Summary Report

For

2010 to 2012 Offsite Vertical Profile Borings and Monitoring Wells Pre-Design Field Investigation

Naval Weapons Industrial Reserve Plant

Bethpage, New York

Naval Facilities Engineering Command Mid-Atlantic

Contract Number N62472-03-D-0057 and N62470-08-D-1001 Contract Task Order 66 and WE62

November 2012

SUMMARY REPORT FOR 2010 TO 2012
OFF-SITE VERTICAL PROFILE BORINGS AND MONITORING WELLS
PRE-DESIGN FIELD INVESTIGATION

NAVAL FACILITIES ENGINEERING COMMAND
MID-ATLANTIC

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command
Mid-Atlantic
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Contract No. N62472-03-D-0057 and N62470-08-D-1001

Contract Task Order 66 and WE62

November 2012

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ACRONYMS

AOC	area of concern
bgs	below ground surface
BPOW	Bethpage Outpost Well
CLEAN	Comprehensive Long-Term Environmental Action Navy
CoC	chain of custody
CTO	contract task order
GOCO	government owned contractor-operated
IDW	investigation derived waste
ER	Environmental Restoration
NAVFAC	Naval Facilities Engineering Command
NSF	National Sanitation Foundation
NTU	nephelometric turbidity units
NWIRP	Naval Weapons Industrial Reserve Plant
NYSDEC	New York State Department of Environmental Conservation
OU-2	Operable Unit 2
PVC	polyvinyl chloride
TOC	total organic carbon
Tetra Tech	Tetra Tech, Inc.
USGS	United States Geological Survey
VOCs	volatile organic compounds
VPB	vertical profile boring

1.0 INTRODUCTION

This report has been prepared by Tetra Tech NUS, Inc. (Tetra Tech) for the Naval Facilities Engineering Command Mid-Atlantic under Contract Task Orders (CTO) 066 and WE62 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) contract numbers N62472-03-D-0057 and N62470-08-D-1001, respectively. This investigation was conducted to better define the extent of solvent-contaminated groundwater off site of the Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, Long Island, New York (Figures 1-1 and 1-2). Regional groundwater flow is south southeast, but is locally affected by the operation of recharge basins and public water supply wells. This investigation was conducted for groundwater in the area as defined in the Operable Unit No. 2 (OU-2) ROD (NAVFAC, 2003).

This field investigation included the installation of vertical profile borings (VPBs) and groundwater monitoring wells, and collection of groundwater and soil samples. Field activities commenced in fall 2010 and were completed in summer 2012. Field activities were conducted in accordance to the following work plans:

- *Letter Work Plan Pre-Design Field Investigation, OU-2 Offsite Groundwater Investigation, Naval Weapons Industrial Reserve Plant, Bethpage, New York. (2010).*
- 2011 *Letter Work Plan Addendum, Pre-Design Field Investigation, OU-2 Offsite Groundwater Investigation, Naval Weapons Industrial Reserve Plant, Bethpage, New York.*
- *VPB-133 Work Plan Addendum - December 2011, OU-2 Offsite Groundwater Investigation, Naval Weapons Industrial Reserve Plant, Bethpage, New York*.
- March 2012 *Letter Work Plan Addendum, TT-102D/TT-102D2 (VPB-133) Pre-Design Field Investigation OU-2 Offsite Groundwater Investigation, Naval Weapons Industrial Reserve Plant, Bethpage, New York.*

This report presents data and field documentation from this investigation and has been organized into the following report volumes:

- Volume I – Overview of the 2010 to 2012 off-site drilling program
- Volume II – VPB 127, Bethpage Outpost Well (BPOW) 1-4, 1-5, and 1-6
- Volume III – VPB 128, BPOW 3-3 and 3-4
- Volume VI – VPB 129, monitoring wells TT-101D, TT-101D1, and TT-101D2
- Volume V – VPB 130, BPOW 2-3
- Volume VI – VPB 131
- Volume VII – VPB 132, BPOW 5-1, 5-2, and 5-3
- Volume VIII – VPB 133, monitoring wells TT-102D and TT-102D2

1.1 SCOPE AND OBJECTIVE

The objectives of this pre-design field investigation were to collect data to better define the horizontal and vertical extent of groundwater contamination, evaluate migration, and determine concentrations of volatile organic compounds (VOCs) in groundwater south of the Navy/Northrop Grumman complex. This contamination is up-gradient of several potable water supply wells in the area and continues to migrate to the south southeast. This investigation included the installation of 7 VPBs and 14 groundwater wells and reconstruction of 1 existing groundwater well (BPOW 1-3).

1.2 SITE HISTORY

NWIRP Bethpage is located in east-central Nassau County, Long Island, New York, approximately 30 miles east of New York City (Figure 1-1). NWIRP Bethpage is in the Hamlet of Bethpage, Town of Oyster Bay, New York. Since its inception in 1943, 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 the Northrop Grumman Corporation (NGC) until September 1998. Prior to 2002, the NWIRP property was bordered on the north, west, and south by current or former Northrop Grumman 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 Environmental Restoration (ER) 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 Nassau County property. Access to the NWIRP is from South Oyster Bay Road to the west.

1.3 GEOLOGY

NWIRP Bethpage is underlain by approximately 1,100 feet of unconsolidated sediments that unconformably overlie crystalline bedrock. The unconsolidated sediments consist of four distinct geologic units that, in descending order, are the Upper Glacial Formation, the Magothy Formation, the Raritan Clay Member of the Raritan Formation, and the Lloyd Sand Member of the Raritan Formation. The

crystalline bedrock consists primarily of metamorphic and igneous rocks. The regional dip of the bedrock is to the south and southeast. All of the geologic units dip in these directions, although to varying degrees.

The Upper Glacial, Magothy, and Raritan Formations were penetrated to some degree during the investigation at NWIRP. The Upper Glacial Formation, which is about 30 to 45 feet thick, consists mostly of coarse sand and gravels deposited during the Pleistocene ice ages. The Magothy Formation consists mostly of fine to coarse sands, with interbeds of clay of the Upper Cretaceous. The clay within the Magothy is fairly common, but laterally discontinuous. The lower portions of the Magothy Formation (at depths approximately 700 to 960 feet bgs) as determined during the investigation consists of pockets of coarse sand and fine gravel. The Magothy Formation thickens seaward.

The Raritan Formation, also deposited during the Cretaceous, consists of an upper clay member and a lower sand member (Lloyd Sand). The clay is considered a confining unit and has a very low vertical hydraulic conductivity of 0.001 feet per day and is areally extensive. (USGS, 2006). The Raritan Formation thickens seaward. Under Long Island the clay member has maximum thickness of 300 feet and consists of a massive silty clay with a few lenses of sand and lignite (USGS, 1995).

The lithology of the offsite borings installed during this investigation consisted of mostly sand, gravel and clay in varying amounts, with traces of lignite at various depths. The upper zone consisted of mostly sand and gravel material and is part of the upper glacial formation. Below the upper gravel and sand layer, lithology consisted of mainly a fine to medium sand with traces of clay of the Magothy Formation. Below the Magothy deposits is the Raritan Clay Unit, which is somewhat variable in depth and thickness. Vertical Profile Boring VPB-132 was drilled to a depth of 1,000 feet bgs in a effort to locate this clay layer. Based on split spoon samples and geophysical logging the apparent top of this unit was approximately 960 feet bgs. The material consisted of a very stiff reddish gray silty clay and continued to the final depth of the boring.

2.0 FIELD ACTIVITIES

Field investigation activities consisted of the drilling, sampling, and soil/groundwater analysis of seven vertical profile borings, installation and development of fourteen monitoring wells, rehabilitation of one existing monitoring well, and re-development of three existing monitoring wells. Drilling during this investigation was performed by Delta Well and Pump Co., Inc. of Ronkonkoma, New York. The following sections provide an overview of each field activity.

2.1 VERTICAL PROFILE BORINGS

Seven VPBs (VPB-127 through VPB-133) were drilled during the offsite investigation. These VPBs were installed between October 2010 and April 2012. The locations of the VPBs are presented on Figure 2-1. Cross sections depicting these locations are presented in Figures A-A', B-B', C-C', and I-I'. A summary of VPB details is provided in Table 2-1. The VPBs ranged in depth from 846 feet below ground surface (bgs) to 1,000 feet bgs.

VPBs were installed by drilling an 8-inch diameter hole via a mud rotary drilling techniques. A steel surface casing was set at each VPB location to stabilize the borehole in the upper portions of the formation. The steel surface casings ranged in depth from 17 feet bgs to 58 bgs. Split spoon samples were collected at varying depths from each VPB to confirm lithology. Split spoon samples were also collected at depths at approximately 800 bgs and below to determine the presence of the Raritan Clay Unit. Gamma ray logging was performed in each VPB to determine lithology. The gamma log was run both down and up the borehole. Boring log sheets and gamma log documentation is provided in each respective VPB summary.

Groundwater grab samples were collected from a hydropunch-type sampler during the installation of VPBs and analyzed for VOCs. Groundwater grab samples were collected using the following sample collection intervals as a guideline:

- 50-Foot intervals from 50 to 200 feet bgs.
- 20-Foot intervals from 200 to greater than 800 feet bgs.

The actual depths for each groundwater grab samples were determined based on drill cuttings, split spoon samples, drilling rod configuration and other field conditions. During the collection of groundwater grab samples, field parameters (pH, temperature, specific conductivity, and turbidity) were measured as recoverable sample volume permitted. Sampling information was recorded on sample log sheets and is provided in each respective VPB summary.

Groundwater and soils samples were analyzed by Ecotest Laboratories, Inc. of North Babylon, New York and Chemtech of Mountainside, New Jersey. Chain of custody (CoC) forms documenting sample shipments, analytical results and data validation reports are provided in each respective VPB summary.

During drilling activities one air sample was collected per VPB location and analyzed for VOCs to evaluate potential emissions from the drill rig. Analytical results from the air samples are provided in each respective VPB summary.

2.2 GROUNDWATER WELL INSTALLATION

Fourteen groundwater wells (BPOWs and monitoring wells) were installed during the offsite investigation. These wells were installed between February 2011 and June 2012. Well locations are presented in Figure 2. Cross sections depicting these locations are presented in Figures A-A', B-B', C-C', and I-I'. Well construction details are provided in Table 2-2. Well boring and construction log sheets are provided in each respective VPB summary.

The wells were installed via mud rotary drilling techniques. Well screen depth intervals were finalized through evaluation of VPB lithology, analytical results from VPB groundwater grab samples, and where applicable, well construction details from down gradient water supply wells. Wells were constructed of 4-inch diameter, schedule 80 National Sanitation Foundation (NSF)-grade Polyvinyl Chloride (PVC) well casing and 10-slot (0.010 inches) well screen. The wells were completed at grade using a 12-inch diameter, locking curb box (with the exception of TT-102D, which was completed as a stick-up well).

2.3 MONITORING WELL DEVELOPMENT

Monitoring wells were developed using a combination of air lift and mechanical surging via submersible pump. In compliance with New York State Department of Environmental Conservation (NYSDEC) policy, wells were developed until turbidity was less than 50 nephelometric turbidity units (NTU). Table 2-3 summarizes the volume of groundwater pumped from each well during development activities. Field parameters, including pH, temperature, specific conductivity, and turbidity were monitored and recorded throughout well development. Well development records for each well are provided in each respective VPB summary.

2.4 SAMPLING PUMP INSTALLATION

Dedicated sampling pump systems (pump and packer) were installed in the following groundwater wells during the 2010 – 2012 offsite investigation:

- BPOW 1-3 pump installed December 2010; bottom of pump set at 395 feet bgs.
- BPOW 2-1 pump installed December 2010; bottom of pump set at 390 feet bgs.
- BPOW 2-3 pump installed December 2011; bottom of pump set at 505 feet bgs.
- BPOW 1-4 pump installed August 2011; bottom of pump set at 335 feet bgs.
- BPOW 1-5 pump installed August 2011; bottom of pump set at 495 feet bgs.
- BPOW 1-6 pump installed August 2011; bottom of pump set at 495 feet bgs.
- BPOW 3-3 pump installed August 2011; bottom of pump set at 495 feet bgs.
- BPOW 3-4 pump installed August 2011; bottom of pump set at 495 feet bgs.

2.5 DECONTAMINATION AND INVESTIGATION DERIVED WASTE

A decontamination pad was constructed at NWIRP Bethpage and was used for the collection of all decontamination-generated fluids. All decontamination fluids was containerized and managed as Investigation Derived Waste (IDW).

IDW generated during this investigation consisted of soil cuttings, drilling mud, and IDW fluids (decontamination fluids/groundwater). All IDW was containerized and staged at NWIRP Bethpage. IDW was characterized and disposed of properly.

2.6 SURVEYING

The location of each vertical profile boring and all newly installed and repaired monitoring wells were surveyed by a New York State licensed surveyor. Survey data is provided in each respective VPB summary.

REFERENCES

Naval Facilities Engineering Command (NAVFAC), 2003. *Record of Decision Naval Weapons Industrial Reserve Plant Bethpage, New York, Operable Unit 2 – Groundwater, NYS Registry: I-30-003B*. April.

Tetra Tech, 2010. *Letter Work Plan Pre-Design Field Investigation, OU-2 Offsite Groundwater Investigation, Naval Weapons Industrial Reserve Plant, Bethpage, New York.* September.

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United States Geological Survey (USGS), 1995. *Groundwater Atlas of the United States, Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont, HA 730-M.*

USGS, 2006. *Hydrogeology of the Lloyd Aquifer on Long Island, New York—A Brief Summary of USGS Investigations.* December.

TABLES

TABLE 2-1
VERTICAL PROFILE BORING SUMAMRY
OFF-SITE LOCATIONS
2010 TO 2012 OU-2 GROUNDWATER INVESTIGATION
NWIRP BETHPAGE, NY

BORING NUMBER	TOTAL DEPTH (ft bgs)	NO. OF GW SAMPLES COLLECTED/ ATTEMPTS	BORING START DATE	BORING COMPLETION DATE	NO. OF SPOON SAMPLES	TOC SAMPLES	GAMMA LOG (ft bgs)	SURFACE CASING SET AT (ft bgs)	DATE OF AIR SAMPLE	WELLS INSTALLED AT VPB LOCATION
VPB-127	846	33/34	10/28/2010	12/2/2010	1	0	845	17	11/23/2010	BPOW 1-4, 1-5, 1-6
VPB-128	847	32/36	12/7/2010	2/3/2011	2	0	840	40	2/1/2011	BPOW 3-3, 3-4
VPB-129	850	33/34	8/16/2011	9/30/2011	4	2	850	46	10/12/2011	TT-101D, 101D1, 101D2
VPB-130	850	32/36	6/6/2011	7/6/2011	4	2	848	40	7/14/2011	BPOW 2-3
VPB-131	850	38	2/27/2012	4/13/2012	1	1	850	58	3/29/2011	none installed
VPB-132	1,000	34/37	1/16/2012	3/6/2012	18	2	988	56	4/19/2012	BPOW 5-1, 5-2, 5-3
VPB-133	988	49	12/12/2011	2/8/2012	26	0	988	50	6/7/2012	TT-102D, 102D2

NWIRP - Naval Weapons Industrial Reserve Plant
VPB - vertical profile boring
ft bgs - feet below ground surface
No. - number
GW - groundwater
TOC - total organic compound
BPOW - Bethpage Outpost Well

TABLE 2-2
GROUNDWATER WELL CONSTRUCTION SUMMARY
OFF-SITE LOCATIONS
2010 TO 2012 OU 2 GROUNDWATER INVESTIGATION
NWIRP BETHPAGE, NY

WELL NUMBER	VPB NUMBER	WELL COMPLETE DATE	WELL BORING DEPTH (ft bgs)	SURFACE CASING SET AT (ft bgs)	SCREEN INTERVAL (ft bgs)	SUMP DEPTH INTERVAL (ft bgs)
BPOW 1-6	VPB-127	4/13/2011	770	40	700-750	750-755
BPOW 1-5		5/4/2011	665	40	600-650	650-655
BPOW 1-4		5/24/2011	410	40	340-400	400-405
BPOW 1-3*		10/12/2010	412	NA	372-412	NA
BPOW 3-4	VPB-128	2/10/2011	840	40	640-690	690-695
BPOW 3-3		3/9/2011	635	40	580-620	620-625
BPOW 2-3	VPB-130	7/19/2011	610	40	564-594	594-599
TT-101D2	VPB-129	10/19/2011	777	55	740-760	760-765
TT-101D1		11/17/2011	603	55	570-590	590-595
TT-101D		11/1/2011	363	55	325-345	345-350
BPOW 5-3	VPB-132	3/22/2012	680	58	620-660	660-665
BPOW 5-2		4/6/2012	598	58	540-580	580-585
BPOW 5-1		4/24/2012	527	58	480-510	510-515
TT-102D2	VPB-133	5/22/2012	790	56	740-770	770-775
TT-102D		6/14/2012	618	56	560-600	600-605

NWIRP - Naval Weapons Industrial Reserve Plant
VPB - vertical profile boring
ft - feet
bgs - below ground surface
NA - not applicable
* reconstructed well

TABLE 2-3
GROUNDWATER WELL DEVELOPMENT SUMMARY
OFF-SITE LOCATIONS
2010 TO 2012 OU 2 GROUNDWATER INVESTIGATION
NWIRP BETHPAGE, NY

WELL NUMBER	VPB NUMBER	AIR DEVELOPMENT	PUMP DEVELOPMENT	AIR DEVELOPMENT VOLUME (GALLONS)	PUMP DEVELOPMENT VOLUME (GALLONS)	TOTAL DEVELOPMENT VOLUME (GALLONS)
BPOW 1-6	VPB-127	6/2/2011, 6/6/2011	6/13/2011, 6/14/2011	17,000	5,380	22,380
BPOW 1-5		6/62011, 6/8/2011	6/14/2011, 6/15/2011	15,000	8,230	23,230
BPOW 1-4		6/8/2011, 6/9/2011	6/16/2011	13,000	4,300	17,300
BPOW 1-3*		NA	10/18/2010	NA	980	980
BPOW 3-4	VPB-128	3/21/2011, 3/23/2011	3/28/2011, 3/29/2011	10,000	7,000	17,000
BPOW 3-3		3/23/2011, 3/24/2011	6/1/2011	14,000	5,220	19,220
BPOW 2-3	VPB-130	8/1/2011, 8/2/2011	8/3/2011	16,000	6,248	22,248
BPOW 2-2		10/7/2010	10/7/2010	4,800	1,600	6,400
BPOW 2-1		10/5/2010	10/5/2010	3,000	1,000	4,000
TT-101D2	VPB-129	11/29/2011, 11/30/2011	12/6/2011	14,400	5,040	19,440
TT-101D1		12/2/2011, 12/5/2011	12/8/2011	14,200	5,240	19,440
TT-101D		12/1/2011	12/7/2011	14,000	5,800	19,800
BPOW 5-3	VPB-132	5/14/2012, 5/15/2012	5/21/2012	16,000	1,698	17,698
BPOW 5-2		5/15/2012, 5/16/2012	5/22/2012	16,000	2,353	18,353
BPOW 5-1		5/16/2012, 5/17/2012	5/23/2012	16,000	1,844	17,844
TT-102D2	VPB-133	7/18/2012	7/23/2012	14,000	4,730	18,730
TT-102D		7/16/2012, 7/17/2012	7/19/2012, 7/20/2012	15,000	4,134	19,134

NWIRP - Naval Weapons Industrial Reserve Plant
BPOW - Bethpage Outpost Well
VPB - vertical profile boring
ft - feet
bgs - below ground surface
NA - not applicable
* - reconstructed well

FIGURES

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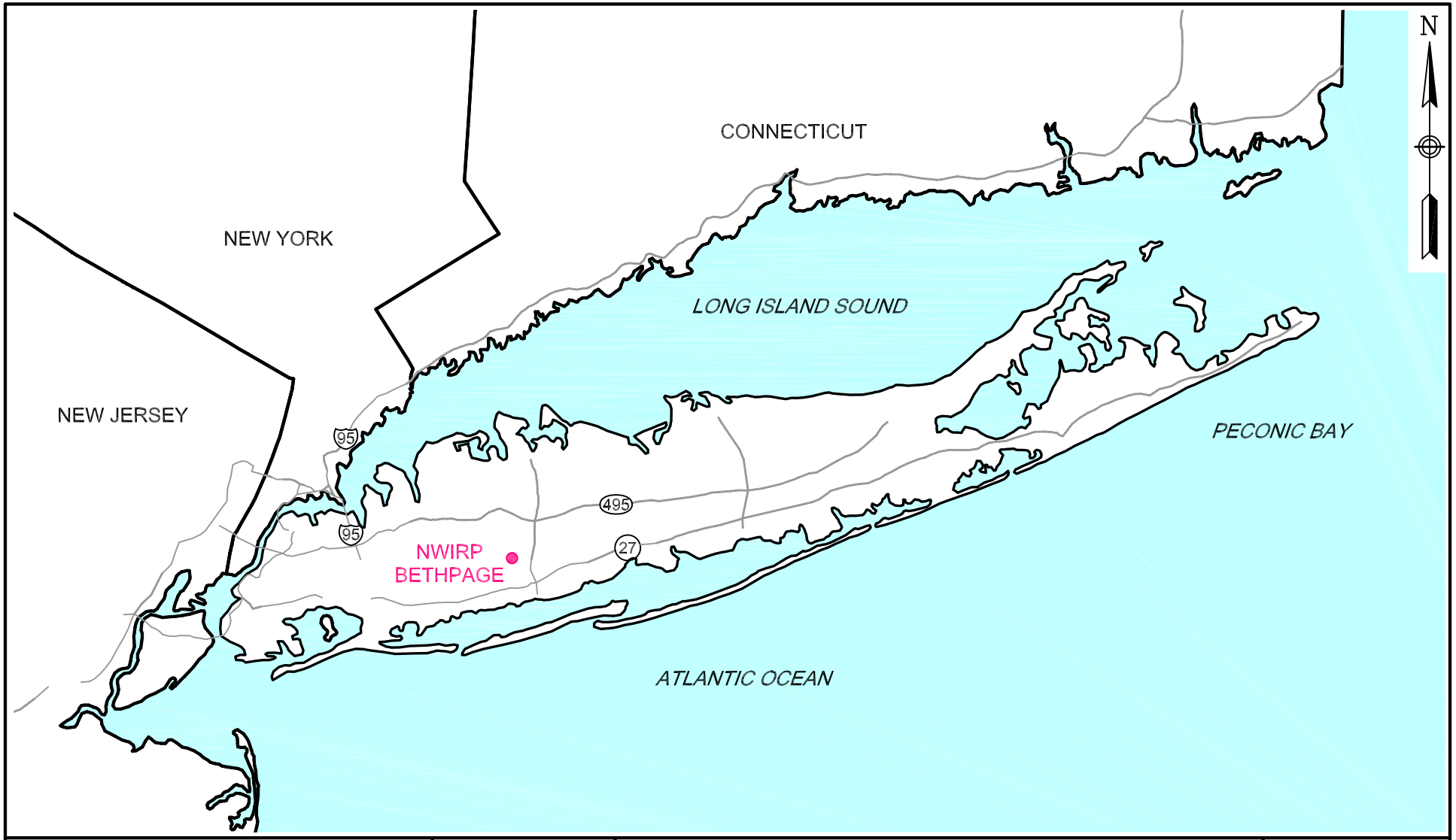

0 15 30
SCALE IN MILES

TETRA TECH, INC.

GENERAL LOCATION MAP
NWIRP BETHPAGE
BETHPAGE, NEW YORK

SCALE
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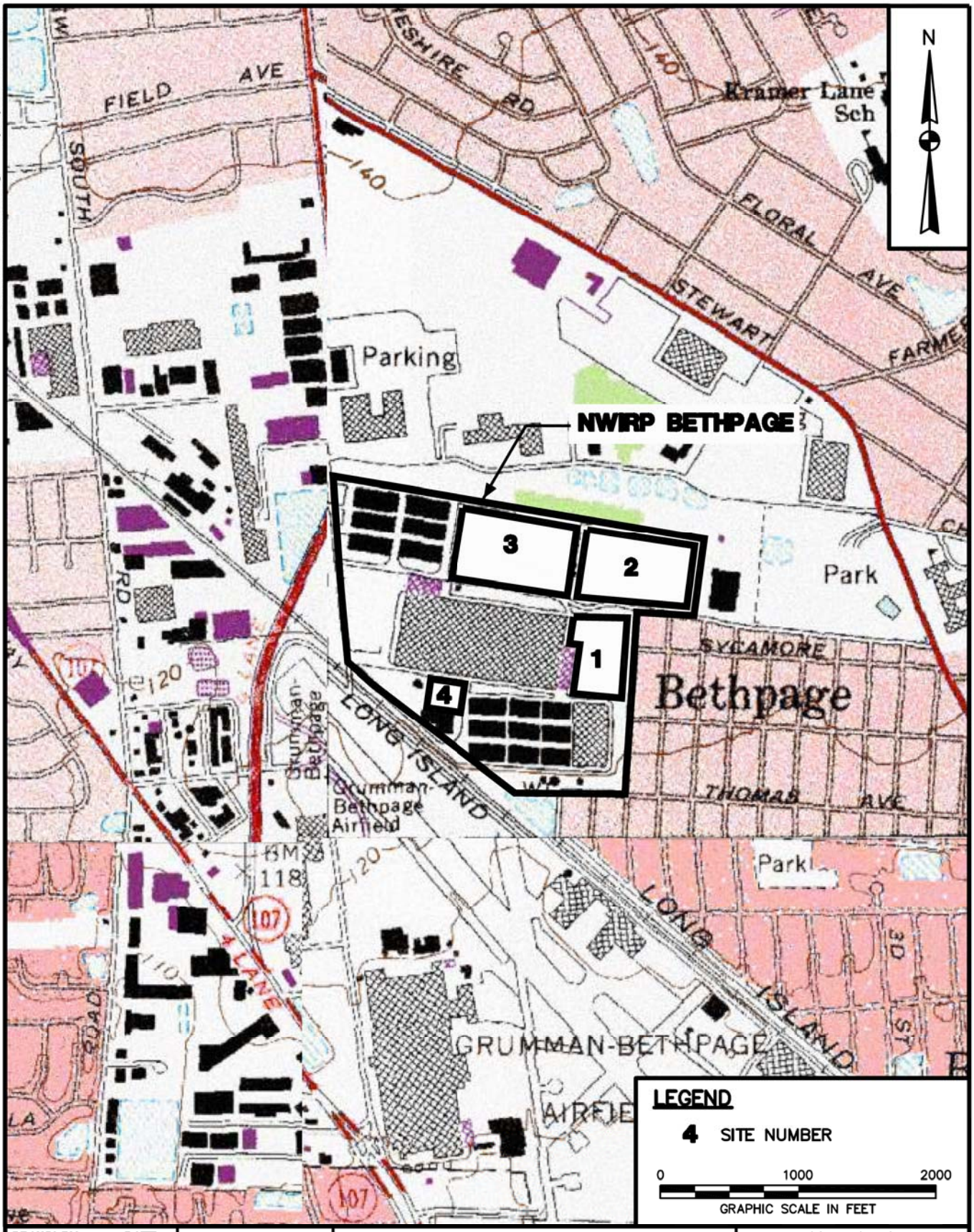
DATE 08/02/10

FIGURE NUMBER
FIGURE 1-1



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REVISED BY DATE			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-2 REV. 0

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N

NORTHROP GRUMMAN

NWIRP BETHPAGE

S Broadway

State Hwy 135

Hempstead Tpke

Southern State Pkwy

State Hwy 135

Hicksville Rd

A

A'

B

B'

C

C'

I

I'

VPB-129
TT-101
TT-101D
TT-101D2

VPB-127
BPOW 01-04
BPOW 01-05
BPOW 01-06

BPOW 01-03

VPB-128
BPOW 03-03
BPOW 03-04

VPB-131
BPOW 02-01
BPOW 02-02
BPOW 02-03
VPB-130

VPB-132
BPOW 5-1
BPOW 5-2
BPOW 5-3

VPB-133
TT-102D
TT-102D2

0 1,000 2,000 4,000 Feet

Legend

- Vertical Profile Boring (2010-2012 OU-2 Program)
- Monitoring Well (2010-2012 OU-2 Program)
- Monitoring Well
- Water Supply Well
- Recovery Well
- Vertical Profile Boring

TETRA TECH

OPERABLE UNIT 2
2010-2012 DRILLING PROGRAM
CROSS SECTION LOCATION MAP
NWIRP BETHPAGE
BETHPAGE, NEW YORK

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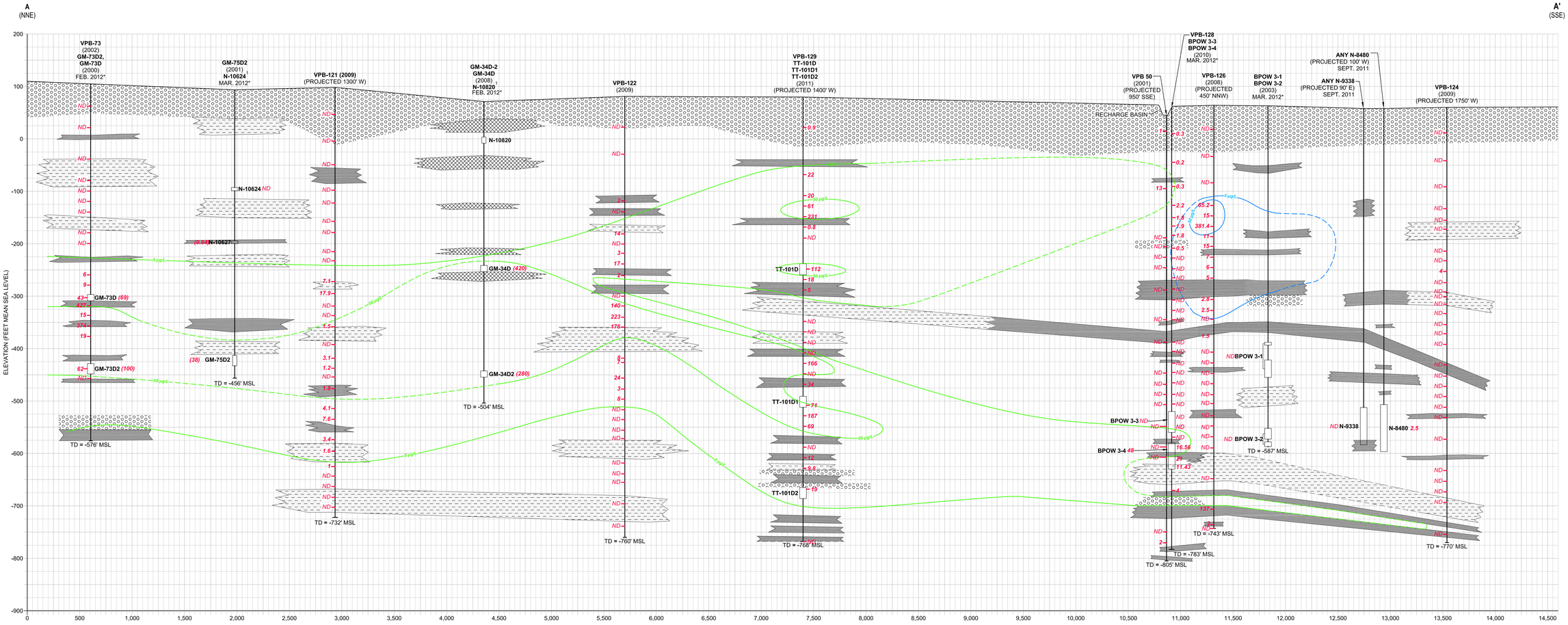

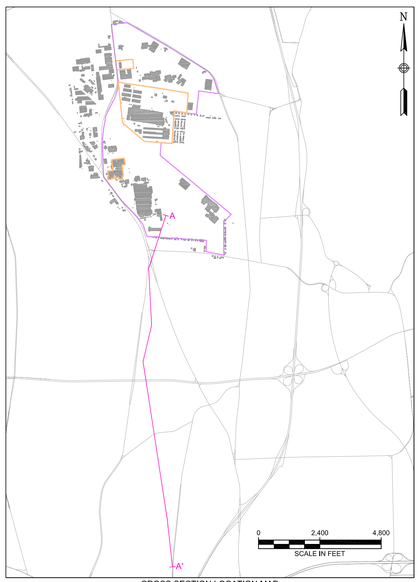

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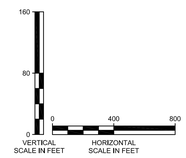

LEGEND

- SAND AND GRAVEL
- F-M SAND WITH VARYING AMOUNTS OF SILT, CLAY, AND C. SAND

CONFINING UNITS

- INTERBEDDED CLAY AND SAND
- SANDY CLAY
- CLAY
- CONFINING UNIT FROM ARCADIS CROSS-SECTION, NO SPECIFIC LITHOLOGY GIVEN
- [1] ARCADIS CROSS SECTION (2004)
- * TVOC DATA FROM ARCADIS

BPOW 3-2 — MONITORING WELL ID
VPB-121 — VERTICAL PROFILE BORING
MAR 2012 — MONITORING WELL SAMPLING DATE
(2003) — INSTALLATION YEAR
(PROJECTED 450' ESE) — PROJECTION
CONFINING UNIT (DASHED WHERE INFERRED)
BPOW 3-2 ND — MONITORING WELL SCREEN WITH TVOC COCENTRATION
374 — VERTICAL PROFILE BORING TVOC RESULTS IN ug/L
ND — NOT DETECTED
TOTAL VOC PLUME CONTOUR LINE
PCE PLUME CONTOUR LINE
TD = -743' MSL — TOTAL DEPTH MEAN SEA LEVEL

TETRA TECH

CROSS SECTION A – A'
BETHPAGE GROUNDWATER PLUME
BETHPAGE, NEW YORK

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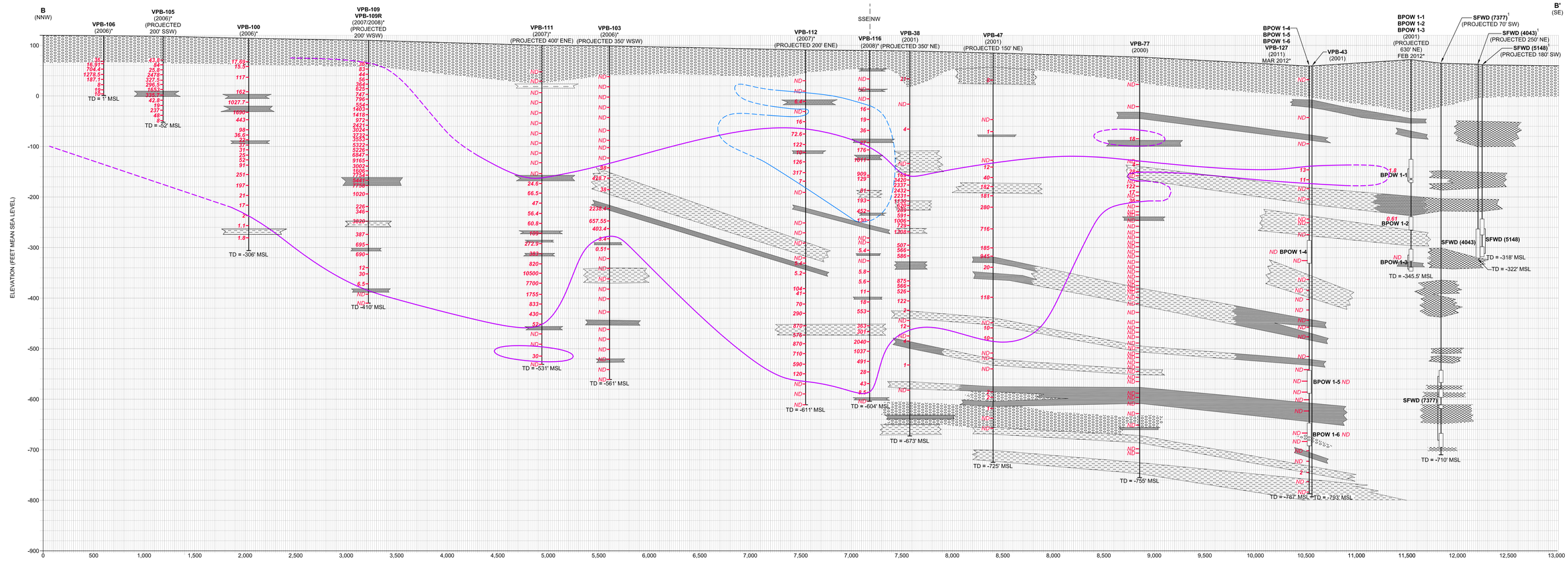
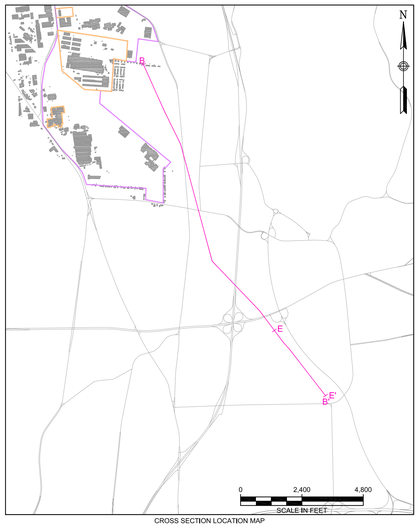
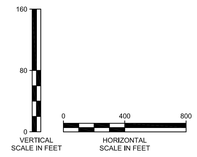




CROSS SECTION LOCATION MAP



LEGEND

- SAND AND GRAVEL
- F-M SAND WITH VARYING AMOUNTS OF SILT, CLAY, AND C. SAND

CONFINING UNITS

- INTERBEDDED CLAY AND SAND
- SANDY CLAY
- CLAY
- CONFINING UNIT FROM ARCADIS CROSS-SECTION; NO SPECIFIC LITHOLOGY GIVEN

[1] ARCADIS CROSS SECTION (2004)

* TVOC DATA FROM ARCADIS

BPOW 3-2 — MONITORING WELL ID

VPB-106 — VERICAL PROFILE BORING

(2003) — INSTALLATION YEAR

(PROJECTED 450' ESE) — PROJECTION

MAR 2012 — MONITORING WELL SAMPLING DATE

CONFINING UNIT (DASHED WHERE INFERRED)

BPOW 3-2 ND — MONITORING WELL SCREEN WITH TVOC COCENTRATION

374 — VERTICAL PROFILE BORING TVOC RESULTS IN ug/L

ND — NOT DETECTED

MIXED VOC PLUME (5 µg/L CONTOUR LINE)

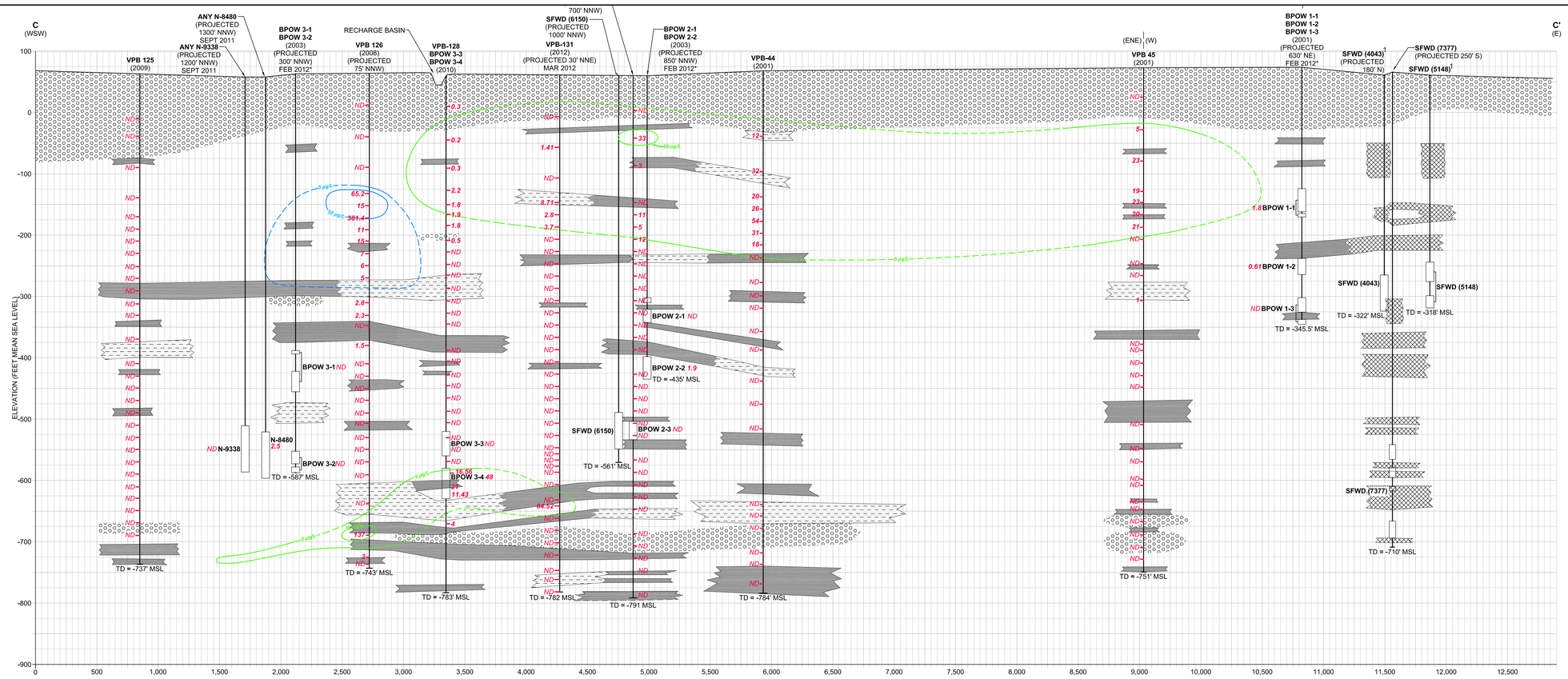
PCE PLUME (5 µg/L CONTOUR LINE)

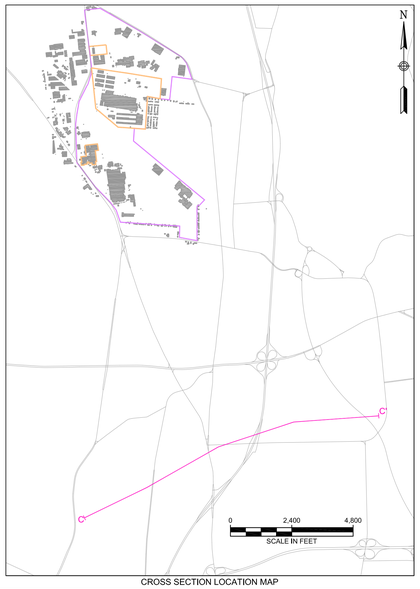
TD = -743' MSL — TOTAL DEPTH MEAN SEA LEVEL

TETRA TECH

CROSS SECTION B – B'
BETHPAGE GROUNDWATER PLUME
BETHPAGE, NEW YORK

FILE	SCALE
112G00622GS02	AS NOTED
FIGURE NUMBER	REV / DATE
B – B'	0 / 11/01/12





CROSS SECTION LOCATION MAP

LEGEND

- SAND AND GRAVEL
- F-M SAND WITH VARYING AMOUNTS OF SILT, CLAY, AND C. SAND

CONFINING UNITS

- INTERBEDDED CLAY AND SAND
- SANDY CLAY
- CLAY
- CONFINING UNIT FROM ARCADIS CROSS-SECTION, NO SPECIFIC LITHOLOGY GIVEN
- † ARCADIS CROSS SECTION (2004)
- • TVOC DATA FROM ARCADIS

BPOW 3-2 — MONITORING WELL ID
VPB-127 — VERICAL PROFILE BORING
(2003) — INSTALLATION YEAR
(PROJECTED 450' ESE) — PROJECTION
MAR 2012 — MONITORING WELL SAMPLING DATE
CONFINING UNIT (DASHED WHERE INFERRED)
BPOW 3-2 ND — MONITORING WELL SCREEN WITH TVOC COCENTRATION
374 — VERTICAL PROFILE BORING TVOC RESULTS IN µg/L
ND — NOT DETECTED
473.5 † — BENZENE DETECTED AT 440 µg/L
TOTAL VOC PLUME CONTOUR LINE
PCE PLUME CONTOUR LINE
TD = -743' MSL — TOTAL DEPTH (MEAN) SEA LEVEL

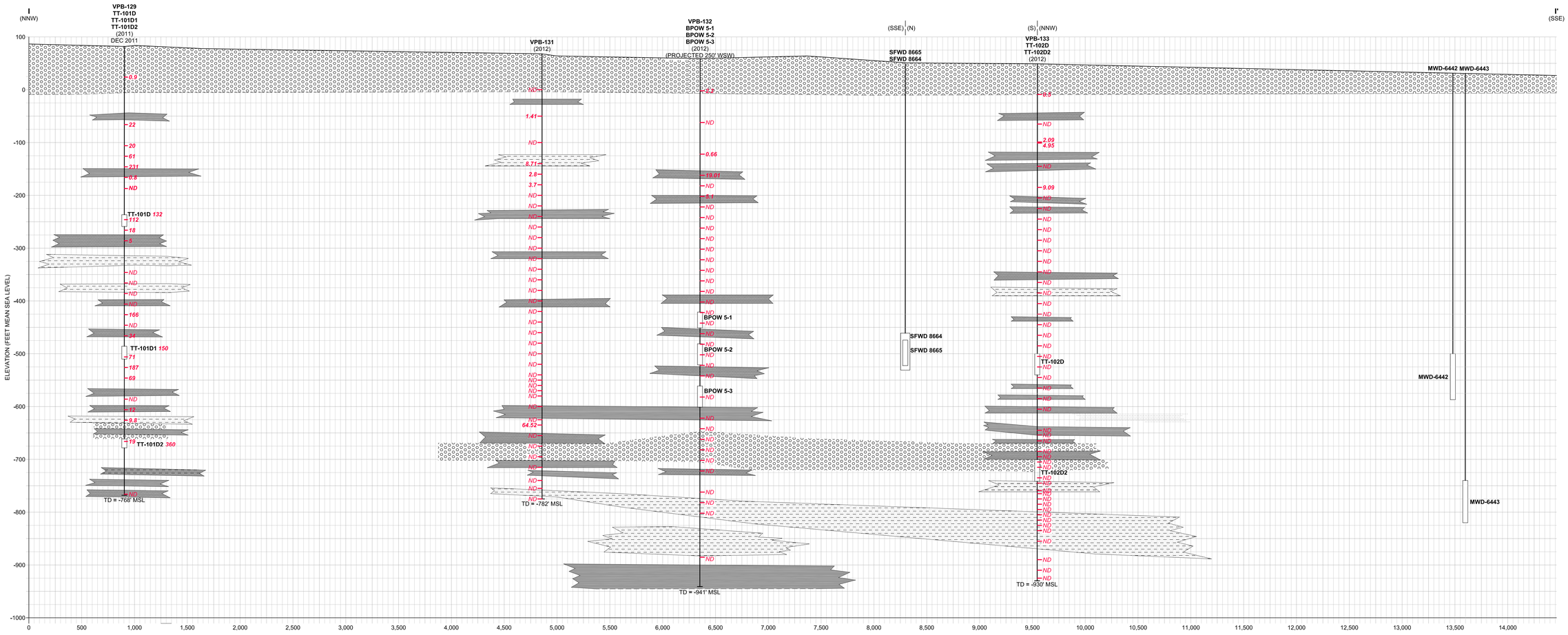
160
80
0
VERTICAL SCALE IN FEET

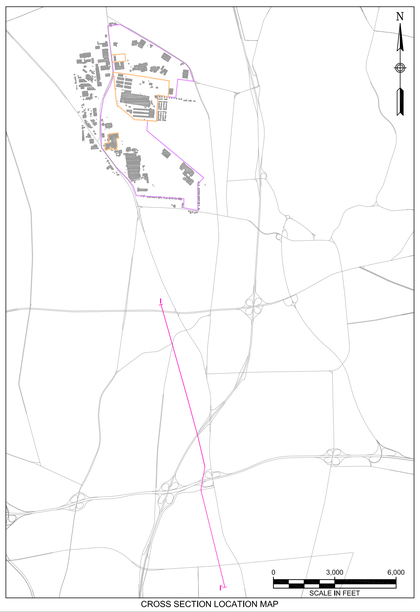
0
400
800
HORIZONTAL SCALE IN FEET

TETRA TECH

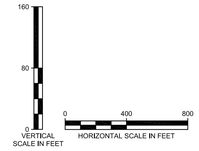
CROSS SECTION C – C'
BETHPAGE GROUNDWATER PLUME
BETHPAGE, NEW YORK

FILE	SCALE
112G00622GS03	AS NOTED
FIGURE NUMBER: C – C'	REV: 0 — DATE: 11/01/12





CROSS SECTION LOCATION MAP



LEGEND

- SAND AND GRAVEL
- F-M SAND WITH VARYING AMOUNTS OF SILT, CLAY, AND C. SAND

CONFINING UNITS

- INTERBEDDED CLAY AND SAND
- SANDY CLAY
- CLAY

TT-101D	MONITORING WELL ID
VPB-132	VERTICAL PROFILE BORING
(2000)	INSTALLATION YEAR
(PROJECTED 300' WSW)	PROJECTION
DEC 2011	MONITORING WELL SAMPLING DATE
	GROUND SURFACE
	CONFINING UNIT (DASHED WHERE INFERRED)
TT-101D	MONITORING WELL SCREEN
181.5	VERTICAL PROFILE BORING VOC RESULTS IN µg/L
ND	NOT DETECTED
TD = -730' MSL	TOTAL DEPTH FEET MEAN SEA LEVEL
µg/L	MIGROGRAMS PER LITER

TETRA TECH

CROSS SECTION I – I'
BETHPAGE GROUNDWATER PLUME
BETHPAGE, NEW YORK

FILE 112G00622GS09	SCALE AS NOTED
FIGURE NUMBER I – I'	REV 0 DATE 11/01/12