are listed in the Work Plan.

TABLE 2
MONITORING WELL DETAILS AND SAMPLE NOMENCLATURE
FACILITY WIDE PFAS INVESTIGATION
NWIRP BETHPAGE, NEW YORK

Location/ Well ID	Screen Interval (feet bgs)	Depth (feet bgs)	Ground Surface Elevation (feet MSL)	TOC (feet MSL)	Screen Interval (feet MSL)	Depth (feet MSL)	Nomenclature	Analysis[1]
Site 1 - Former Drum Marshalling Area								
MW301D	210-220	220	126.32	128.9	-103.68 to -93.68	-93.68	BPTT-MW301D-2018MMDD	Method 537 Compounds
MW301I	130-140	140	126.04	128.48	-23.96 to -13.96	-13.96	BPTT-MW301I-2018MMDD	Method 537 Compounds
MW301S	51-61	61	126.38	128.88	55.38 to 65.38	65.38	BPTT-MW301S-2018MMDD	Method 537 Compounds
MW302D	203-213	213	116.35	116.08	-106.65 to -96.65	-96.65	BPTT-MW302D-2018MMDD	Method 537 Compounds
MW302I1	110-120	120	116.32	115.91	-13.68 to -3.68	-3.68	BPTT-MW302I1-2018MMDD	Method 537 Compounds
MW302I2	140-150	150	116.33	115.91	-43.67 to -33.67	-33.67	BPTT-MW302I2-2018MMDD	Method 537 Compounds
MW302S	41-51	51	116.32	116.01	55.32 to 65.32	65.32	BPTT-MW302S-2018MMDD	Method 537 Compounds
MW304I2	140-150	150	116.7	119.18	-43.3 to -33.3	-33.3	BPTT-MW304I2-2018MMDD	Method 537 Compounds
MW305D	286-296	296	116.25	115.94	-189.75 to -179.75	-179.75	BPTT-MW305D-2018MMDD	Method 537 Compounds
MW305I	190-200	200	116.38	116.16	-93.62 to -83.62	-83.62	BPTT-MW305I-2018MMDD	Method 537 Compounds
MW305S	40-50	50	116.52	116.04	56.52 to 66.52	66.52	BPTT-MW305S-2018MMDD	Method 537 Compounds
MW306D	284-294	294	115.59	118.06	-188.41 to -178.41	-178.41	BPTT-MW306D-2018MMDD	Method 537 Compounds
MW306I	189-199	199	115.45	117.76	-93.55 to -83.55	-83.55	BPTT-MW306I-2018MMDD	Method 537 Compounds
MW306S	50-60	60	115.33	117.82	45.33 to 55.33	55.33	BPTT-MW306S-2018MMDD	Method 537 Compounds
MW307D	276-286	286	114.85	114.42	-181.15 to -171.15	-171.15	BPTT-MW307D-2018MMDD	Method 537 Compounds
MW307I	188-198	198	114.67	114.16	-93.33 to -83.33	-83.33	BPTT-MW307I-2018MMDD	Method 537 Compounds
MW307S	40.5-50.5	50.5	114.59	114.39	54.09 to 64.09	64.09	BPTT-MW307S-2018MMDD	Method 537 Compounds
Site 2 - Recharge Basin and Site 3- Salvage Storage Area								
MW308D	250-260	260	128.78	130.98	-141.22 to -131.22	-131.22	BPTT-MW308D-2018MMDD	Method 537 Compounds
MW308I	156-166	166	128.58	130.73	-47.42 to -37.42	-37.42	BPTT-MW308I-2018MMDD	Method 537 Compounds
MW308S	54-64	64	128.586	131.05	54.586 to 64.586	64.586	BPTT-MW308S-2018MMDD	Method 537 Compounds
MW309D	252-262	262	129.42	131.52	-142.58 to -132.58	-132.58	BPTT-MW309D-2018MMDD	Method 537 Compounds
MW309I	160-170	170	129.44	131.83	-50.56 to -40.56	-40.56	BPTT-MW309I-2018MMDD	Method 537 Compounds
MW309S	53-63	63	129.41	131.77	56.41 to 66.41	66.41	BPTT-MW309S-2018MMDD	Method 537 Compounds
MW310S	57.5-67.5	67.5	127.42	127.422	49.92 to 59.92	59.92	BPTT-MW310S-2018MMDD	Method 537 Compounds
MW311S	55-65	65	128.01	128.008	53.01 to 63.01	63.01	BPTT-MW311S-2018MMDD	Method 537 Compounds
MW312S	53-63	63	127.74	127.737	54.74 to 64.74	64.74	BPTT-MW312S-2018MMDD	Method 537 Compounds
MW313S	53-63	63	127.48	127.48	54.48 to 64.48	64.48	BPTT-MW313S-2018MMDD	Method 537 Compounds
MW314I	144-154	154	126.28	126.279	-37.72 to -27.72	-27.72	BPTT-MW314I-2018MMDD	Method 537 Compounds
MW314S	55-65	65	126.15	126.146	51.15 to 61.15	61.15	BPTT-MW314S-2018MMDD	Method 537 Compounds
Site 4 - Former Underground Storage Tank Area (West End of Plant 3)								
AOC22-MW10	49-59	60	NA	NA	49-59	60	BPTT-AOC22-MW10-2018MMDD	Method 537 Compounds
AOC22-MW11	53-63	64	NA	NA	53-63	64	BPTT-AOC22-MW11-2018MMDD	Method 537 Compounds
HN-MW24I	148-158	158	122.69	121.78	148-158	158	BPTT-HN-MW24I-2018MMDD	Method 537 Compounds
HN-MW24S	49-59	59	123.03	122.73	48.6-58.6	58.6	BPTT-HN-MW24S-2018MMDD	Method 537 Compounds

TABLE 2
MONITORING WELL DETAILS AND SAMPLE NOMENCLATURE
FACILITY WIDE PFAS INVESTIGATION
NWIRP BETHPAGE, NEW YORK

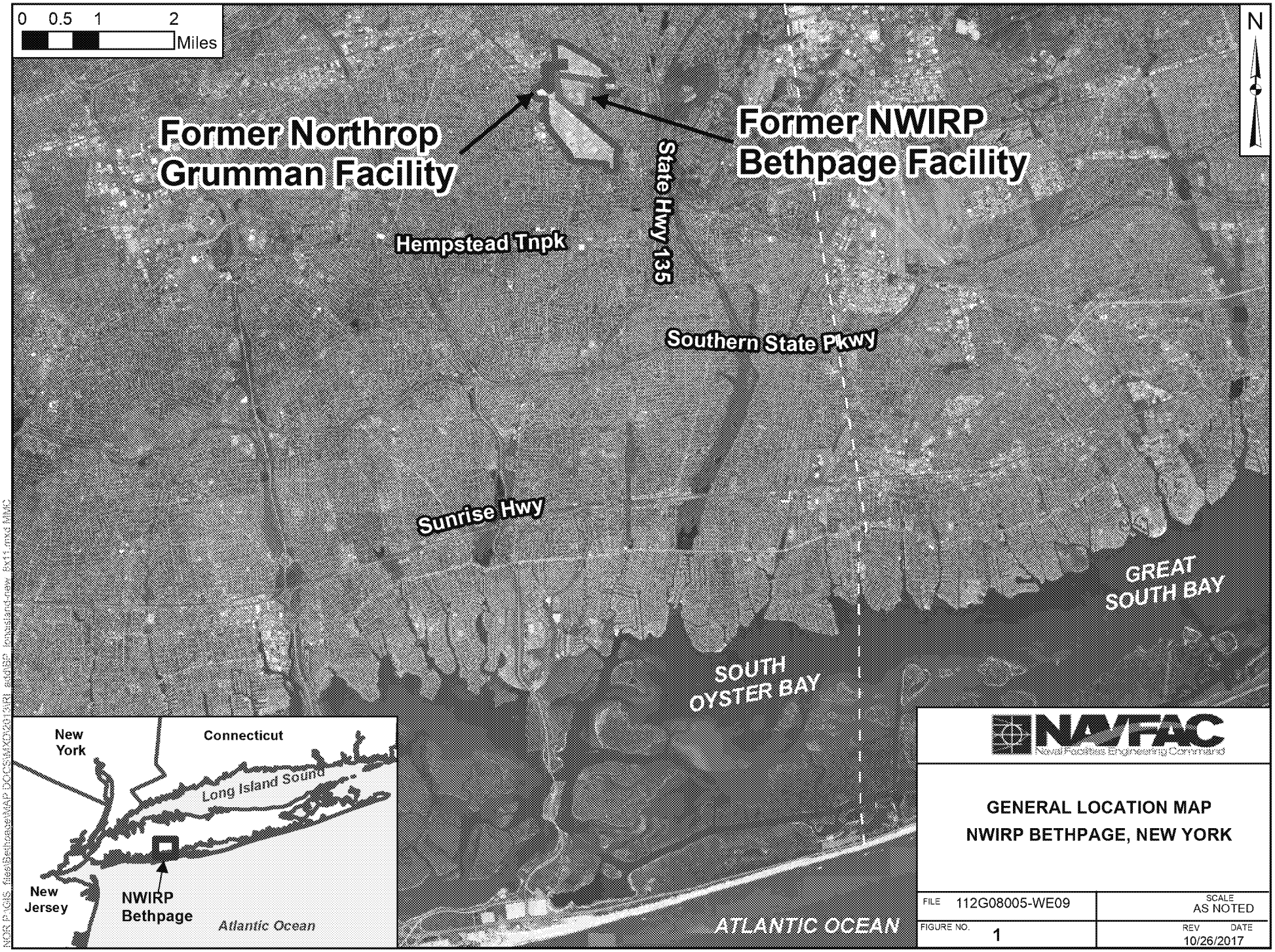
Location/ Well ID	Screen Interval (feet bgs)	Depth (feet bgs)	Ground Surface Elevation (feet MSL)	TOC (feet MSL)	Screen Interval (feet MSL)	Depth (feet MSL)	Nomenclature	Analysis[1]
Surface Water Locations[2]								
Manhole	NA	NA	NA	NA	NA	NA	BPTT-MH-SW4001-2018MMDD	Method 537 Compounds
Northeast Recharge Basin	NA	NA	NA	NA	NA	NA	BPTT-SW4002-2018MMDD	Method 537 Compounds
Southwest Recharge Basin	NA	NA	NA	NA	NA	NA	BPTT-SW4004-2018MMDD	Method 537 Compounds

bgs - below ground surface.
msl - mean sea level.
MMDD - date which the sample is taken. For example, a sample collected on January 25, 2018 would end in "-20170125".
NA - Not applicable or not available.
PFAS - perfluoroalkyl substances.
TOC - top of casing.

1. Method 537 compounds include, perfluorooctanoic acid, perfluorooctanesulfonic acid, perfluorobutanesulfonic acid, N-ethyl perfluorooctanesulfonamidoacetic acid, N-methyl perfluorooctanesulfonamidoacetic acid, perfluorodecanoic acid, perfluorododecanoic acid, perfluoroheptanoic acid, perfluorohexanesulfonic acid, perfluorohexanoic acid, perfluorononanoic acid, perfluorotetradecanoic acid, perfluorotridecanoic acid, and perfluoroundecanoic acid.

2. Surface water will be collected from all three locations during a storm event. A surface water sample will be collected from the northeast recharge basin during a non-storm event.

FIGURES



NAVFAC
Naval Facilities Engineering Command

GENERAL LOCATION MAP
NWIRP BETHPAGE, NEW YORK

FILE 112G08005-WE09	SCALE AS NOTED
FIGURE NO. 1	REV DATE 10/26/2017

N
Plant 20
AEROSPACE BOULEVARD
GROUNDWATER FLOW
SOUTH OYSTER BAY ROAD
Manhole
MW310S
MW311S
MW311I
MW312I
MW312S
MW309D
MW309I
MW309S
MW313S
SLUDGE DRYING BEDS
NORTHEAST RECHARGE BASIN
OU3 Interim Remedial Measure Treatment System
Bethpage Community Park
MW308S
MW308I
MW308D
SOUTHWEST RECHARGE BASIN
SOUTHEAST RECHARGE BASIN
Site 3- Salvage Storage Area
Site 2- Recharge Basin Area
MW301D
MW301S
MW301I
MW314S
MW314I
Site 4- Former UST Area
Plant 3
HN-27I
Site 1- Former Drum Marshaling Area
AOC22-MW11
AOC22-MW05
AOC22-MW03
HN-24I
HN-24S
AOC22-MW02
HN-24IR
AOC22-MW09
FW-MW02
FW-MW03
FW-MW01
9 acre Navy Retained Parcel
AOC22-MW10
AOC22-MW08
AOC22-MW07
AOC22-MW06
HN-29IR
HN-29D
MW302I2
MW302D
MW302S
MW302I1
MW303D
MW303S
MW303I2
MW303I1
MW304S
MW304I1
MW304D
MW304I2
Plant 10
LONG ISLAND RAILROAD
Plant 17
MW305I
MW305D
MW305S
MW306S
MW306D
MW306I
MW307I
MW307D
MW307S
NYGIS March 2016 Aerial Photo
Legend
Manhole
Utility Drain Line
Site Boundary
9 Acre Parcel
1997 NWIRP Bethpage Property
1962 Northrop Grumman Property (Bethpage Community Park)
0
350
700
Feet
NAVFAC
Naval Facilities Engineering Command
NWIRP BETHPAGE
EXISTING MONITORING WELLS
NWIRP BETHPAGE, NEW YORK
FILE 112G08005-WE09
SCALE AS NOTED
FIGURE NO. 2
REV
DATE 1/5/2018

NAVFAC
Naval Facilities Engineering Command

NWIRP BETHPAGE
2018 PROPOSED PFAS SAMPLING LOCATIONS
NWIRP BETHPAGE, NEW YORK

FILE	112G08005-WE09	SCALE	AS NOTED
FIGURE NO.	3	REV / DATE	8/22/2017

NCR GIS: files\Bethpage\MAP DOCS\MXD\Bethpage_Site1_pcr\PP_PFAS_WELLS_082117.mxd MKC