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NORTHROP GRUMMAN

Groundwater Interim Remedial Measure Hydraulic Effectiveness Evaluation Work Plan

Operable Unit 3, Former Grumman Setting Ponds, Bethpage, New York.

September 24, 2013

ARCADIS

Groundwater Interim Remedial Measure
Hydraulic Effectiveness Evaluation Work Plan

Operable Unit 3, Former Grumman Settling Ponds, Bethpage, New York

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Our Ref.:
NY001496.1112.GWMI1

Date:
September 24, 2013

1.0 Introduction

This work plan was prepared by ARCADIS of New York, Inc. (ARCADIS) on behalf of Northrop Grumman Systems Corporation (Northrop Grumman) to confirm the hydraulic effectiveness of the Operable Unit 3 (OU3) Groundwater Interim Remedial Measure (IRM), located adjacent to the Bethpage Community Park, in Bethpage, New York (Site or Park). The work plan describes the approach for drilling four vertical profile borings (VPBs), installing six piezometers and five monitoring wells at and near the Site and collecting groundwater samples from new and selected existing piezometers and wells.

1.1 Background

The Site is bordered by Cherry Avenue Extension/Aerospace Boulevard and the Arumdaun Presbyterian Church Vision Center Building to the north, Stewart Avenue and Bethpage High School to the east, the former Grumman Plant 24 Access Road and residential areas to the south, the former Plant 24 Access Road and the former Grumman Plant 24 to the west. The Site location is shown on **Figure 1**.

Regional groundwater flow in the area is to the south/southeast, with a downward component, and is locally modified by pumping of public supply and remediation wells.

As summarized in the Site Area RI Report (ARCADIS 2008), groundwater beneath the Site is impacted by volatile organic compounds (VOCs) in excess of NYSDEC Standards, Criteria, and Guidance Values (SCGs). Because of the existence of on-site impacted groundwater and pursuant to the OU3 Order on Consent signed by Northrop Grumman and the New York State Department of Environmental Conservation (NYSDEC), Northrop Grumman designed, constructed, and operates the Groundwater Interim Remedial Measure (IRM). Water from the wells is treated by an air stripper and then discharged to recharge basins located on the former Naval Weapons Industrial Reserve Plant (NWIRP) property, to the west of the site. The performance objectives of the Groundwater IRM system are described in the Operation, Maintenance, and Monitoring Report for the Groundwater IRM – 2012 Annual Summary (OM&M Report) (ARCADIS 2013a). Data collected and evaluated during the annual sampling rounds since 2009 (multiple lines of evidence) indicate that the IRM system is meeting its objectives. Also described in the OM&M Report, one Groundwater IRM objective is to capture Site-related VOCs (referred to as “Project VOCs”), which have been identified generally in groundwater beneath the western portion of the Park. Northrop Grumman does not assume responsibility for certain compounds (e.g. Freon 12 and Freon 22, referred to as “Non-Project VOCs”), which are generally found in groundwater beneath

the eastern portion the Park. Further detail regarding "Project VOCs" and "Non Project VOCs" is provided the OM&M Report.

The Groundwater IRM includes four recovery wells (RW-1 through RW-4) that are located along the southern segment of the former Plant 24 Access Road. Monitoring wells and piezometers associated with the Groundwater IRM are located adjacent to the Groundwater IRM remedial wells (**Figure 2**).

2.0 Work Plan Objective

The objective of the work described in this work plan is to provide additional groundwater quality and water-level information to confirm the current understanding that the Groundwater IRM is effectively controlling off-site migration of site-related VOCs in groundwater beneath and between the IRM recovery wells, and to monitor offsite water quality to confirm a "clean water front" is being produced downgradient of the recovery wells. Generally, hydraulic capture data represents a leading indicator of the hydraulic effectiveness of the IRM in that it will show hydraulic control as soon as it develops. Improving trends in groundwater quality and development of a "clean water front" downgradient of the IRM are lagging indicators of the effectiveness of the hydraulic control provided by the IRM because groundwater quality takes longer to show improvement.

3.0 Scope

The scope of work to be performed under this work plan will consist of the following activities:

- Installation of six on-site piezometers (PZ-5c, PZ-8a, PZ-8b, PZ-8c, PZ-9a, and PZ-10a).
- Drilling and sampling of two on-site VPBs (VPB-300 and VPB-301).
- Drilling and sampling of two off-site VPBs (VP-207 and VPB-208) followed by installation of two additional off-site monitoring wells (MW207-1 and MW208-1) in the VPB boreholes.
- Installation of three off-site monitoring wells immediately downgradient of the recovery system (MW204-1, MW205-1, and MW206-1).
- Sampling and analysis of groundwater for VOCs from 14 monitoring wells (nine existing and five new), the four IRM recovery wells, and eight piezometers (two

existing and six new). The wells and piezometers are located in and downgradient of the VOC source area (in the Park's ball field).

- Measurement of water levels in wells and piezometers on or near the Park.

For the drilling portion of this work plan, **Table 1** presents the details and objectives for the proposed VPBs. The on-site VPBs will be drilled to depths that ensure any VOC-impacted groundwater that could migrate below the capture zone of the remedial wells has been identified. **Table 2** presents the construction details and objectives for the proposed piezometers and monitoring wells. **Figure 2** shows the proposed locations for the new piezometers, monitoring wells and VPBs. **Figure 3** shows the piezometers, monitoring wells and VPBs on a cross-section along the southern portion of the former Plant 24 Access Road. This figure depicts how the new piezometers and VPBs will be used to fill data gaps in the hydraulic and water quality interpretation of current conditions, especially where contours are dashed or are not closed.

Table 3 presents the proposed water-level measurement and groundwater sampling plan for the effectiveness evaluation. **Figure 2** shows proposed groundwater sampling locations. Sampling and laboratory protocols for the collection and analysis of water samples will follow the procedures detailed in the NYSDEC-approved OU3 Remedial Investigation/Feasibility Study (RI/FS) Work Plan (ARCADIS 2006). Groundwater samples collected from monitoring wells, remedial wells, and piezometers will be submitted for laboratory analysis of the Target Compound List VOCs. Measurement of water levels will also follow procedures detailed in the RI/FS Work Plan.

3.1 Investigation Derived Waste

Investigation derived waste (IDW) produced during drilling activities will be collected, containerized in 55-gallon drums, and temporarily stored at the Northrop Grumman facility before being characterized (as required by the disposal facility) and disposed off-site at an approved facility. Purge water generated during groundwater sampling activities will be collected and stored in drums, pending characterization sampling, and either discharged to the local Publicly Owned Treatment Works (POTW) or sent off-site for disposal.

3.2 Decontamination

A decontamination pad will be constructed on Northrop Grumman property for equipment decontamination and collection of all fluids produced during decontamination activities. Decontamination fluids will be stored in drums, pending

characterization sampling, and either discharged to the POTW or sent off-site for disposal.

3.3 Reporting

An interpretative report will be prepared following completion of the field work and after evaluation of all pertinent data and information collected. The report will include information, findings, and conclusions regarding the hydraulic effectiveness of the Groundwater IRM.

4.0 Estimated Schedule

Table 4 provides the estimated duration of work activities, based on the expected notice to proceed, to be given by Northrop Grumman.

5.0 Health and Safety

The health and safety procedures, detailed in the Site-Specific Health and Safety Plan (ARCADIS 2013), will be followed for work carried out according to this work plan.

6.0 References

ARCADIS 2013 U.S. Inc. 2013a. Operation, Maintenance, and Monitoring Report for the Groundwater Interim Remedial Measure - 2012 Annual Summary, Operable Unit 3 – Former Grumman Settling Ponds, Bethpage, New York. NYSDEC Site #1-30-003A. May 2013.

ARCADIS 2013b. Site Specific Health and Safety Plan, Northrop Grumman Systems Corporation, April 2013.

ARCADIS U.S. Inc. (ARCADIS) 2011. Remedial Investigation Report (Site Area). Operable Unit 3 – Former Grumman Settling Ponds, Bethpage, New York. NYSDEC Site #1-30-003A. February 1, 2008.

ARCADIS G&M, Inc. 2006. Remedial Investigation/Feasibility Study Work Plan, Former Grumman Settling Ponds (Operable Unit 3 – Bethpage Community Park), Bethpage, New York. NYSDEC Site # 1-30-003A. Revised March 8, 2006.

Tables

Figures

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Table 1. Proposed Vertical Profile Boring Drilling - Sampling Details, Groundwater IRM Hydraulic Effectiveness Evaluation, Operable Unit 3, Northrop Grumman Systems Corporation, Bethpage, New York.

Boring Location[1]	Sampling Intervals (ft bls)	Split-Spoon Soil Sampling Frequency (ft)	Hydropunch Groundwater Sampling Frequency (ft)	Groundwater Laboratory Analysis [4]	Borehole Geophysical Logging	Objective
VPB-300	Water Table[2] to 200	10	10	TCL VOC	Gamma/Electric/SP/ Resistivity	Collect additional groundwater quality data that will assist in updating the vertical plume delineation at the site downgradient boundary. This information will be used to confirm that the conclusion that the Groundwater IRM is effectively controlling off-site contaminant migration beneath and between the IRM recovery wells.
	200 - 400[3]	20	20	TCL VOC		
VPB-301	Water Table[2] to 200	10	10	TCL VOC	Gamma/Electric/SP/ Resistivity	
	200 - 400[3]	20	20	TCL VOC		
VPB-207	Water Table[2] to 150 [3]	10	10	TCL VOC	Gamma/Electric/SP/ Resistivity	Collect additional groundwater quality data offsite for plume characterization and delineation. Data will also be used to determine monitoring well screen intervals.
VPB-208	Water Table[2] to 150 [3]	10	10	TCL VOC	Gamma/Electric/SP/ Resistivity	Collect additional groundwater quality data offsite for plume characterization and delineation. Data will also be used to determine monitoring well screen intervals.

Footnotes:

(1) Vertical profile borings will be drilled using mud rotary methodology and groundwater samples will be collected using the hydropunch.

(2) Water table is approximately 50 ft bls.

(3) The decision whether to terminate VPBs VP-300 and 301 at 400 ft bls and VP-207 and VP-208 at 150 ft bls will be based on the analytical results of groundwater samples (concentrations of VOCs) collected from the VPBs and other site data.

(4) Laboratory analysis of groundwater samples will be performed for the TCL List of VOCs using NYSDEC ASP 2000 Method OLM 4.3. VPB results will be obtained on a 24 hour TAT.

Definitions:

IRM	Interim Remedial Measure
ft bls	feet below land surface
VP	Vertical Profile Boring
TAT	Turnaround Time
TCL	Target Compound List
VOC	Volatile Organic Compound
NYSDEC	New York State Department of Environmental Conservation
ASP	Analytical Services Protocol
SP	Spontaneous Potential

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Table 2. Proposed Piezometer and Monitoring Well Construction Details, Groundwater IRM Hydraulic Effectiveness Evaluation, Operable Unit 3, Northrop Grumman Systems Corporation, Bethpage, New York.

Piezometer Identification	Piezometer Diameter (in)	Casing/ Screen Material	Depth to Screen Top (ft)	Depth to Screen Bottom (ft)	Screen Length (ft)	Well Depth (ft)	Geohysical Log	Casing/ Screen	Development Methodology	Objective
Proposed Piezometers										
PZ-5c	2	Stick-Up	130	135	5	138	Y	Sch. 40 PVC	PS	Collect hydraulic (water-level elevation) data that will enhance the evaluation of groundwater flow at the Site (vertically and horizontally) also the understanding of the capture zone created by pumping the GW IRM recovery wells. The data collectively will also be used to confirm the conclusion that the GW IRM is effectively controlling off-site contaminant migration beneath and between the IRM recovery wells.
PZ-8a	2	Stick-Up	60	65	5	68	N	Sch. 40 PVC	PS	
PZ-8b	2	Stick-Up	80	85	5	88	N	Sch. 40 PVC	PS	
PZ-8c	2	Stick-Up	130	135	5	138	Y	Sch. 40 PVC	PS	
PZ-9a	2	Flushmount	57	62	5	65	Y	Sch. 40 PVC	PS	
PZ-10a	2	Flushmount	65	70	5	73	Y	Sch. 40 PVC	PS	
Proposed Monitoring Wells										
MW-204-1	4	Flushmount	80	90	10	95	Y	Sch. 40 PVC/SS	PS	Collect hydraulic (water-level elevation) data that will enhance the evaluation of groundwater flow at the Site (vertically and horizontally) and also the understanding of the capture zone created by pumping the GW IRM recovery wells. Collect groundwater quality data to monitor conditions proximal to the recovery wells.The data collectively will also be used to confirm the conclusion that the GW IRM is effectively controlling off-site contaminant migration beneath
MW-205-1	4	Flushmount	65	75	10	80	Y	Sch. 40 PVC/SS	PS	
MW-206-1	4	Flushmount	120	130	10	135	Y	Sch. 40 PVC/SS	PS	
VP-207 [2] / MW-207-1 [3]	4	Flushmount	80	90	10	95	Y	Sch. 40 PVC/SS	PS	Collect groundwater quality data and hydraulic (water-level elevation) data that will assist in evaluating the development of a "clean water front" off-site and downgradient from the GW IRM recovery wells.
VP-208 [2] / MW-208-1 [3]	4	Flushmount	120	130	10	142	Y	Sch. 40 PVC/SS	PS	

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Table 2. Proposed Piezometer and Monitoring Well Construction Details, Groundwater IRM Hydraulic Effectiveness Evaluation, Operable Unit 3, Northrop Grumman Systems Corporation, Bethpage, New York.

Footnotes

(1) Piezometers will be installed using hollow stem auger methodology. Total depth and screened interval will be confirmed based upon split spoon and geophysical logging results (gamma, electric, spontaneous potential, and resistivity).

(2) VPB-207 and 208 will be drilled to 150 ft bls (see Table 1). Sampling of groundwater at 20 ft intervals for VOC analysis. Wells and VPBs to be drilled/installed on Town right-of-way.

(3) Final depths of proposed monitoring wells will be determined based on VPB data.

Definitions

PZ	piezometer
PVC	polyvinyl chloride
in	inches
ft	feet
PS	pump and surge
SS	Stainless Steel

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Table 3. Proposed Remedial Wells, Monitoring Wells, and Piezometer Sampling Network, Groundwater IRM Hydraulic Effectiveness Evaluation, Operable Unit 3, Northrop Grumman Systems Corporation, Bethpage, New York

Well Identification	Date Installed	Well Diameter (inches)	Casing/ Screen Material	Screened Interval (ft bls)		Total Depth (ft bls)	Groundwater Laboratory Analysis [2]	Objective
OU3 Existing Recovery Wells[1]								
RW-01	12/12/2008	8	Sch. 80 PVC/SS	108	128	134	TCL VOC	Provide updated data documenting groundwater remedial well water quality
RW-02	3/19/2008	6	Steel/SS	84	104	104	TCL VOC	
RW-03	12/3/2008	8	Sch. 80 PVC/SS	84	104	107	TCL VOC	
RW-04	11/21/2008	8	Sch. 80 PVC/SS	110	130	133	TCL VOC	
OU3 Existing Monitoring Wells								
BCPMW-2	6/5/2003	2	Sch. 40 PVC	60	75	75	TCL VOC	Provide updated groundwater quality data downgradient of source areas and upgradient of the recovery wells
BCPMW-3	6/6/2003	2	Sch. 40 PVC	59	74	74	TCL VOC	
BCPMW-4-1	8/10/2006	4	Sch. 40 PVC	45	65	70	TCL VOC	Provide updated groundwater quality data downgradient of source areas and in between recovery wells
BCPMW-4-2	8/8/2006	4	Sch. 40 PVC	68.5	83.5	88.5	TCL VOC	
BCPMW-4-3	2/9/2007	4	Sch. 40 PVC	115	125	130	TCL VOC	
BCPMW-5-1	12/5/2006	4	Sch. 80 PVC/ SS	50	65	70	TCL VOC	Provide updated groundwater quality data within the source area
BCPMW-6-1	3/7/2007	4	Sch. 40 PVC	88.5	98.5	103.5	TCL VOC	Provide updated groundwater quality data in between recovery wells
BCPMW-6-2	3/5/2007	4	Sch. 40 PVC	133	143	148	TCL VOC	
BCPMW-7-1	2/20/2007	4	Sch. 40 PVC	90	100	105	TCL VOC	Provide updated groundwater quality data to the east of the recovery wells
OU3 Existing Piezometers								
PZ-01c	2/26/2008	1	Sch. 40 PVC	132.9	137.9	140	TCL VOC	Provide updated groundwater quality data beneath GW IRM recovery wells screened intervals
PZ-02c	2/27/2008	1	Sch. 40 PVC	133.2	138.2	140.2	TCL VOC	
OU3 Proposed Monitoring Wells								
MW-204-1	TBD	4	Sch. 40 PVC	80	90	95	TCL VOC	Provide groundwater quality data west of RW-2
MW-205-1	TBD	4	Sch. 40 PVC	65	75	80	TCL VOC	Provide groundwater quality data in between RW-2 and 3
MW-206-1	TBD	4	Sch. 40 PVC	120	130	135	TCL VOC	Provide groundwater quality data in between RW-3 and 4
MW-207-1	TBD	4	Sch. 40 PVC	80	90	95	TCL VOC	Provide groundwater quality data downgradient of RW-2 and 3
MW-208-1	TBD	4	Sch. 40 PVC	120	130	135	TCL VOC	Provide groundwater quality data downgradient of RW-3 and 4
OU3 Proposed Piezometers								
PZ-5c	TBD	2	Sch. 40 PVC	130	135	138	TCL VOC	Provide groundwater quality data west of RW-1
PZ-8a	TBD	2	Sch. 40 PVC	60	65	68	TCL VOC	Provide groundwater quality data in between RW-2 and 3
PZ-8b	TBD	2	Sch. 40 PVC	80	85	88	TCL VOC	Provide groundwater quality data in between RW-2 and 3
PZ-8c	TBD	2	Sch. 40 PVC	130	135	138	TCL VOC	Provide groundwater quality data in between RW-2 and 3
PZ-9a	TBD	2	Sch. 40 PVC	57	62	67	TCL VOC	Provide groundwater upgradient hydraulic and water quality data
PZ-10a	TBD	2	Sch. 40 PVC	65	70	75	TCL VOC	Provide groundwater upgradient hydraulic and water quality data

Notes and Abbreviations

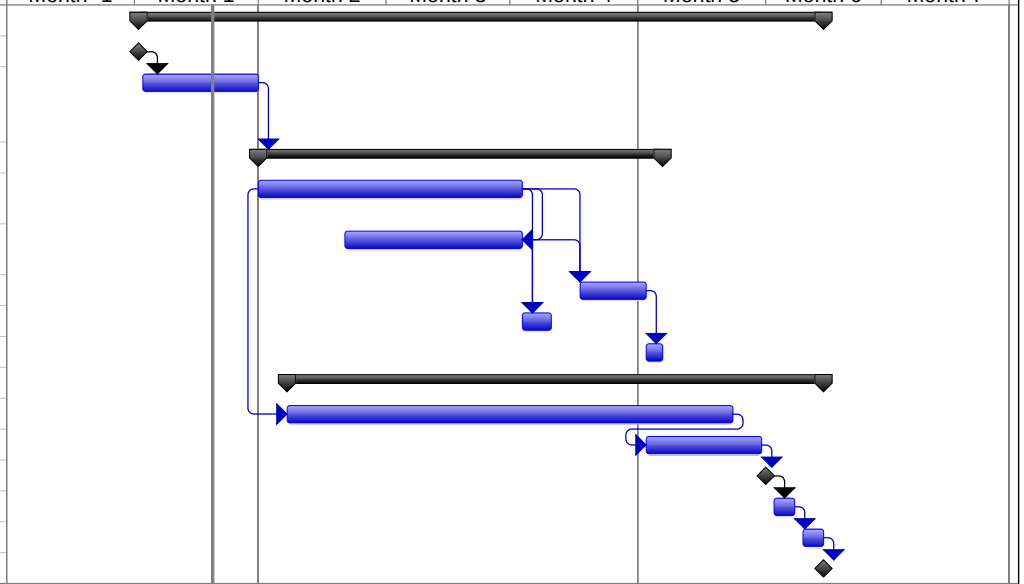
[1] Remedial wells will be sampled at the treatment building

[2] Laboratory analysis of groundwater samples will be performed for the TCL List of VOCs using NYSDEC ASP 2000 Method OLM 4.3.

ft bls	feet below land surface
IRM	Interim Remedial Measure
SS	Stainless Steel
PVC	Polyvinyl chloride
NGC	Northrop Grumman Systems Corporation
TCL	target compound list
VOC	volatile organic compound
NYSDEC	New York State Department of Environmental Conservation
ASP	Analytical Services Protocol
TBD	To be determined

Table 4. Estimated Schedule for Groundwater Interim Remedial Measure Hydraulic Effectiveness Evaluation, Northrop Grumman Corporation, Bethpage, New York

ID	Task Name	Duration	Predecessors
1	**GW IRM Hydraulic Effectiveness Evaluation**	**116 days**	
2	Notice to Proceed	0 days	
3	Project Planning & Coordination (includes permits, access, HASP, utility clearence, and Contractor moblization)	4 wks	2
4	**Field Work**	**67 days**	**3**
5	Install VPBs (4) & Mont. Wells (2) - Mud Rotary Rig (includes well development)	9 wks	
6	Install Piezometers (6) & Mont. Wells (3) - HSA Rig (includes well development)	6 wks	5FF
7	Groundwater Sampling (26 locations)	2 wks	5,6FS+2 wks
8	IDW Disposal - drill cuttings	1 wk	5,6
9	IDW Disposal - purge water	2 days	7
10	**Data Validation & Reporting**	**91 days**	
11	Data Validation	15 wks	5SS+5 days
12	Report Preparation	4 wks	11FS-15 days
13	Submit Draft Report to NG	0 days	12FS+1 day
14	NG Report Review	5 days	13
15	Finalize Report	5 days	14
16	Submit Report to NYSDEC	0 days	15



Task		External Milestone		Manual Summary Rollup	
Split		Inactive Task		Manual Summary	
Milestone		Inactive Milestone		Start-only	
Summary		Inactive Summary		Finish-only	
Project Summary		Manual Task		Progress	
External Tasks		Duration-only		Deadline	

\\arcadis-us.com\OfficeData\Melville-NY\APROJECT\Northrop Grumman\Superfund\2013\OU3\NY001496.1112 GW IRM\Work Plans\Table 4 Estimated Schedule GWIRM Hyd Effect Eval.mpp

SOURCE:
USGS 7.5 MIN. AMITYVILLE QUADRANGLE, AMITYVILLE, N.Y., 1994, FREEPORT QUADRANGLE, FREEPORT, N.Y., 1994, HICKSVILLE QUADRANGLE, HICKSVILLE, N.Y., 1967, PHOTOREVISED 1979, HUNTINGTON, N.Y., 1967, PHOTOREVISED 1979

0 2000' 4000'

SCALE IN FEET

NORTHROP GRUMMAN SYSTEMS CORPORATION
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

SITE LOCATION

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FIGURE
1

CITY:SYRACUSE-NY DIV/GROUP:ENV DB:A.SANCHEZ LD: PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACTINY001496\Site Location Map.dwg LAYOUT: BETHPAGE PARK SAVED: 9/17/2013 2:36 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 9/17/2013 3:25 PM BY: SAMIOS, ALEX
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FREEPORT.TIF
HICKSVILLE.TIF
HUNTINGTON.TIF

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XREFS: IMAGES: PROJECTNAME: ----
Xref_01

CHERRY AVENUE EXTENSION/AEROSPACE BOULEVARD
B30MW-1
FORMER NURSERY AREAS
BALL FIELDS
grass
TENNIS COURTS
PADDLEBALL COURTS
PARK MAIN ENTRANCE
BICYCLE RACKS
bit.
PLAYGROUND
stones
COVERED PICNIC AREA
gravel
B24MW-2
DRAINAGE SWALE
RECHARGE BASIN
OU-3 GROUNDWATER INTERIM REMEDIAL MEASURE TREATMENT BUILDINGS
McKAY FIELD
ACCESS ROAD
OU-3 SOIL GAS INTERIM REMEDIAL MEASURE TREATMENT BUILDINGS
SHUFFLEBOARD
BASKETBALL
HORSESHOES
PZ-9A
PZ-10A
GATE
LIPA TRANSFORMER
901 STEWART AVE (FORMER GRUMMAN PLANT 24)
PARKING LOT
BCPMW-5-1
BASEBALL FIELD
BCPMW-3
BCPMW-2
BCPMW-4-1
PZ-5A
PZ-5B
PZ-5C
RW-1
B24MW-3
ACCESS ROAD
PZ-1A
PZ-1B
PZ-1C
BCPMW-4-2
BCPMW-4-3
RW-2
PZ-2A
PZ-2B
PZ-2C
VP-301
VP-300
FORMER GRUMMAN PLANT 24 ACCESS ROAD PROPERTY
PZ-8A/B/C
RW-3
PZ-6A
PZ-6B
BCPMW-6-1
BCPMW-6-2
PZ-7A
PZ-7B
RW-4
BCPMW-7-1
PZ-3
PZ-4
MW-204-1
MW-205-1
MW-206-1
MW-200-1
MW-201-1
MW-202-1
MW-203-1
EIGHTH ST.
SEVENTH ST.
SIXTH ST.
FIFTH ST.
FOURTH ST.
THIRD ST.
SYCAMORE AVENUE
MW-207-1
VP-207
MW-208-1
VP-208
MAPLE AVENUE
CHERRY AVENUE
STEWART AVE.
BETHPAGE HIGH SCHOOL PROPERTY
OFFICE
ICE RINK
conc.
monument
POOL HOUSE
POOL AREA

EXPLANATION:

- NORTHROP GRUMMAN PROPERTY LINE
- FENCE
- BASIN
- bit. BITUMINOUS PAVEMENT
- MW-200-1 MONITORING WELL
- RW-2 RECOVERY WELL
- PZ-2C PIEZOMETER
- PROPOSED MONITORING WELL
- PROPOSED PIEZOMETER
- PROPOSED VERTICAL PROFILE BORING (VPB)

NOTES:

1. MONITORING WELLS, RECOVERY WELLS, AND PIEZOMETERS SURVEYED TO NORTH AMERICAN DATUM (NAD) 83.
2. PARK FEATURES SHOWN WERE PRESENT PRIOR TO TOWN OF OYSTER BAY REDEVELOPMENT IN 2005.

N

0 100' 200'
SCALE IN FEET

NORTHROP GRUMMAN SYSTEMS CORPORATION
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLINGONDS)
BETHPAGE, NEW YORK

PROPOSED VERTICAL PROFILE BORING, MONITORING WELL, AND PIEZOMETER LOCATIONS

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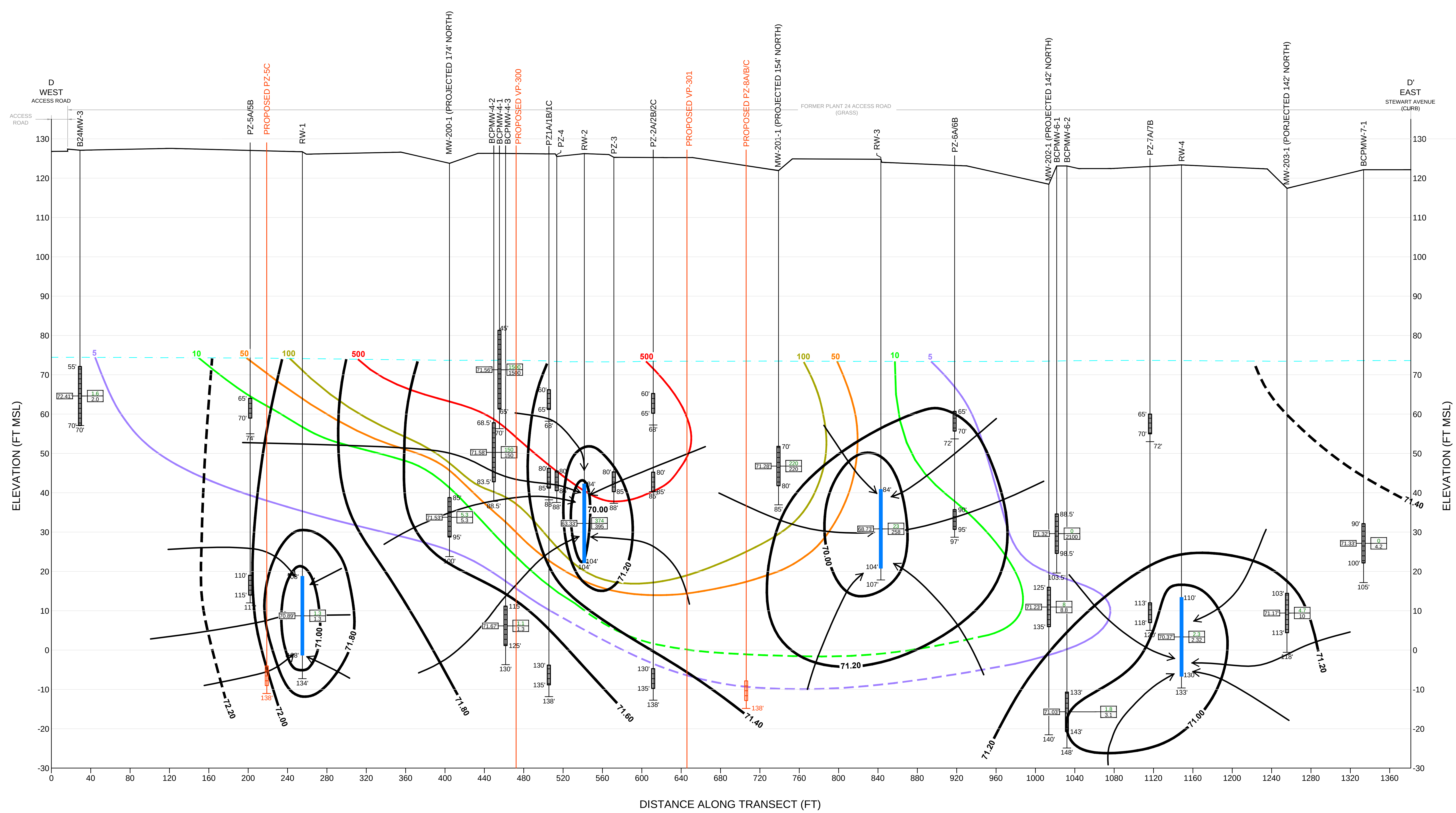
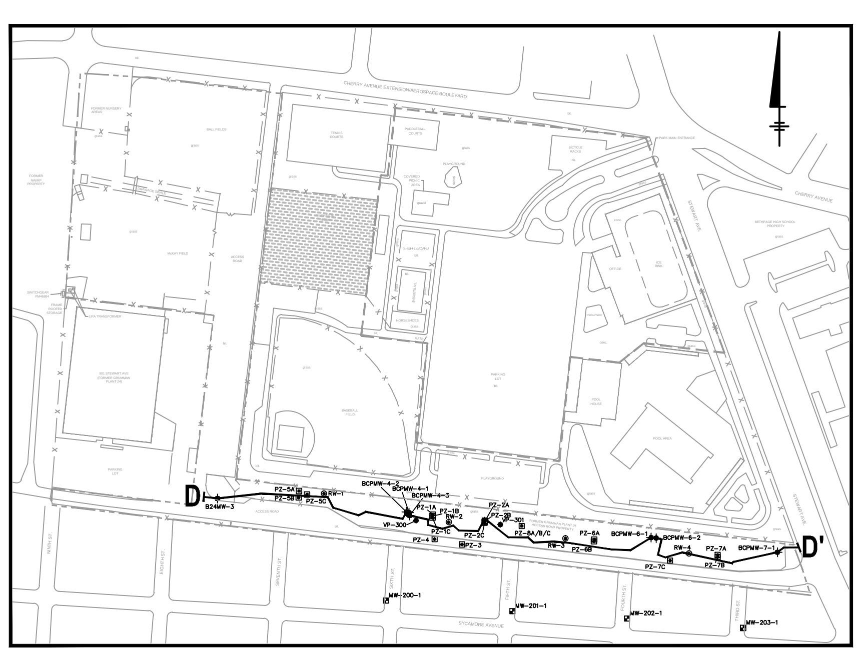
FIGURE 2

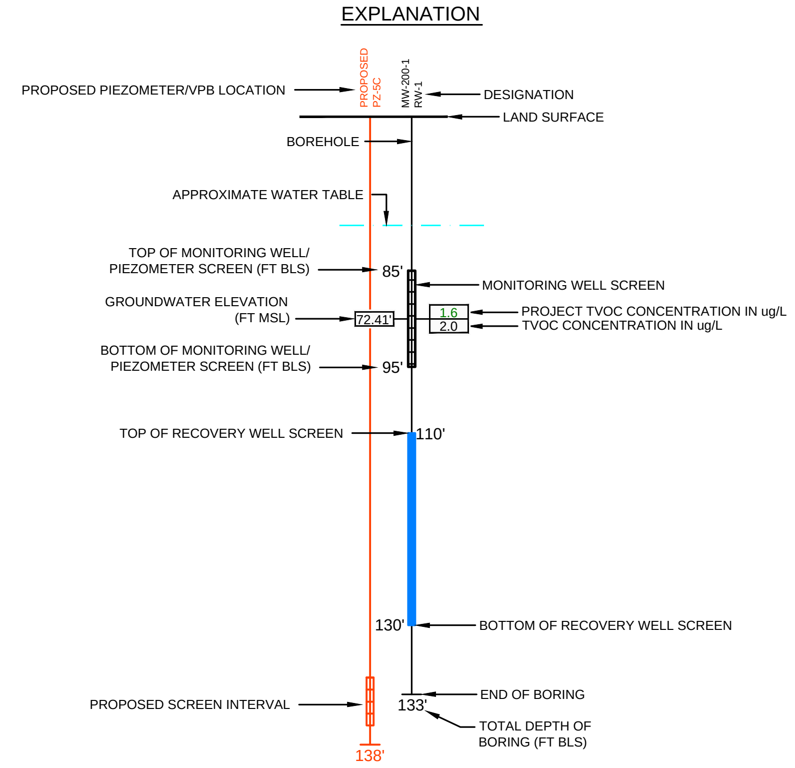




KEY PLAN
SHOWING CROSS SECTION D-D'

0 200' 400'
SCALE IN FEET

EXPLANATION



VERTICAL SCALE IN FEET
EXAGGERATION: 4x

10 / 0 / 0 / 40

HORIZONTAL SCALE IN FEET

DEFINITIONS:

FT - FEET
MSL - MEAN SEA LEVEL
BLS - BELOW LAND SURFACE
ug/L - MICROGRAMS PER LITER
TVOC - TOTAL VOLATILE ORGANIC COMPOUND
VPB - VERTICAL PROFILE BORING

71.80 — GROUNDWATER ELEVATION CONTOUR IN FEET RELATIVE TO MEAN SEA LEVEL, DASHED WHERE LESS CONTROL AVAILABLE

← VERTICAL DIRECTION OF GROUNDWATER FLOW

5 — 5 ug/L
10 — 10 ug/L
50 — 50 ug/L
100 — 100 ug/L
500 — 500 ug/L

PROJECT TVOC CONTOUR IN ug/L, DASHED WHERE LESS CONTROL AVAILABLE

NOTES:

1. WATER LEVEL ELEVATIONS CALCULATED FROM DATA COLLECTED ON MAY 13, 2013.
2. MONITORING WELL TVOC/PROJECT TVOC DATA FROM THE OCTOBER 2012 SAMPLING ROUND. RESULT REPRESENTATIVE OF ENTIRE WELL SCREEN INTERVAL.
3. TVOC CONTOURS ARE BASED ON PROJECT TVOC DATA, SEE NOTE 5.
4. THE GROUNDWATER INTERIM REMEDIAL MEASURE (IRM) HAS BEEN DESIGNED TO ADDRESS GROUNDWATER THAT HAS TVOC CONCENTRATIONS GREATER THAN 5 µg/L IN THE UPPER 20 FEET OF THE SURFICIAL AQUIFER AND GROUNDWATER BELOW THE UPPER 20 FEET OF THE SURFICIAL AQUIFER THAT HAS TVOC CONCENTRATIONS GREATER THAN 50 µg/L.
5. PROJECT VOCS ARE VOCS THAT MAY BE RELATED TO FORMER GRUMMAN HISTORICAL ACTIVITIES. NON-PROJECT VOCS ARE VOCS THAT ARE NOT RELATED TO FORMER GRUMMAN ACTIVITIES BUT HAVE BEEN DETECTED IN THE SITE AREA.

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CROSS SECTION D-D' SHOWING TVOCs IN GROUNDWATER, DIRECTION OF VERTICAL GROUNDWATER FLOW, AND PROPOSED LOCATION OF PIEZOMETERS AND VPBs

ARCADIS

FIGURE
3