ABBREVIATED WORK PLAN – SEPTEMBER 2015
BWD WELL 6-2 PILOT TEST
OPERABLE UNIT 2 GROUNDWATER
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT (NWIRP), BETHPAGE, NEW YORK

This abbreviated work plan has been prepared for the Mid-Atlantic Division of the Naval Facilities Engineering Command (NAVFAC) pursuant to Contract Task Order (CTO) WE69, issued under Comprehensive Long-term Environmental Action Navy (CLEAN) contract number N62470-11-D-8013. This abbreviated work plan will follow the requirements for collecting water levels and analytical samples from monitoring wells within Operable Unit (OU) 2, which are detailed in the Abbreviated Quarterly Groundwater Sampling Work Plan (Resolution Consultants, December 2014), and the United Federal Program Sampling and Analysis Plan (UFP SAP) for Groundwater Sampling Using Low Stress (Low Flow) Purging and Sampling Protocol (Resolution Consultants, November 2013). This investigation is being conducted to investigate the feasibility of using Bethpage Water District (BWD) Well 6-2 to mitigate Trichloroethylene (TCE) contaminated groundwater off site of the Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, Long Island, New York (Figure 1). Regional groundwater flow is south-southeast, but is locally affected by the operation of recharge basins and public water supply wells.

Scope and Objectives

Resolution Consultants shall provide the overall project management and planning for the Navy scope of work (SOW) addressed in this work plan. The objective of this project is to conduct a short-term pilot test using BWD Well 6-2. The well will be pumped and water levels in surrounding wells will be monitored to assess the potential hydraulic influence of the well.

BWD will be subcontracted by Resolution Consultants to operate Well 6-2 in a near-continuous manner and to manage treatment and distribution and/or disposal of the recovered groundwater for a period of 3 months. It is anticipated that pumping and water quality data for influent and effluent water will be provided by BWD per their normal operation sampling and will be included in the subcontract with Resolution Consultants. Resolution Consultants will simultaneously monitor water levels in nearby wells surrounding Well 6-2, collect air samples to monitor potential groundwater treatment impacts to ambient air quality, assess the data, and prepare a report of findings.

Data Collection Locations

BWD Well 6-2 and 16 existing monitoring well locations where water levels will be monitoring are identified on Figure 2. Table 1 provides pertinent well construction information. Electronic data loggers will be used to monitor water levels in the 16 monitoring wells.

Air samples will be collected at two locations, one upwind and one downwind, situated near the Well 6-2 water treatment plant. Air dispersion modeling based on site-specific data provided by BWD and local weather data will be used to select appropriate air sampling stations.

Groundwater quality in the same 16 monitoring wells where water levels are monitored will be assessed using the results of the regularly scheduled quarterly sampling that is conducted under CTO WE15.

Site History

NWIRP Bethpage is located in east-central Nassau County, Long Island, New York, approximately 30 miles east of New York City (Figure 1). NWIRP Bethpage is in the Hamlet of Bethpage, Town of Oyster Bay, New York. Since its inception in 1941, the plant's primary mission was the research prototyping, testing, design engineering, fabrication, and primary assembly of military aircraft. The facilities at NWIRP included four plants used for assembly and prototype testing, a group of quality control laboratories, two warehouse complexes (north and south), a salvage storage area, water recharge basins, the Industrial Wastewater Treatment Plant, and several smaller support buildings. The Navy's property originally totaled 109.5 acres and was formerly a Government-Owned Contractor-Operated (GOCO) facility that was operated by Northrop Grumman (NG) until September 1998. Prior to 2002, the NWIRP property was bordered on the north, west, and south by current or former NG facilities, and on the east by a residential neighborhood. By March 2008, approximately 100 acres of NWIRP property were transferred to Nassau County in three separate actions. The remaining 9 acres and access easements were retained by the Navy to continue remedial efforts at Installation Restoration (IR) Site 1 – Former Drum Marshalling Area and Site 4 – Former Underground Storage Tanks (Area of Concern [AOC] 22). A parcel of land connecting the two sites was also retained. Currently, the 9-acre parcel of NWIRP is bordered on the east by the residential neighborhood and on the north, south, and west by Steel Equities property; however, a portion near Sites 2 and 3 is still owned by Nassau County. Access to the NWIRP is from South Oyster Bay Road.

Field Investigation Task Plan

Details of the field investigation are provided below. All aspects of the field investigation will be conducted in accordance with the UFP SAP for Groundwater Sampling Using Low Stress (Low Flow) purging and Sampling Protocol (Resolution Consultants, November 2013), and Abbreviated Quarterly Groundwater Sampling Workplan (Resolution Consultants, December 2014).

Water Level Monitoring and Capture Zone Evaluation

Electronic data loggers have been deployed in 16 existing Navy wells located in the vicinity of BWD Well 6-2 (see Figure 2). The manufacturer, model, and serial numbers for each set of equipment were recorded for each monitoring location. The data loggers were decontaminated prior to use and setup per manufacturer's specifications. The data loggers have been placed in the wells a sufficient distance below the typical well water level to allow for fluctuation of the water level above the data logger during the monitoring period (i.e., data logger to remain submerged). Water levels will be recorded at 5-minute intervals, and data stored by the loggers will be downloaded monthly and evaluated to ensure proper operation of the equipment. One additional data logger has been installed in well RE104D1 to record the site's barometric pressure for the duration of the water level monitoring (see Figure 2).

Assuming that significant pumping cycle change effects are recorded by the data loggers in the monitored wells, aquifer parameters such as hydraulic conductivity, transmissivity, and storativity will be calculated using specialized software or traditional analytical methods (e.g., distance-drawdown, type curve matching). This information will then be used to calculate the capture zone of BWD 6-2 at variable pumping rates using analytical or numerical solutions.

Air Monitoring

Air quality will be monitored within the vicinity of BWD Plant 6 at two locations. The intent of the air monitoring is to evaluate Volatile Organic Compounds (VOCs) upwind and downwind of the plant using two TO-15 canisters and assess potential impacts. The following assumptions have been made regarding the ambient air modeling and testing:

- An air dispersion model will be used the day prior to real-time sampling to help determine placement of upwind and downwind canisters.
- To support the air dispersion modeling, BWD will provide the following information for Plant 6:
    - Emission rate
    - Stripper height

  - Stripper diameter
  - Stripper exit velocity
  - Stripper gas temperature
  - Ambient temp
  - Composition of stripper effluent
  - Relative density of stripper effluent
- With the data provided by BWD, forecasted meteorological data for next day will be extracted from Air Resource Laboratory's READY website and used to run AERMOD for a 24-hour period.

The optimal air sampling locations will be based on the results of the air modeling described above. Two air sampling locations will be set up to conduct three sampling events (quarterly), collected over a 24-hour period (for each event). In addition, a weather station will be set up at one of the air monitoring locations to determine rainfall and wind direction.

Monitoring Well Groundwater Sample Collection and Analysis

Quarterly groundwater sampling of the wells will be conducted in accordance with the UFP SAP Addendum - Groundwater Sampling Using Low Stress (Low Flow) Purging and Sampling Protocol (Resolution Consultants, 2013).

All groundwater and QA/QC samples will be analyzed by a New York State and Navy Approved Laboratory for the chemicals of interest using EPA Methods 8260C (VOCs) and 8270C SIM (SVOCs).

BWD Well 6-2 Operation

Resolution Consultants will make every attempt to secure a subcontract with BWD to operate and maintain Well 6-2, to treat recovered groundwater, to distribute or dispose of the recovered groundwater, and to provide plant operation data. In the event that Resolution is unable to secure a subcontract with the BWD the SOW will be reevaluated. The BWD SOW will specify Well 6-2 to be operated on a near continuous basis (greater than 90% of capacity) for a period of 3 months. This rate corresponds to approximately 47 million gallons per month of recovered and treated groundwater. The amount of water that is disposed versus the amount of water that is distributed to customers will be recorded and reported. Nearby Well BWD 6-1 will only be run as required to maintain its operational status, or to maintain pressure in BWD's system.

During operation of Well 6-2, BWD will continue to run Plant 6, including the following:

i. Operate and maintain the pumps and blowers;
ii. Conduct all normal monitoring of water quality, including chlorine, pH, and VOCs including the influent of Well 6-2;
iii. Operate the caustic and chlorine feed systems;
iv. Change out air filters; and
v. Monitor and report to the Navy on a monthly basis, water extraction from Well 6-1 and 6-2, and discharge to distribution or the blow-off pit and analytical results;

Activities specifically excluded from the BWD SOW include:

vi. Monitoring of water quality in the distribution system except as stated above in ii;
vii. Except for pH and chlorine, which are included in this SOW, sampling and analysis of water quality for parameters not associated with OU2-related VOCs;
viii. Maintenance associated with breakdown of equipment;
ix. Structure, security, or landscaping maintenance;
x. Waste management; and
xi. Normal activities conducted on an annual basis.

Site-Specific HASP

Prior to initiating field activities at the site, Resolution Consultants shall prepare an amendment to the site-specific Health and Safety Plan (HASP).

IDW

Investigation Derived Waste (IDW) accumulated during sampling activities will be collected, containerized, accumulated at NWIRP Bethpage, and disposed off-site. All IDW activities will be consistent with the UFP SAP Addendum – Groundwater Sampling Using Low Stress (Low Flow) Purging and Sampling Protocol (Resolution Consultants, November 2013).

Decontamination

Decontamination of the data loggers will be performed when the equipment is removed from a well at the completion of the monitoring, or when equipment is moved to another location. Equipment will be decontaminated and waste will be brought to a central area at NWIRP Bethpage. All

decontamination fluids will be collected and staged for characterization and subsequent disposal. All decontamination activities will be consistent with the UFP SAP Addendum – VPB and Monitoring Well Installation and Sampling (Resolution Consultants, November 2013).

Data Validation

Resolution Consultant shall perform field investigations as necessary and evaluate all data from groundwater and air samples. All data validation activities will be consistent with the UFP SAP Addendum – VPB and Monitoring Well Installation and Sampling (Resolution Consultants, November 2013).

Reporting

A final report will be developed to provide documentation of this pilot test. Documentation required to support this project will consist of the following items:

- Data logger records in tabular format (on disc);
- Data sheets or files submitted by BWD documenting Wells 6-1 and 6-2 operation, along with data on water treatment system;
- Air dispersion model results;
- Analytical results for air samples, along with laboratory reports;
- Tabular results of quarterly groundwater samples; laboratory reports provided under separate cover in quarterly groundwater sample reports not included;
- Calculation sheets and figures for aquifer parameters, and or output from specialized software programs;
- Calculation sheets and figures for determination of well capture zone, and/or output from specialized software programs;
- Draft (D1), Draft Final (D2), and Final Pilot Test Report

Tables

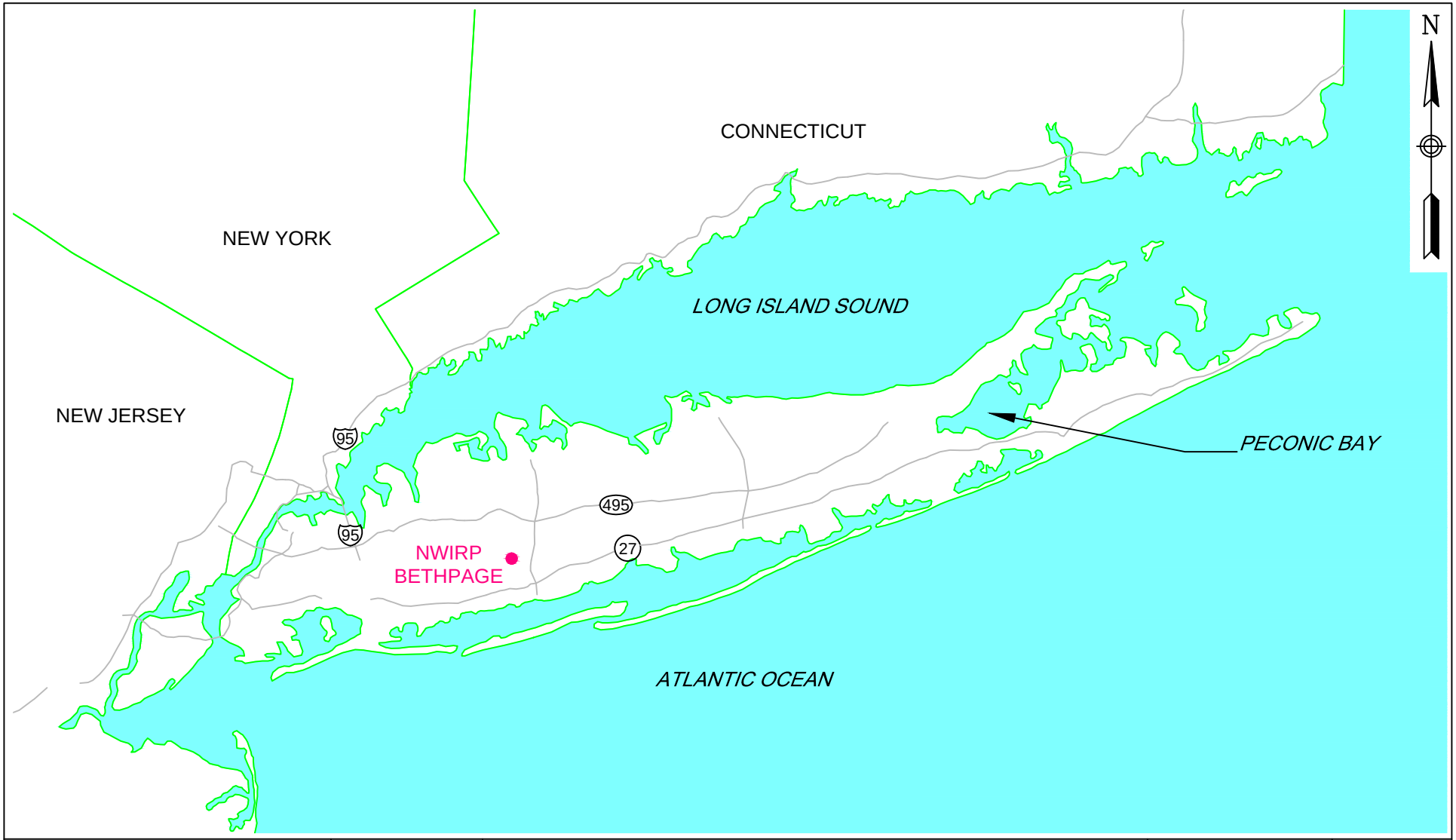
Table 1
Well Construction Details

WELL	Ground Elevation (ft amsl)	Top Casing Elevation (ft amsl)	Top of Screen Depth	Bottom of Screen Depth	Total Depth
BWD 6-1	92	na	330	380	386
BWD 6-2	92	na	700	770	775
RE103D1	93.80	93.00	625	640	645
RE103D2	93.63	92.73	653	673	673
RE103D3	93.74	92.76	715	730	735
RE104D1	90.53	89.80	350	370	375
RE104D2	90.79	90.12	710	730	735
RE104D3	90.87	90.20	760	780	785
RE105D1	87.62	87.23	530	550	555
RE105D2	87.59	87.18	730	750	755
RE108D1	95.68	95.38	530	550	555
RE108D2	95.72	95.43	630	650	655
RE120D1	86.06	85.58	630	650	655
RE120D2	86.03	85.54	690	710	713
RE120D3	86.14	85.70	740	760	765
RE122D1	97.74	97.42	520	540	545
RE122D2	97.70	97.35	590	610	615
RE122D3	97.62	97.27	715	735	740

Notes:

ft amsl – feet above mean sea level
All depths in feet below ground.
na – not available

Figures



0 15 30

SCALE IN MILES

NAVFAC

GENERAL LOCATION MAP
NWIRP BETHPAGE
BETHPAGE, NEW YORK

N62470-11-D-8015	WE69
APPROVED BY AJ	DATE 8/20/15
APPROVED BY --	DATE --
1	0

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Former Naval Weapons Industrial Reserve Plant

Former Northrop Grumman Site

RE122D1 (545 ft)
RE122D2 (615 ft)
RE122D3 (740 ft)

RE108D1 (555 ft)
RE108D2 (655 ft)

RE104D1 (375 ft)
RE104D2 (735 ft)
RE104D3 (785 ft)

RE103D1 (645 ft)
RE103D2 (673 ft)
RE103D3 (735 ft)

WELL 6-2 (BWD-8941)

RE120D1 (655 ft)
RE120D2 (713 ft)
RE120D3 (765 ft)

RE105D1 (555 ft)
RE105D2 (755 ft)

Note: The well depths are indicated in parentheses.

Legend

- Barologger - Installed
- Installed Data Loggers
- Monitoring Well
- Vertical Profile Boring
- Vertical Profile Boring - Proposed
- Water Supply Well
- Extraction Well

0 500 1,000 2,000 Feet

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INSTALLED DATA LOGGER LOCATIONS FOR
BWD WELL 6-2 PILOT TEST
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
BETHPAGE, NEW YORK

CONTRACT NUMBER	CTO NUMBER
N62470-11-D8013	WE69
APPROVED BY: AJ	DATE: 9/3/2015
APPROVED BY: —	DATE: —
FIGURE NO.: 2	REV: 0