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ENVIRONMENT

Subject:
2019 Annual Summary Report - System Operation and Monitoring, Bethpage Park Groundwater Containment System (BPGWCS), Operable Unit 3 (Former Grumman Settling Ponds), Bethpage, New York, NYSDEC Site #1-30-003A.

Date:
March 30, 2020

Contact:
Christopher Engler

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Our ref:
30037969

Dear Jason:

Enclosed is one electronic PDF copy of the 2019 Annual Summary Report for the BPGWCS operation and monitoring, performed in accordance with the NYSDEC-approved OU3 Groundwater IRM OM&M Manual (Arcadis 2009) and the NYSDEC-approved Sampling and Analysis Plan (SAP; Arcadis 2009). As we have transitioned to electronic submittals (via PDF) in line with NYSDEC's paper reduction program, hard copies of the report can be provided on request.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Arcadis of New York, Inc.

Christopher Engler, PE
New York PE-069748

Vice President

Enclosure

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ARCADIS Design & Consultancy for natural and built assets

Northrop Grumman Systems Corporation

2019 ANNUAL OPERATION, MAINTENANCE, AND MONITORING REPORT

Operable Unit 3 - Groundwater

Bethpage, New York

NYSDEC ID # 1-30-003A

March 30, 2020

2019 ANNUAL OPERATION, MAINTENANCE AND MONITORING REPORT

Operable Unit 3 - Groundwater Containment System Bethpage, New York
NYSDEC ID # 1-30-003A

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1 INTRODUCTION

Pursuant to the Administrative Order on Consent (AOC) Index #W1-0018-04-01 (New York State Department of Environmental Conservation [NYSDEC] 2005) and the Operable Unit 3 (OU3) Record of Decision (NYSDEC 2013), Arcadis of New York, Inc. (Arcadis), on behalf of Northrop Grumman Systems Corporation (Northrop Grumman), has prepared this OU3 Bethpage Park Groundwater Containment System (BPGWCS) Annual Summary Report for submittal to the NYSDEC. The present-day Bethpage Community Park property (Park), the McKay Field, and Plant 24 Access Road, which the NYSDEC has termed the "Former Grumman Settling Ponds Area" and designated as OU3, are referred to herein as the Site Area. Figure 1 provides a Site Area location map.

The BPGWCS (previously referred to as the Groundwater Interim Remedial Measure) has been operational since July 21, 2009. The operation, maintenance, and monitoring (OM&M) activities performed during 2019 (i.e., January 1 through December 31, 2019 [the "annual reporting period"]) are summarized in this Annual Summary Report. This report also describes the Operation, Maintenance, and Monitoring (OM&M) activities performed during the Fourth Quarter of 2019 (i.e., October 1 through December 31, 2019 [the "Fourth Quarter"]). Data summaries for the previous three 2019 quarterly operational periods are available in the following letter reports:

- Results of First Quarter 2019 System Operation and Monitoring for the Bethpage Park Groundwater Containment System, May 2019 (Arcadis 2019a)
- Results of Second Quarter 2019 System Operation and Monitoring for the Bethpage Park Groundwater Containment System, August 2019 (Arcadis 2019b)
- Results of Third Quarter 2019 System Operation and Monitoring for the Bethpage Park Groundwater Containment System, November 2019 (Arcadis 2019c)

During the annual reporting period, the BPGWCS Remedial System and Environmental Effectiveness Monitoring Programs were conducted in accordance with the OU3 Groundwater Interim Operation, Maintenance, and Monitoring Manual (OM&M Manual; Arcadis 2016).

As discussed in the OU3 Site Area Remedial Investigation Report (Site Area RI) (Arcadis 2011), Northrop Grumman does not take responsibility for certain compounds (e.g., Freon 12 and Freon 22) present in Site Area groundwater. Throughout this Annual Report, a distinction is made between "Project" and "Non-Project" volatile organic compounds (VOCs), defined as follows:

- Project VOCs: VOCs that may be related to former Northrop Grumman historical activities. For this OM&M Report, Project VOCs include 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethylene (TCE); vinyl chloride (VC); cis-1,2-dichloroethene (cis-1,2-DCE); trans-1,2-dichloroethene (trans-1,2-DCE); benzene; toluene; xylene-O, and xylenes-M,P.
- Non-Project VOCs: VOCs, such as Freon 12 and Freon 22, that are understood to be unrelated to former Northrop Grumman activities but have been detected in Site Area groundwater. As noted in the Site Area RI (Arcadis 2011), a sub-plume of Freon 22 has been identified originating from the area of the Town of Oyster Bay's (Town's) former ice rink. Based on Town information (Zervos 2007), Freon 22 was used by the Town and released to the environment.

2 BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM OBJECTIVES

Remedial action objectives (RAOs) for the BPGWCS are as follows:

- Mitigate the off-site migration of dissolved-phase VOCs. Specifically, the BPGWCS addresses:
    - Groundwater that has total VOC concentrations greater than 5 micrograms per liter (µg/L) in the upper 20 feet of the surficial aquifer across the 1,200-foot-wide lateral extent of the Site Area southern boundary.
    - Groundwater below the upper 20 feet of the surficial aquifer that has total VOC concentrations greater than 50 µg/L across the 1,200-foot-wide lateral extent of the Site Area southern boundary.
- Comply with applicable NYSDEC standards, criteria, and guidance values (SCGs) for treated water and air emissions.

A secondary benefit of the BPGWCS is the creation of a clean-waterfront atop downgradient groundwater, which minimizes the potential for vapor intrusion downgradient of the Site Area.

3 BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM DESCRIPTION

The BPGWCS consists of:

- A pump-and-treat system where groundwater is:
    - Extracted along the Plant 24 Access Road via four remedial wells.
    - Conveyed to a treatment plant at McKay Field via four underground pipelines.
    - Treated via air stripping to reduce concentrations of Project and Non-Project VOCs to comply with applicable NYSDEC SCGs for treated water.
    - Filtered to remove oxidized metals to comply with applicable NYSDEC SCGs for treated water.
    - Returned to the aquifer via a discharge pipeline routed to a recharge basin located on the adjacent former Bethpage Navy Weapons Industrial Reserve Plant property.
- A vapor-phase treatment system that reduces concentrations of Project VOCs in the air stripper off-gas prior to discharge to the atmosphere.
- A groundwater monitoring network utilized to periodically assess the environmental effectiveness of the BPGWCS.

Major components of the BPGWCS are as follows:

- Four remedial wells (RW-1, RW-2, RW-3, and RW-4) with design pumping rates of 30 gallons per minute (gpm), 75 gpm, 75 gpm, and 30 gpm, respectively; for a total design influent flow rate of 210 gpm.
- One low-profile air stripper to remove VOCs from extracted groundwater prior to discharge to the recharge basins.
- Two bag filter units configured so that one is operational and the other is in standby mode. The system control logic automatically switches from the operational filter unit to the standby filter unit when the bag filter is full to prevent a system shutdown and the spent filters are then replaced.
- Four emission control units, two containing vapor-phase granular-activated carbon and two containing potassium permanganate-impregnated zeolite, to treat Project VOCs in the air stripper off-gas.
- A groundwater monitoring network, consisting of 35 monitoring locations, including 23 groundwater monitoring wells, four remedial wells, and 20 piezometers.

The latest version of the OM&M Manual (Arcadis 2016) provides additional information on the BPGWCS. Figure 2 shows the layout of the BPGWCS, and Figure 3 provides a schematic drawing of the remedial systems. Figure 4 shows groundwater sampling locations that form the groundwater monitoring network. Appendix A provides construction details for the monitoring wells and piezometers.

4 OPERATION AND MAINTENANCE ACTIVITIES

4.1 Annual System Performance and Alarm Summary

The 2019 system operational up-time is provided on Table 1 and summarized below. System shutdowns that occurred in 2019 are summarized below.

In 2019:

- The system operated 355 out of 365 days (97% uptime), up from 95% runtime observed in 2018.
- The remedial wells operated at reduced flow rates during portions of the year due to pump wear, which is attributed to iron build-up in the pumps, influent pipelines and valves. The reduced flow rates were corrected by adjusting the manifold globe valves or through the performance of periodic system maintenance (i.e. pulling and replacing the remedial well pumps and valve cleaning).
- There were thirty-seven (37) routine system shutdowns (less than 12 hours each) due to alarm conditions encountered during normal operation of the system. Alarms in this category were responded to and troubleshooting was completed to restart the system within the same day (less than 12 hours).
- The following four (4) non-routine system shutdowns resulted in downtime for greater than 12 hours each, of which:

- One (1) shutdown was to accommodate replacement of valves and fittings on January 22nd, 2019.
- One (1) shutdown was due to failed PLC power supply on July 17th, 2019. The system was brought back online July 18th, 2019.
- One (1) Alarm reset error caused system shutdown on November 14th, 2019 prevented system restart until November 18th, 2019.
- One (1) shutdown was due to a broken blower fan on December 29th, 2019. Repair and system was restart completed on 1/10/20.

There were approximately 26 days of reduced flow, which was due to unforeseen RW-2 motor and pump overload conditions associated with iron build-up. Generally, the system was restarted without incident the same day or the day following routine alarms. OM&M activities were conducted in accordance with the OU3 Groundwater OM&M Manual.

5 SYSTEM MONITORING ACTIVITIES

5.1 2019 System Monitoring Activities

The following compliance and performance monitoring activities were conducted during the annual reporting period (see Appendix B, Appendix B-1 for a summary of the compliance and performance monitoring program requirements):

- Twelve (12) sampling events to collect twelve (12) required water samples and four (4) air samples;
- Forty-five (45) weekly site visits to monitor and record key system operational parameters.

System O&M results for the annual reporting period are summarized in the following tables and figures:

- Operational Summary, including monitoring events, system operational days, and noteworthy site activities (Table 1);
- Summary of Influent and Effluent Water Sample Analytical Results (Tables 2 and 3, respectively) - Table 3 also provides the BPGWCS treatment system removal efficiency;
- Summary of Influent and Effluent Vapor Sample Analytical Results and Summary of Effluent Vapor Tentatively Identified Compounds (Tables 4, 5 and 6, respectively) - Table 5 also provides the BPGWCS treatment system removal efficiency;
- Summary of System Parameters, including flow rates, line pressures, and temperatures (Table 7);
- Summary of Groundwater Recovered, VOC Mass Recovered, and VOC Mass Recovery Rates (Table 8) - Table 8 provides a breakdown of these parameters by Remedial Well and System and breaks down the VOC mass recovered and VOC recovery rates into Project, Non-Project, and total VOCs;
- Cumulative Total, Project, and Non-Project VOC Mass Removed (Figure 5);

- Remedial Well Total, Project, and Non-Project VOC Concentrations (Figures 6A, 6B, and 6C, respectively);
- Influent Total, Project, and Non-Project VOC Concentrations (Figure 7); and,
- Total, Project, and Non-Project VOC Mass Recovery Rates (Figures 8A, 8B, and 8C, respectively).

5.2 Summary of Monitoring Results and Conclusions

5.2.1 System Operation and Effectiveness

Annual BPGWCS monitoring results and conclusions are summarized below:

- Total volume of groundwater recovered and treated (Table 8):
  - 2019 Annual Total: 101 million gallons
  - Cumulative total since system startup: 1 billion and 69 million gallons
- Total VOC mass recovered (Table 8 and Figure 8A):
  - 2019 Annual Total: 12.88 lbs of VOCs
  - Cumulative total since system startup: 2,200 lbs of VOCs
- VOC mass recovered and mass removal rates (Table 8 and Figures 8A, 8B, and 8C):
  - The majority of VOCs recovered during the annual reporting period were Project VOCs (98 percent or 12.59 lbs).
  - Majority of Project VOCs are recovered by RW-2 (89 percent or 11.51 lbs) and RW-3 (8 percent or 1.07 lbs)
  - Majority Non-Project VOCs are recovered by RW-3 (62 percent or 0.29 lbs) and RW-4 (38 percent or 0.18 lbs).
- Treatment system influent concentrations (Tables 2, and Figures 6A, 6B, 6C, and 7):
  - Total Project VOC influent concentrations, which ranged from 8.9 µg/L in June to 13.7 µg/L in March during the annual reporting period, is consistent with historical values. Project VOC influent concentrations are generally stable over the annual reporting period. These concentrations are below the peak concentration observed in 2014 (105 µg/L). Project VOC influent concentrations have generally decreased since 2010.
  - Total Non-Project VOC influent concentrations were not detected during the annual reporting period.
  - Total iron (147.75 µg/L) was detected during the annual reporting period, which is consistent with historical values.
  - Mercury has not been detected in any influent or effluent sample since system startup. Sample collection for mercury analysis has therefore been deemed unnecessary.

- Project VOCs in Remedial Well, RW-1 (Table 10) were not detected during the annual reporting period.
    - In RW-2, several Project VOCs (cis-1,2-DCE, TCE, and VC) continue to be detected above applicable SCGs, but the detections remained stable or have decreased in concentration during the annual reporting period.
    - In RW-3, some Project VOCs (cis-1,2-DCE and TCE) were detected during all quarters, but the detections were below the applicable SCGs.
    - In RW-4, one Project VOC (TCE) was detected in the fourth quarter, but the detection was below the applicable SCG and none were detected during the first, second, and third quarter.
    - RW-2 Project VOCs have decreased from the peak total concentration observed at system startup in July 2009 (3858 µg/L) to the most recent low of 38.1 µg/L in September 2019.
    - Similar to total influent concentrations, Project VOC remedial well concentrations have generally decreased since 2010, with Project VOCs not detected above applicable SCGs in Remedial Well RW-3 since November 2013, and no detections in RW-1 since system startup.
- Non-Project VOCs in Remedial Wells RW-1, RW-2, RW-3 and RW-4 (Table 10) were not detected above applicable SCGs during 2019. Similar to total influent concentrations, Non-Project VOC remedial well concentrations have generally decreased during the annual reporting period and since 2010, with Non-Project VOCs not detected above applicable SCGs in Remedial Wells RW-1, RW-2, or RW-4 since system startup. Only two detections of Non-Project VOCs have been above applicable SCGs in RW-3 since system startup.
- The air stripper, air stripper off-gas treatment system, and bag filter system performed within acceptable operating ranges during the annual reporting period, as indicated by:
    - The air stripper VOC removal efficiency was greater than 99.9 percent for Project and Non-Project VOCs (Table 3).
    - Both water and air discharges complied with applicable SCGs and discharge limits (Tables 3, and 9).

5.2.2 Regulatory Status of Discharges

5.2.2.1 Air Discharge

Influent concentrations for the annual reporting period were compared to 6NYCRR III A Part 212-2.3(b) (Rule 212), Table 4 - Degree of Air Cleaning Required for Non-Criteria Air Contaminants. Concentrations of all effluent compounds detected during the Fourth Quarter were less than 16,959 µg/m^3 (concentration equivalent to 0.1 pounds per hour at a flow rate of 1,577 standard cubic feet per minute), as shown in Table 9 of this report. Therefore, in accordance with the requirements of Table 4 of the NYSDEC regulations, air dispersion modeling was performed to demonstrate that the maximum off-site air concentration is less than the NYSDEC Division of Air Resources (DAR-1) Annual Guidance

Concentrations (AGCs) on a 12-month rolling average and Short-term Guidance Concentrations (SGCs), issued August 10, 2016 (NYSDEC 2016).

Effluent concentrations for the annual period are provided on Table 5. The U.S. Environmental Protection Agency (USEPA) air quality dispersion model AERMOD was executed to estimate the highest ambient air concentration of the compounds on Table 5. AERMOD is the USEPA's recommended best state-of-the-art practice Gaussian plume dispersion model. Gaussian models are the most widely used techniques for estimating the impact of non-reactive pollutants, per Appendix W of Title 40 Code of Federal Regulations (CFR) 51 – Guideline of Air Quality Models.

The following parameters were used for the AERMOD model analysis:

- Urban dispersion coefficients
- AERMAP base and terrain elevations, processed using National Elevation Dataset (NED) digitized terrain data
- Surface and upper air observations measured at the Nation Weather Service stations located at Farmingdale and Brookhaven airports for calendar years 2011-2015, in accordance with NYSDEC's DAR-1 Air Dispersion Modeling Guidance Document. This longer period of time was reviewed for the model run, to provide a conservative estimate of atmospheric impacts on the off-site concentrations.
- Discrete receptor grids, per the following methodology:
    - Receptors were located along the property boundary at distances not exceeding 25 meters;
    - A 1.5 km x 1.5 km Cartesian grid receptors with distances of 50 meters between the receptors; and
    - A 3.0 km x 3.0 km Cartesian grid receptors with distances of 100 meters between the receptors.
- Emission rate: 1 gram per second (g/s).

Table 9 provides the compound specific scaled hourly ambient air impact and the scaled annual ambient air impact for the Fourth Quarter sampling event. Based on the model, the maximum one-hour ambient air impact was 3,153.03 [µg/m^3]/[g/s] and the maximum annual ambient air impact was 96.49 [µg/m^3]/[g/s]. As shown, the scaled ambient air impacts for the BPGWCS are below the corresponding SGCs and AGCs, which is consistent with the previous quarterly results during the annual reporting period.

Based on the ambient modeling analysis, the BPGWCS effluent air discharge for the annual reporting period meets the requirements for DAR-1 and is below the Rule 212 requirements.

5.2.2.2 Water Discharge

The BPGWCS-treated water effluent met NYSDEC regulatory requirements during the annual reporting period (Table 3 and Appendix B), as noted below:

- The measured concentration of individual VOCs in the treated water effluent were below applicable discharge limits, per the interim State Pollutant Discharge Elimination System (SPDES) equivalency permit.
- The measured concentration of total and dissolved iron in the treated water effluent were below applicable SPDES discharge limits.

6 ENVIRONMENTAL EFFECTIVENESS MONITORING

The OU3 BPGWCS System environmental effectiveness (i.e., hydraulic monitoring and groundwater quality monitoring) activities and results for the annual reporting period are discussed below.

6.1 Hydraulic Monitoring

6.1.1 Activities

In accordance with OM&M Manual requirements and methodologies (Arcadis 2016), groundwater hydraulic monitoring was performed quarterly during the annual reporting period. Specifically, depth-to-water measurements were completed on February 8, May 30, July 2 and November 25, 2019, at the 43 locations forming the approved monitoring well network (Figure 4). Table 11 summarizes results of depth-to-water measurements to date.

6.1.2 Results

Figure 9 provides the configuration of the shallow potentiometric surface and the inferred horizontal groundwater flow directions on July 2, 2019 at the Site Area. Comparing third quarter water-level elevations from 2019 to those from 2018 reveal that the water table was approximately one-foot higher at the time water level elevations were recorded in 2019 as compared to 2018.

Groundwater hydraulic monitoring is conducted quarterly however, the shallow potentiometric surface is mapped for only one quarter yearly as the rise and fall of this surface seasonally, due to recharge, has a negligible effect on the capture zone. As Figure 9 shows, groundwater flow in the area is generally toward

the south/south east. The BPGWCS system is capturing groundwater flow from the Bethpage Community Park. The southern edge of the capture zone extends to just south of Monitoring Wells MW-201-1 thru MW-203-1. The groundwater divide is slightly south of Sycamore Avenue, north of MW-207A-1R/MW-207B-1R and MW-208-1.

Figure 10 provides a cross-sectional view of vertical groundwater flow (based on groundwater levels measured on July 2, 2019), and Project VOC concentrations in groundwater (based on results from the July 2019 groundwater sampling round [3rd Quarter]). Figure 10 indicates groundwater containing Project VOCs is being captured and removed by remedial wells RW-1 through RW-4, which is consistent with the intended purpose of the OU3 BPGWCS System.

Figure 9 in combination with Figure 10 indicate that the OU 3 BPGWCS System provides effective vertical and horizontal hydraulic control of groundwater containing Project VOCs and prevents its movement offsite.

6.2 Groundwater Quality Monitoring

6.2.1 Activities

An annual groundwater sampling round was performed in July 2019 as part of site-wide sampling activity. Groundwater samples were collected from 19 monitoring wells that are specified for sampling in the OU3 OM&M Manual (Arcadis 2016).

An Initial Hydraulic Effectiveness Evaluation (HEE) of the OU3 BPGWCS System was performed in 2014-2015 (ERM 2015). As part of this HEE, a total of 6 monitoring wells and 6 piezometers were installed. Groundwater samples were also collected during this annual round from 4 of the monitoring wells installed during the Initial HEE (i.e., MW-204-1, MW-205-1, MW-206-1 and MW-208-1). Monitoring Wells MW-207A and MW-207B, installed during the Initial HEE, were assessed and found to be unusable in 2017. Therefore, monitoring wells MW-207A and MW-207B were replaced by MW-207A-1R and MW-207B-1R in 2018 as part of a Supplemental HEE conducted in 2018. Sampling results are presented in the Supplemental HEE report (EMAGIN 2018).

6.2.2 Results

Groundwater samples collected from the 17 monitoring wells were analyzed for Target Compound List (TCL) VOCs, plus Freon 12 and Freon 22, using USEPA Method 8260C, 1,4-Dioxane using USEPA Method 8270D SIM and total (unfiltered) and dissolved (filtered) metals (cadmium and chromium) using USEPA Method 6010.

Groundwater quality data, including historical results to date, are summarized in Table 12 (for VOCs and 1,4-Dioxane) and Table 13 (for metals).

6.3 Environmental Effectiveness Monitoring Conclusions

As discussed above, Figures 9 and 10 indicate that the OU3 BPGWCS System is operating as designed, that the expected associated capture zone has developed, and that off-site migration of groundwater containing Project VOCs is being prevented. This observation is also supported by NYDEC letter dated

March 18, 2016 states “that the OU3 groundwater treatment system is, overall, containing the OU3 groundwater plume source”.

NYSDEC Technical Memorandum (November 28, 2018) requested Toluene be included on the analyte analyzed for in all groundwater samples. As shown in Table 13, Toluene has not been identified at concentrations above detection limits (i.e. 1.0 ppb).

In summary, the Initial and Supplemental HEEs collectively confirmed the effectiveness of the OU3 BPGWCS System in preventing VOC impacted groundwater from migrating offsite. Groundwater monitoring results presented in Figure 9 and Figure 10 also confirm that the OU3 BPGWCS System is effectively controlling shallow Project VOCs in groundwater.

7 RECOMMENDATIONS

Based on the results of the Initial and Supplemental HEEs and the groundwater analytical results collected during the annual reporting period, Arcadis recommends continued operation of the OU3 BPGWCS System as is.

8 REFERENCES

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TABLES

Table 1
Operational Summary
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

MONTH	DAY																													Days Operational [1]
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
2009 Total																																160
2010 Total																																352
2011 Total																																351
2012 Total																																353
2013 Total																																354
2014 Total																																349
2015 Total																																348
2016 Total																																351
2017 Total																																354
2018 Total																																348
1Q 2019																																89
2Q 2019																																91
3Q 2019																																90
Oct 2019																																31
Nov 2019														(2)																		26
Dec 2019																													(3)			28
4Q 2019																																85
2019 Total																																355
TOTAL																																**3675**

Legend:

Indicates system online the majority or all of the day.
Indicates system operated with reduced flow rates.
Indicates system off-line the majority or all of the day.

Abbreviations, Notes, and Units on last page.

Table 1
Operational Summary
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Notes:

1. Days the system was operational for the majority of the day are counted as one day.

Fourth Quarter 2019

2. Alarm reset error prevented system restart.
3. System shutdown due to broken fan on blower, repair and system restart completed 1/10/20.

Abbreviations/Units:

4Q	Fourth Quarter

Table 2
Summary of Influent Water Sample Analytical Results
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Compound	03/01/19 (µg/L)	06/07/19 (µg/L)	09/06/19 (µg/L)	11/05/19 (µg/L)
Project VOCs				
1,1,1 - Trichloroethane	< 1.0	< 1.0	< 1.0	< 1.0
1,1 - Dichloroethane	< 1.0	< 1.0	< 1.0	< 1.0
1,2 - Dichloroethane	< 1.0	< 1.0	< 1.0	< 1.0
1,1 - Dichloroethene	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	**3.1**	**2.4**	**3.0**	**3.6**
Vinyl Chloride	**2.7**	**1.6**	**1.8**	**1.3**
cis 1,2-Dichloroethene	**7.9**	**4.9**	**5.7**	**6.0**
trans 1,2-Dichloroethene	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	< 1.0	< 1.0	< 1.0	< 1.0
m,p-Xylene	< 1.0	< 1.0	< 1.0	< 1.0
Subtotal Project VOCs	**13.7**	**8.9**	**10.5**	**10.9**
Non-Project VOCs				
1,1,2,2-Tetrachloroethane	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone	< 10	< 10	< 10	< 10
4-Methyl-2-Pentanone	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	< 10	< 10	< 10	< 10
Bromodichloromethane	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodifluoromethane (Freon 22)	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,3-Dichloropropene	< 1.0	< 1.0	< 1.0	< 1.0

Abbreviations, Notes, Qualifiers, and Units on last page.

Table 2
Summary of Influent Water Sample Analytical Results
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Compound	03/01/19 (µg/L)	06/07/19 (µg/L)	09/06/19 (µg/L)	11/05/19 (µg/L)
Non-Project VOCs				
Dichlorodifluoromethane (Freon 12)	< 2.0	< 2.0	< 2.0	< 2.0
Dichloromethane	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone	< 5.0	< 5.0	< 5.0	< 5.0
Methyl Tert-Butyl Ether	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane (Freon 11)	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorotrifluoroethane (Freon 113)	< 5.0	< 5.0	< 5.0	< 5.0
1-Chloro-1,1-difluoroethane (Freon 142b)	--	< 5.0	< 5.0	< 5.0
Subtotal Non-Project VOCs	0.0	0.0	0.0	0.0
Total VOCs[1]	**13.7**	**8.9**	**10.5**	**10.9**
1,4-Dioxane	**0.80**	**0.33**	**0.70**	**0.71**

Compound	03/01/19 (µg/L)	06/07/19 (µg/L)	09/06/19 (µg/L)	11/05/19 (µg/L)
Inorganics				
Total Iron	**204**	--	--	--
Total Manganese	**47.7**	--	--	--
pH[2]	5.5	5.3	5.5	5.5

Abbreviations, Notes, Qualifiers, and Units:

-- Not Analyzed
USEPA United States Environmental Protection Agency
VOC Volatile Organic Compound

1. "Total VOCs" represents the sum of individual concentrations of the compounds detected. The values used in calculations referenced in this report have been rounded to the nearest whole number.

2. Influent pH samples collected and measured in the field by Arcadis personnel on the dates listed using a field calibrated pH/conductivity meter. pH units are standard units.

3.0 Bold value indicates a detection.
< 1.0 Compound not detected at or above the laboratory quantification limit.
µg/L micrograms per liter

Table 3
Summary of Effluent Water Sample Analytical Results
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Compound	Discharge Limit[1] (µg/L)	01/10/19 (µg/L)	02/05/19 (µg/L)	03/01/19 (µg/L)	04/02/19 (µg/L)	05/15/19 (µg/L)	06/07/19 (µg/L)	07/02/19 (µg/L)	08/02/19 (µg/L)	09/06/19 (µg/L)	10/15/19 (µg/L)	11/05/19 (µg/L)	12/04/19 (µg/L)
Project VOCs													
1,1,1-Trichloroethane	5[2]	<0.50	<0.50	<0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5[2]	<0.50	<0.50	<0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5[2]	<0.50	<0.50	<0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5[2]	<0.50	<0.50	<0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	5[2]	<0.50	<0.50	<0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	5[2]	<0.50	<0.50	<0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans 1,2-Dichloroethene	5[2]	<0.50	<0.50	<0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Subtotal Project VOCs		0	0	0	0	0	0	0	0	0	0	0	0
Compound	**Discharge Limit[1] (µg/L)**	**01/10/19 (µg/L)**	**02/05/19 (µg/L)**	**03/01/19 (µg/L)**	**04/02/19 (µg/L)**	**05/15/19 (µg/L)**	**06/07/19 (µg/L)**	**07/02/19 (µg/L)**	**08/02/19 (µg/L)**	**09/06/19 (µg/L)**	**10/15/19 (µg/L)**	**11/05/19 (µg/L)**	**12/04/19 (µg/L)**
Non-Project VOCs													
Chloroform	5[2]	<0.50	<0.50	<0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane	5[2]	<0.50	<0.50	<0.50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorotrifluoroethane (Freon 113)	5[2]	<0.50	<0.50	<0.50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Subtotal Non-Project VOCs		0	0	0	0	0	0	0	0	0	0	0	0
Total VOCs[3]		0	0	0	0	0	0	0	0	0	0	0	0
Treatment Efficiency[4]		> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%	> 99.9%
Compound	**Discharge Limit[1] (µg/L)**	**01/10/19 (µg/L)**	**02/05/19 (µg/L)**	**03/01/19 (µg/L)**	**04/02/19 (µg/L)**	**05/15/19 (µg/L)**	**06/07/19 (µg/L)**	**07/02/19 (µg/L)**	**08/02/19 (µg/L)**	**09/06/19 (µg/L)**	**10/15/19 (µg/L)**	**11/05/19 (µg/L)**	**12/04/19 (µg/L)**
Inorganics													
Dissolved Cadmium	5	--	--	--	--	--	--	--	--	--	--	--	--
Total Cadmium	5	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Chromium	50	--	--	--	--	--	--	--	--	--	--	--	--
Total Chromium	50	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved Iron	600	--	--	--	--	--	--	--	--	--	--	--	--
Total Iron	600	**120**	**179**	**204**	< 100	**126**	< 100	**102**	**133**	**133**	**201**	**110**	< 100
Total Mercury	250	--	--	--	--	--	--	--	--	--	--	--	--
Total Manganese	600	**52.4**	**51.2**	**47.7**	**44.2**	**47.3**	**45.2**	**49.4**	**50.1**	**51.2**	**46.1**	**47.6**	**43.1**
Nitrate and Nitrite	10,000	**2,700**	**2,800**	**2,500**	**2,700**	**2,500**	**2,300**	**2,500**	**2,500**	**2,700**	**2,700**	**2,700**	**2,900**
Toal Kjeldahl Nitrogen	10,000	< 200	< 201	**450.0**	< 200	< 200	< 200	< 200	< 200	**310.0**	< 200	< 200	< 200
Total Nitrogen	10,000	**2,700**	**2,800**	**3,000**	**2,800**	**2,700**	**2,300**	**2,500**	**2,500**	**3,000**	**2,700**	**2,900**	**3,100**
1,4-Dioxane	NE	**0.73**	**1.10**	**0.76**	**0.61**	**0.74**	**0.61**	**0.68**	**0.34**	**0.71**	**0.70**	**0.68**	**0.87**
pH[5]	5.5-8.5	6.9	7.0	6.6	6.8	6.6	6.7	7.0	6.7	6.7	6.2	6.3	6.8

Abbreviations, Notes, Qualifers, and Units on last page.

Table 3
Summary of Effluent Water Sample Analytical Results
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Abbreviations, Notes, Qualifiers, and Units:

--	Not Analyzed
NYSDEC	New York State Department of Environmental Conservation
SPDES	State Pollutant Discharge Elimination System
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1. Discharge limits per the interim SPDES equivalency program or Division of Water Technical and Operational Guidance Series (TOGS 1.1.1) Quality Standards and Guidance Values and Groundwater Effluent Limitations, if the compound is not part of the SPDES Permit Equivalency.
2. As of September 2017, the 10 SPDES VOCs discharge limits are per Site Number 1-30-003A Operable Unit 3 SPDES Permit Equivalency.
3. "Total VOCs" represents the sum of individual concentrations of compounds detected. The values used in calculations referenced in this report have been rounded to the
4. Treatment efficiency was calculated by dividing the difference between the influent and effluent total VOC concentrations by the influent total VOC concentration.
5. Effluent pH measured on site using a handheld pH meter. pH units are standard units.

102	Bold value indicates a detection.
< 0.50	Compound not detected above the laboratory quantification limit.
J	Result is estimated.
µg/L	micrograms per liter

Table 4
Influent Vapor Sample Analytical Results
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Compound[1]	03/01/19 (µg/m^3)	06/07/19 (µg/m^3)	09/06/19 (µg/m^3)	11/26/19 (µg/m^3)
Project VOCs				
1,1,1 - Trichloroethane	**0.76**	**0.65**	**0.93**	**0.82**
1,1 - Dichloroethane	**6.9**	**4.5**	**4.5**	**3.8**
1,2 - Dichloroethane	< 0.65	< 0.65	< 0.81	< 0.81
1,1 - Dichloroethene	**1.9**	**1.1**	**1.1**	**0.99**
Tetrachloroethene	**2.8**	**10**	**2.6**	**2.2**
Trichloroethene	**54**	**48**	**54.8**	**49**
Vinyl Chloride	**52.7**	**29.7**	**30.7**	**23.0**
cis 1,2-Dichloroethene	**165**	**103**	**103**	**108**
trans 1,2-Dichloroethene	**0.52 J**	**0.34 J**	< 0.79	< 0.79
Benzene	**0.93**	**0.64**	< 0.64	**1.90**
Toluene	**0.87**	**0.57 J**	**0.49 J**	**2.30**
o-Xylene	**0.69**	**0.74**	**0.52 J**	**0.78 J**
m,p-Xylene	**0.74**	**0.48 J**	< 0.87	**1.7**
Subtotal Project VOCs	**289**	**200**	**193**	**194**
Non-Project VOCs				
1,1,2,2-Tetrachloroethane	< 0.55	< 0.55	< 0.69	< 0.69
1,1,2-Trichloroethane	< 0.44	< 0.44	< 0.55	< 0.55
1,2-Dichloropropane	< 0.74	< 0.74	< 0.92	< 0.92
1,3-Butadiene	< 0.35	< 0.35	< 0.44	**0.42 J**
2-Butanone	**0.47**	**22**	**0.65**	< 0.59
4-Methyl-2-Pentanone	< 0.66	< 0.66	< 0.82	< 0.82
Acetone	**4.8**	**104**	**5.5**	**4.5**
Bromodichloromethane	< 0.54	< 0.54	< 0.67	< 0.67
Bromoform	< 0.33	< 0.33	< 0.41	< 0.41
Bromomethane	< 0.62	**0.47 J**	< 0.78	< 0.78
Carbon Disulfide	< 0.50	< 0.50	< 0.62	< 0.62
Carbon Tetrachloride	**0.42**	**0.43**	< 0.25	< 0.25
Chlorobenzene	< 0.74	< 0.74	< 0.92	< 0.92
Chlorodibromomethane	< 0.68	< 0.68	< 0.85	< 0.85
Chlorodifluoromethane (Freon 22)	**8.1**	**8.4**	**8.4**	**6.3**
Chloroethane	< 0.42	< 0.42	< 0.53	< 0.53
Chloroform	**6.3**	**7.3**	**7.8**	**7.3**
Chloromethane	**1.5**	**1.2**	**0.87**	**1.3**
cis-1,3-Dichloropropene	< 0.73	< 0.73	< 0.91	< 0.91
Dichlorodifluoromethane (Freon 12)	**1.9**	**2.2**	**2.2**	< 0.99
Dichloromethane	0.63	< 0.56	**0.94**	**4.2**
Ethylbenzene	< 0.69	< 0.69	< 0.87	**0.65 J**
Methyl N-Butyl Ketone	< 0.65	**0.41 J**	< 0.82	< 0.82
Methyl Tert-Butyl Ether	**0.50 J**	< 0.58	**0.43 J**	< 0.72
Styrene (Monomer)	< 0.68	< 0.68	< 0.85	< 0.85
trans-1,3-Dichloropropene	< 0.73	< 0.73	< 0.91	< 0.91
Trichlorofluoromethane (Freon 11)	**1.1**	**1.5**	**2.0**	**1.6**
Trichlorotrifluoroethane (Freon 113)	**1.8**	**2.1**	**1.8**	**1.5**
1-Chloro-1,1-difluoroethane (Freon 142b)	< 0.66	< 0.66	< 0.82	< 0.82
Subtotal Non-Project VOCs	**28**	**150**	**20**	**28**
Total VOCs[2]	**317**	**350**	**213**	**222**

Abbreviations, Notes, Qualifiers, and Units on last page.

Table 4
Influent Vapor Sample Analytical Results
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Abbreviations, Notes, Qualifiers, and Units:

ELAP	Environmental Laboratory Approval Program
NYSDOH	New York State Department of Health
OM&M	Operation, Maintenance, and Monitoring
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1. Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15. A VOC analyte list is provided in the DRAFT Bethpage Park Groundwater Containment System OM&M Manual (Arcadis 2016). Influent samples were collected at Vapor Sampling Port-1 (VSP-1); refer to Figure 3 of this OM&M Report for the location of VSP-1.

2. "Total VOCs" represents the sum of individual concentrations of compounds detected. The values used in calculations referenced in this report have been rounded to the nearest whole number.

0.93	Bold value indicates a detection.
< 0.81	Compound not detected above the laboratory quantification limit.
J	Result is estimated.
µg/m^3	micrograms per cubic meter

Table 5
Summary of Effluent Vapor Sample Analytical Results
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Compound[1]	03/01/19 (µg/m^3)	06/07/19 (µg/m^3)	09/06/19 (µg/m^3)	11/26/19 (µg/m^3)
Project VOCs				
1,1,1 - Trichloroethane	**0.65**	**0.82**	**0.76**	**0.82**
1,1 - Dichloroethane	**6.5**	**5.7**	**4.5**	**4.5**
1,2 - Dichloroethane	< 0.65	**0.28 J**	< 0.81	< 0.81
1,1 - Dichloroethene	**1.6**	**0.95**	**0.87**	**0.99**
Tetrachloroethene	**1.9**	**43**	**1.9**	**1.8**
Trichloroethene	**30**	**22**	**26**	**31**
Vinyl Chloride	**34.5**	**13**	**15.0**	**16**
cis 1,2-Dichloroethene	**114**	**65.0**	**65.8**	**85.6**
trans 1,2-Dichloroethene	< 0.63	< 0.63	< 0.79	< 0.79
Benzene	**1.0**	**1.2**	< 0.64	**1.5**
Toluene	**2.8**	**3.5**	**1.5**	**2.8**
o-Xylene	**0.69**	**0.43 J**	< 0.87	**0.61 J**
m,p-Xylene	**1.0**	**0.43 J**	< 0.87	**1.4**
Subtotal Project VOCs	**195**	**156**	**116**	**147**
Non-Project VOCs				
1,1,2,2-Tetrachloroethane	< 0.55	< 0.56	< 0.69	< 0.69
1,1,2-Trichloroethane	< 0.44	**3.3**	< 0.55	< 0.55
1,2-Dichloropropane	< 0.74	< 0.74	< 0.92	< 0.92
1,3-Butadiene	< 0.35	< 0.35	< 0.44	< 0.44
2-Butanone	**14**	**26**	**1.8**	**4.7**
4-Methyl-2-Pentanone	< 0.66	< 0.66	< 0.82	< 0.82
Acetone	**96.4**	**302**	**21**	**38.5**
Bromodichloromethane	< 0.54	< 0.55	< 0.67	< 0.67
Bromoform	< 0.33	< 0.34	< 0.41	< 0.41
Bromomethane	< 0.62	< 0.62	< 0.78	< 0.78
Carbon Disulfide	< 0.50	< 0.50	< 0.62	< 0.62
Carbon Tetrachloride	**0.33**	**0.34**	< 0.25	< 0.25
Chlorobenzene	**0.97**	< 0.74	< 0.92	< 0.92
Chlorodibromomethane	< 0.68	< 0.70	< 0.85	< 0.85
Chlorodifluoromethane (Freon 22)	**8.8**	**8.4**	**8.4**	**7.7**
Chloroethane	< 0.42	< 0.42	< 0.53	< 0.53
Chloroform	**10**	**11**	**10**	**11**
Chloromethane	**1.5**	**1.5**	**0.85**	**1.3**
cis-1,3-Dichloropropene	< 0.73	< 0.73	< 0.91	< 0.91
Dichlorodifluoromethane (Freon 12)	**2.1**	**2.3**	**2.1**	< 0.99
Dichloromethane	**0.66**	**0.56**	< 0.69	< 0.69
Ethylbenzene	< 0.69	< 0.69	< 0.87	**0.48 J**
Methyl N-Butyl Ketone	< 0.65	< 0.65	< 0.82	< 0.82
Methyl Tert-Butyl Ether	**0.36 J**	< 0.58	< 0.72	< 0.72
Styrene (Monomer)	< 0.68	< 0.68	< 0.85	< 0.85
trans-1,3-Dichloropropene	< 0.73	< 0.73	< 0.91	< 0.91
Trichlorofluoromethane (Freon 11)	**1.3**	**1.5**	**1.6**	**1.7**
Trichlorotrifluoroethane (Freon 113)	**2.5**	**2.5**	**2.1**	**2.0**
1-Chloro-1,1-difluoroethane (Freon 142b)	< 0.66	< 0.66	< 0.82	< 0.82
Subtotal Non-Project VOCs	**139**	**359**	**39**	**67**
Total VOCs[2]	**334**	**516**	**156**	**214**

Abbreviations, Notes, Qualifiers, and Units on last page.

Table 5
Summary of Effluent Vapor Sample Analytical Results
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Design & Consultancy for natural and built assets

Abbreviations, Notes, Qualifiers, and Units:

ELAP	Environmental Laboratory Approval Program
NYSDOH	New York State Department of Health
OM&M	Operation, Maintenance, and Monitoring
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1. Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15. A VOC analyte list is provided in the DRAFT Bethpage Park Groundwater Containment System OM&M Manual (Arcadis 2016). Effluent samples were collected at Vapor Sampling Port-5 (VSP-5); refer to Figure 3 of this OM&M Report for the location of VSP-5.
2. "Total VOCs" represents the sum of individual concentrations of all compounds detected. The values used in calculations referenced in this report have been rounded to the nearest whole number.

0.76	Bold value indicates a detection.
< 0.81	Compound not detected above the laboratory quantification limit.
J	Result is estimated.
µg/m^3	micrograms per cubic meter

Table 6
Summary of Effluent Vapor Tentatively Identified Compounds
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Compound[1,2,3]	03/01/19 (ppbv)	06/07/19 (ppbv)	09/06/19 (ppbv)	11/26/19 (ppbv)
Tentatively Identified Compounds				
2-Ethyl-1-hexanol	**1.1 JN**	ND	ND	ND
2-Phenyl-2-propanol	**1.6 JN**	**3.3 JN**	ND	ND
Acetophenone	**1.3 JN**	**2.1 JN**	ND	ND
Alkane	**7.9 J**	ND	ND	ND
Alkane	**4.4 J**	ND	ND	ND
Alkane	ND	ND	ND	**3.3 J**
C3 alkyl benzene	ND	**6.2 J**	ND	**3.9 J**
Carbon Dioxide	**170 JNB**	**100 JNB**	**220 JB**	**29 JNB**
Isopropylbenzene	**3.3 JN**	ND	ND	ND
Unknown (A)	ND	**2.8 J**	ND	ND
Unknown (B)	ND	ND	**3.3 J**	ND
Total VOC TICs[4]	**19.6 J**	**14.4 J**	**3.3 J**	**7.2 J**

Abbreviations, Notes, Qualifiers, and Units:

ECU	Emission Control Unit
ELAP	Environmental Laboratory Approval Program
NYSDOH	New York State Department of Health
OM&M	Operation, Maintenance, and Monitoring
TIC	Tentatively Identified Compound
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1. Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15. A VOC analyte list is provided in the DRAFT Bethpage Park Groundwater Containment System OM&M Manual (Arcadis 2016). Effluent samples were collected at Vapor Sampling Port-5 (VSP-5); refer to Figure 3 of this OM&M Report for the location of VSP-5.
2. The ECUs were placed in a parallel configuration on 3/1/2018 to test for performance gain.
3. VSP-5 sample location moved to new sample port at ECU effluent stack.
4. Compounds found in associated method blank are not included in Total VOC TICs.

3.3	Bold value indicates a detection.
ND	TIC were not detected.
B	TIC was detected in the associated method
J	Result is estimated.
N	Indicates presumptive evidence of a compound.
ppbv	parts per billion by volume

Table 7
Summary of System Parameters
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Date [1]	Water Flow Rates						Water Pressures					Air Flow Rate [2]	Air Pressures [5]					Air Temp. [5]
	Remedial Well [2]				Combined Influent [3]	Effluent [2]	Remedial Well Effluent [2,4]				Effluent [5]	Effluent	ECU Influents				Effluent	Effluent
	RW-1	RW-2	RW-3	RW-4			RW-1	RW-2	RW-3	RW-4			GAC-501	GAC-502	PPZ-601	PPZ-602		
	(gpm)	(gpm)	(gpm)	(gpm)	(gpm)	(gpm)	(psi)	(psi)	(psi)	(psi)	(psi)	(scfm)	(iwc)	(iwc)	(iwc)	(iwc)	(iwc)	(^{o}R)
01/10/19	30.4	69.8	80.2	30.7	211	221	54	6	33	54	12	1,581	0.0	0.0	0.0	0.0	0.0	530
02/05/19	30.9	75.6	76.0	30.7	213	223	54	67	47	55	14	1,607	0.0	0.0	0.0	0.0	0.0	535
03/01/19	30.5	75.0	75.9	30.3	212	220	55	30	47	56	12	1,695	0.0	0.0	0.0	0.0	0.0	528
04/02/19	30.6	59.6	75.2	30.2	196	205	54	5	37	56	12	1,692	0.0	0.0	0.0	0.0	0.0	532
05/15/19	30.3	64.8	76.5	30.0	202	211	55	6	44	56	12	1,698	0.0	0.0	0.0	0.0	0.0	534
06/07/19	30.4	53.0 [6]	73.1	30.0	134	197 [6]	56	5 [6]	46	55	11	1,658	0.0	0.0	0.0	0.0	0.0	540
07/02/19	29.6	71.7	72.7	29.0	203	212	54	66	43	53	29	1,491	0.0	0.0	0.0	0.0	0.0	541
08/02/19	28.4	64.9	70.1	28.4	192	200	54	60	44	54	13	1,463	0.0	0.0	0.0	0.0	0.0	541
09/06/19	29.7	63.4	74.1	30.3	198	207	57	15	39	56	13	1,522	0.0	0.0	0.0	0.0	0.0	542
10/15/19	29.9	74.5	75.1	30.3	210	219	57	69	35	56	17	1,510	0.0	0.0	0.0	0.0	0.0	538
11/05/19	30.1	73.3	75.4	29.8	209	218	57	66	33	56	14	1,496	0.0	0.0	0.0	0.0	0.0	535
12/04/19	30.1	72.1	75.5	30.0	208	218	57	6	40	56	13	1,542	0.0	0.0	0.0	0.0	0.0	532

Abbreviations, Notes, and Units on last page.

Table 7
Summary of System Parameters
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Abbreviations, Notes, and Units:

ECU	Emission Control Unit
GAC	Granular Activated Carbon
HMI	Human-Machine Interface
RW	Remedial Well
SCADA	Supervisory Control and Data Acquisition
Temp	Temperature

1. Operational data collected by Arcadis on days noted. Parameters listed were typically recorded during compliance monitoring events. Data in this table correspond to approximately the past year of system operation.
2. Instantaneous parameters obtained from the SCADA HMI: Water Flow Rate, Water Pressure, Air Flow Rate.
3. Combined influent water-flow rate is the sum of individual well flow rates via the SCADA System.
4. Remedial Well effluent pressure readings measured at the influent manifold within the treatment system building.
5. Instantaneous values recorded from field-mounted instruments during weekly site visits.
6. Due to a RW-2 pump failure on 6/07/19 after system sampling, the flow rate average was calculated using readings between midnight and the time of shutdown.

gpm	gallons per minute
iwc	inches of water column
psi	pounds per square inch
^{o}R	degrees Rankine
scfm	standard cubic feet per minute

Table 8
Summary of Groundwater Recovered, VOC Mass Recovered, and VOC Mass Recovery Rates
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Operating Period [1]	Volume of Groundwater Recovered (x1,000 gal) [2]					VOC Mass Recovered (lbs) [3]															VOC Mass Recovery Rate (lbs/day) [4]													
						Total VOCs [5]					Project VOCs [6]					Non-Project VOCs [7]					Total VOCs [5]					Project VOCs [6]					Non-Project VOCs [7]				
	RW-1	RW-2	RW-3	RW-4	Total	RW-1	RW-2	RW-3	RW-4	Total	RW-1	RW-2	RW-3	RW-4	Total	RW-1	RW-2	RW-3	RW-4	Total	RW-1	RW-2	RW-3	RW-4	Total	RW-1	RW-2	RW-3	RW-4	Total	RW-1	RW-2	RW-3	RW-4	Total
System Pilot Test, Shakedown and Startup Totals [8]	137	270	251	150	808	NA	NA	NA	NA	1.1	NA	NA	NA	NA	1.0	NA	NA	NA	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2010 Totals	15,726	35,127	38,160	15,689	104,702	0.56	172	412	89	672	0.56	171	28	0.10	200	< 0.01	0.17	383	89	469	< 0.01	0.46	1.1	0.24	1.8	< 0.01	0.46	0.075	< 0.01	0.54	< 0.01	< 0.01	1.0	0.24	1.3
2011 Totals	15,218	36,570	37,682	15,196	104,666	0.36	167	271	78	516	0.36	167	35	0.090	203	< 0.01	1.1	236	78	314	< 0.01	0.45	0.73	0.21	1.4	< 0.01	0.45	0.095	< 0.01	0.55	< 0.01	< 0.01	0.64	0.21	0.85
2012 Totals	15,260	35,178	36,111	15,336	101,885	0.28	114	113	40	267	0.25	113	12	0.39	126	< 0.01	1.5	101	40	141	< 0.01	0.31	0.31	0.11	0.73	< 0.01	0.31	0.032	< 0.01	0.35	< 0.01	< 0.01	0.28	0.11	0.39
2013 Totals	15,968	37,514	36,622	16,036	106,140	0.14	111	41	18	171	0.14	110	4.3	0.36	113	< 0.01	1.6	37	18	57	< 0.01	0.30	0.11	0.050	0.47	< 0.01	0.30	0.012	< 0.01	0.31	< 0.01	< 0.01	0.10	0.049	0.16
2014 Totals	15,690	33,222	31,199	15,691	95,802	0.063	67	9.9	8.1	85	0.063	65	2.0	0.20	67	< 0.01	1.5	8.1	7.9	17	< 0.01	0.19	0.028	0.023	0.24	< 0.01	0.18	< 0.01	< 0.01	0.19	< 0.01	< 0.01	0.023	0.022	0.047
2015 Totals	15,859	38,082	34,961	14,755	103,657	0.028	47	7.1	4.5	57	0.021	45	1.5	0.20	45	<0.01	1.7	5.6	4.2	12	<0.01	0.13	0.019	0.012	0.16	<0.01	0.12	<0.01	<0.01	0.12	<0.01	<0.01	0.015	0.012	0.032
2016 Totals	15,826	34,539	39,349	15,826	105,540	<0.01	38	3.2	2.2	44	<0.01	37	1.4	0.20	39	<0.01	1.5	1.7	2.0	5.2	<0.01	0.10	<0.01	<0.01	0.12	<0.01	0.10	<0.01	<0.01	0.11	<0.01	<0.01	<0.01	<0.01	0.014
2017 Totals	16,005	31,600	37,614	15,965	101,184	< 0.01	13	2.2	1.2	17	< 0.01	13	1.1	0.16	14	< 0.01	0.56	1.1	1.1	2.7	< 0.01	0.037	< 0.01	< 0.01	0.046	< 0.01	0.035	< 0.01	< 0.01	0.038	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2018 Totals	15,145	37,712	32,473	14,917	100,247	< 0.01	13.71	0.90	0.56	15.2	< 0.01	13.5	0.70	< 0.01	14.2	< 0.01	0.27	0.19	0.52	0.97	< 0.01	0.038	< 0.01	< 0.01	0.042	< 0.01	0.037	< 0.01	< 0.01	0.039	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
January 2019 through March 2019 Totals																																			
01/01/19 · 02/01/19	1,322	1,656	3,433	1,319	7,730	< 0.01	0.76	0.12	0.04	0.91	< 0.01	0.8	0.094	< 0.01	0.85	< 0.01	< 0.01	0.02	0.04	0.059	< 0.01	0.025	< 0.01	0.001	0.029	< 0.01	0.025	< 0.01	< 0.01	0.028	< 0.01	< 0.01	< 0.01	0.001	< 0.01
02/01/19 · 03/01/19	1,231	3,013	3,031	1,206	8,481	< 0.01	1.4	0.10	0.03	1.5	< 0.01	1.4	0.083	< 0.01	1.5	< 0.01	< 0.01	0.02	0.03	0.053	< 0.01	0.049	< 0.01	0.001	0.054	< 0.01	0.049	< 0.01	< 0.01	0.052	< 0.01	< 0.01	< 0.01	0.001	< 0.01
03/01/19 · 04/01/19	1,318	2,789	3,264	1,305	8,675	< 0.01	1.3	0.11	0.04	1.4	< 0.01	1.3	0.090	< 0.01	1.4	< 0.01	< 0.01	0.02	0.04	0.058	< 0.01	0.041	< 0.01	0.001	0.046	< 0.01	0.041	< 0.01	< 0.01	0.044	< 0.01	< 0.01	< 0.01	0.001	< 0.01
Subtotal Jan - Mar 2019	3,870	7,458	9,727	3,830	24,885	< 0.01	3.4	0.33	0.11	3.9	< 0.01	3.4	0.27	< 0.01	3.7	< 0.01	< 0.01	0.06	0.11	0.170	< 0.01	0.038	< 0.01	0.001	0.043	< 0.01	0.038	< 0.01	< 0.01	0.041	< 0.01	< 0.01	< 0.01	0.001	< 0.01
April 2019 through June 2019 Totals																																			
04/01/19 · 05/01/19	1,317	2,812	3,229	1,291	8,649	< 0.01	0.93	0.13	0.04	1.09	< 0.01	0.93	0.10	< 0.01	1.03	< 0.01	< 0.01	0.02	0.04	0.066	< 0.01	0.031	< 0.01	0.001	0.036	< 0.01	0.031	< 0.01	< 0.01	0.034	< 0.01	< 0.01	< 0.01	0.001	< 0.01
05/01/19 · 06/01/19	1,363	2,789	3,376	1,350	8,878	< 0.01	0.92	0.13	0.04	1.09	< 0.01	0.92	0.11	< 0.01	1.0	< 0.01	< 0.01	0.02	0.05	0.069	< 0.01	0.030	< 0.01	0.001	0.035	< 0.01	0.030	< 0.01	< 0.01	0.033	< 0.01	< 0.01	< 0.01	0.001	< 0.01
06/01/19 · 07/01/19	1,335	1,884	3,265	1,308	7,792	< 0.01	0.62	0.13	0.04	0.79	< 0.01	0.62	0.10	< 0.01	0.72	< 0.01	< 0.01	0.02	0.04	0.068	< 0.01	0.021	< 0.01	0.001	0.026	< 0.01	0.021	< 0.01	< 0.01	0.024	< 0.01	< 0.01	< 0.01	0.001	< 0.01
Subtotal Apr - June 2019	4,015	7,485	9,870	3,949	25,319	< 0.01	2.47	0.38	0.11	2.96	< 0.01	2.5	0.31	< 0.01	2.8	< 0.01	< 0.01	0.07	0.13	0.203	< 0.01	0.027	< 0.01	0.001	0.033	< 0.01	0.027	< 0.01	< 0.01	0.031	< 0.01	< 0.01	< 0.01	0.001	< 0.01
July 2019 through September 2019 Totals																																			
07/01/19 · 08/01/19	1,296	3,140	3,183	1,272	8,891	< 0.01	1.01	0.11	< 0.01	1.12	< 0.01	1.0	0.082	< 0.01	1.09	< 0.01	< 0.01	0.02	< 0.01	0.024	< 0.01	0.033	< 0.01	< 0.01	0.036	< 0.01	0.033	< 0.01	< 0.01	0.035	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
08/01/19 · 09/01/19	1,314	3,013	3,236	1,313	8,876	< 0.01	0.97	0.11	< 0.01	1.08	< 0.01	1.0	0.084	< 0.01	1.1	< 0.01	< 0.01	0.03	< 0.01	0.025	< 0.01	0.031	< 0.01	< 0.01	0.035	< 0.01	0.031	< 0.01	< 0.01	0.034	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
09/01/19 · 10/01/19	1,287	2,712	3,197	1,310	8,506	< 0.01	0.87	0.11	< 0.01	0.98	< 0.01	0.9	0.083	< 0.01	1.0	< 0.01	< 0.01	0.02	< 0.01	0.024	< 0.01	0.029	< 0.01	< 0.01	0.033	< 0.01	0.029	< 0.01	< 0.01	0.032	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Subtotal Jul - Sept 2019	3,897	8,865	9,616	3,895	26,273	< 0.01	2.86	0.32	< 0.01	3.18	< 0.01	2.9	0.25	< 0.01	3.1	< 0.01	< 0.01	0.07	< 0.01	0.073	< 0.01	0.031	< 0.01	< 0.01	0.035	< 0.01	0.031	< 0.01	< 0.01	0.034	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
October 2019 through December 2019																																			
10/01/19 · 11/01/19	1,343	3,210	3,370	1,351	9,275	< 0.01	1.02	0.12	< 0.01	1.14	< 0.01	1.0	0.09	< 0.01	1.1	< 0.01	< 0.01	0.03	0.04	0.066	< 0.01	0.033	< 0.01	< 0.01	0.037	< 0.01	0.033	< 0.01	< 0.01	0.036	< 0.01	< 0.01	< 0.01	0.001	< 0.01
11/01/19 · 12/01/19	1,133	2,764	2,829	1,128	7,854	< 0.01	0.88	0.10	< 0.01	0.98	< 0.01	0.9	0.08	< 0.01	1.0	< 0.01	< 0.01	0.03	0.03	0.055	< 0.01	0.029	< 0.01	< 0.01	0.033	< 0.01	0.029	< 0.01	< 0.01	0.032	< 0.01	< 0.01	< 0.01	0.001	< 0.01
12/01/19 · 01/01/20	1,198	2,688	3,004	1,190	8,079	< 0.01	0.86	0.11	< 0.01	0.96	< 0.01	0.9	0.08	< 0.01	0.9	< 0.01	< 0.01	0.03	0.03	0.059	< 0.01	0.028	< 0.01	< 0.01	0.031	< 0.01	0.028	< 0.01	< 0.01	0.030	< 0.01	< 0.01	< 0.01	0.001	< 0.01
Subtotal Oct - Jan 20 [9]	3,674	8,662	9,203	3,669	25,208	< 0.01	2.76	0.33	< 0.01	3.09	< 0.01	2.8	0.25	< 0.01	3.0	< 0.01	< 0.01	0.09	0.10	0.180	< 0.01	0.030	< 0.01	< 0.01	0.034	< 0.01	0.030	< 0.01	< 0.01	0.033	< 0.01	< 0.01	< 0.01	0.001	< 0.01
2019 Totals	15,456	32,470	38,416	15,343	101,685	< 0.01	11.51	1.36	0.22	13.10	< 0.01	11.51	1.07	< 0.01	12.59	< 0.01	< 0.01	0.29	0.18	0.63	< 0.01	0.032	< 0.01	< 0.01	0.048	< 0.01	0.032	< 0.01	< 0.01	0.034	< 0.01	< 0.01	< 0.01	0.001	< 0.01
Total [10]	162,882	366,121	379,283	161,478	1,069,765	2	1,030	915	256	2,200	2	1,018	106	2	1,128	< 0.01	10	809	254	1,067	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Abbreviations, Notes, Qualifiers, and Units:

NA Not Applicable

VOC Volatile Organic Compound.

1. Represents operating period between consecutive monitoring events.

2. Volume of groundwater recovered is based on individual local well totalized flow readings. Listed value is the difference between totalized flow values recorded between consecutive monitoring events. The total groundwater recovered during a given operating period is the sum of the individual well flow totals. Values shown are rounded to the nearest gallon, but should only be considered accurate to two significant figures to account for error associated with field measurements.

3. Mass recovered per well was calculated by multiplying the Total VOC concentration from the most recent sampling event by the number of gallons extracted during the reporting period. The total amount recovered during a given operating period is the sum of masses recovered from each of the individual wells. Values less than ten pounds are presented using two significant figures and values greater than ten pounds have been rounded to the nearest whole number; however, these values should only be considered accurate to two significant figures to account for error associated with field measurements and analytical data.

4. Mass recovery rates were calculated by dividing the total mass recovered for each well and for the system by the number of days in the respective operating period. Values are presented using two significant figures.

5. "Total VOCs" represents the sum of individual concentrations of the VOCs detected.

6. "Project VOCs" represents the sum of individual compound concentrations of 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethelyene; vinyl chloride; cis-1,2-dichloroethene; trans-1,2-dichloroethene; benzene; toluene; and xylenes-o,m, p.

7. "Non-Project VOCs" represents the difference between Total VOCs and Project VOCs.

8. Values based on operational data recorded prior to system startup on July 21, 2009.

9. The volume of groundwater recovered and mass recovered calculations represent the operational period between October 1, 2019 and January 1, 2020.

10. "Total" refers to the amounts removed by the Operable Unit 3 Bethpage Park Groundwater Containment System.

< Less than

gal Gallons

lbs Pounds

lbs/day Pounds per day

Table 9
Summary of Air Quality Impact Analysis
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Toxic Air Contaminant[4]	CAS#	VSP-05 Vapor Effluent ($\mu g/m^3$)	Emission Rate[1]			Scaled Impact - Hourly[2] ($\mu g/m^3$)	Scaled Impact - Annual[2] ($\mu g/m^3$)	SGC[3] ($\mu g/m^3$)	AGC[3] ($\mu g/m^3$)	% of SGC	% of AGC
		11/26/2019	lb/yr	lb/hr	g/s						
Project VOCs											
1,1,1-Trichloroethane	00071-55-6	0.82	0.04	4.83E-06	6.1E-07	1.9E-03	5.9E-05	9,000	5000	0.0%	0.0%
1,1-Dichloroethane	00075-34-3	4.5	0.23	2.65E-05	3.3E-06	1.1E-02	3.2E-04	--	0.63	--	0.1%
1,1-Dichloroethene	00075-35-4	0.99	0.05	5.84E-06	7.4E-07	2.3E-03	7.1E-05	--	200	--	0.0%
Benzene	00071-43-2	1.5	0.08	8.84E-06	1.1E-06	3.5E-03	1.1E-04	1,300	0.13	0.0%	0.1%
cis-1,2-Dichloroethene	00156-59-2	85.6	4.42	5.05E-04	6.4E-05	2.0E-01	6.1E-03	--	63	--	0.0%
Tetrachloroethene	00127-18-4	1.8	0.09	1.06E-05	1.3E-06	4.2E-03	1.3E-04	300	4	0.0%	0.0%
Toluene	00108-88-3	2.8	0.14	1.65E-05	2.1E-06	6.6E-03	2.0E-04	37,000	5000	0.0%	0.0%
Trichloroethene	00079-01-6	31	1.60	1.83E-04	2.3E-05	7.3E-02	2.2E-03	20	0.2	0.4%	1.1%
Vinyl Chloride	00075-01-4	16	0.83	9.43E-05	1.2E-05	3.7E-02	1.1E-03	180,000	0.11	0.0%	1.0%
Xylene-O	01330-20-7	0.61	0.02	2.00E-06	2.5E-07	8.0E-04	2.4E-05	22,000	100	0.0%	0.0%
Xylenes - M,P	01330-20-7	1.4	0.03	3.30E-06	4.2E-07	1.3E-03	4.0E-05	22,000	100	0.0%	0.0%
Non-Project VOCs											
2-Butanone	00078-93-3	4.7	0.24	2.77E-05	3.5E-06	1.1E-02	3.4E-04	13,000	5000	0.0%	0.0%
Acetone	00067-64-1	38.5	1.99	2.27E-04	2.9E-05	9.0E-02	2.8E-03	180,000	30000	0.0%	0.0%
Chlorodifluoromethane (Freon 22)	00075-45-6	7.7	0.40	4.54E-05	5.7E-06	1.8E-02	5.5E-04	--	50000	--	0.0%
Chloroform	00067-66-3	11	0.57	6.49E-05	8.2E-06	2.6E-02	7.9E-04	150	14.7	0.0%	0.0%
Chloromethane	00074-87-3	1.3	0.07	7.67E-06	9.7E-07	3.0E-03	9.3E-05	22,000	90	0.0%	0.0%
Ethylbenzene	00100-41-4	0.48	0.02	2.83E-06	3.6E-07	1.1E-03	3.4E-05	--	1000	--	0.0%
Trichlorofluoromethane (Freon 11)	00075-69-4	1.7	0.09	1.00E-05	1.3E-06	4.0E-03	1.2E-04	9,000	5000	0.0%	0.0%
Trichlorotrifluoroethane (Freon 113)	00076-13-1	2.0	0.10	1.18E-05	1.5E-06	4.7E-03	1.4E-04	960,000	180000	0.0%	0.0%

Abbreviations, Notes, and Units on last page.

Table 9
Summary of Air Quality Impact Analysis
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Abbreviations, Notes, and Units:

AGC	Annual Guideline Concentration
DAR-1	Division of Air Resources-1
--	None Specified
NYSDEC	New York State Department of Environmental Conservation
SGC	Short-term Guideline Concentration
VSP	Vapor Sampling Point

1. Emission rate calculated based on VSP-05 effluent concentration and a daily average exit air flow rate of 1,577 ft^3/min for 11/26/2019. Emission rate standardized at 70 F and 1 atm.
   1,1,1-Trichloroethane (lb/hr) = TCE [µg/m^3] x Air Flow Rate [ft^3/min] x (1 m^3/35.3147 ft^3) x (60 min/hr) x (0.000001 g/1 µg) x (0.0022 lb/g)
   lb/yr = lb/hr x 8,760 hrs/yr
   g/s = lb/hr x hr/3,600 sec x 453.59 g/lb
2. Ambient impact based on AERMOD modeling using normalized rate of 1 g/s is scaled to the actual emission rate of the pollutant. Modeling was performed using the representative meteorological data from the nearest station (Brookhaven/Farmingdale) for the years 2011 through 2015. The maximum impact from all the years was used for the calculations.
   Scaled hourly impact (µg/m^3) = AERMOD predicted hourly ambient impact at 1 g/s ([µg/m^3]/[g/s]) x Actual emission rate (g/s)
   Scaled annual impact (µg/m^3) = AERMOD predicted annual ambient impact at 1 g/s ([µg/m^3]/[g/s]) x Actual emission rate (g/s)

AERMOD Normalized Ambient Impact at 1 g/s	
Hourly ([µg/m^3]/[g/s])	Annual ([µg/m^3]/[g/s])
3,153.03	96.49

3. Short-term and annual guideline concentrations specified in the NYSDEC DAR-1 AGC/SGC tables revised August 10, 2016.
4. Compounds not detected above the laboratory reporting limit are excluded from the air quality impact analysis summary.

cfm	cubic feet per minute
g/s	grams per second
lb/hr	pounds per hour
lb/yr	pounds per year
µg/m^3	micrograms per cubic meter

Table 10
Summary of Remedial Well Groundwater Sample Analytical Results - VOCs
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Compound[1] (µg/L)	Sample Location: Sample Date: NYSDEC SCGs	RW-1 3/1/2019	RW-1 6/7/2019	RW-1 9/6/2019	RW-1 11/5/2019	RW-2 3/1/2019	RW-2 6/7/2019	RW-2 9/6/2019	RW-2 11/5/2019	RW-3 3/1/2019	RW-3 6/7/2019	RW-3 9/6/2019	RW-3 11/5/2019	RW-4 3/1/2019	RW-4 6/7/2019	RW-4 9/6/2019	RW-4 11/5/2019
Project VOCs																	
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	**1.1**	**0.78 J**	**0.58 J**	**0.65**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	0.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethylene	5	< 1.0	< 1.0	< 1.0	< 1.0	**9.9**	**8.1**	**10.2**	**10.8**	**2.1**	**2.5**	**2.0**	**2.0**	< 1.0	< 1.0	< 1.0	**0.64**
Vinyl Chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	**10.7**	**8.0**	**8**	**4.9**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	**33.4**	**22.7**	**19.9**	**21.9**	**1.2**	**1.3**	**1.1**	**1.2**	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene-o	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylenes-m,p	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Subtotal Project VOCs		0	0	0	0	**55.1**	**39.6**	**38.1**	**38.3**	**3.3**	**3.8**	**3.1**	**3.2**	0	0	0	**0.6**
Non-Project VOCs																	
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Butadiene	0.5	NA	< 5.0	< 5.0	< 5.0	NA	< 5.0	< 5.0	< 5.0	NA	< 5.0	< 5.0	< 5.0	NA	< 5.0	< 5.0	< 5.0
2-Butanone	NE	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-methyl-2-pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	NE	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodifluoromethane (Freon 22)	NE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**3.4 J**	**4.0 J**	< 5.0	**3.1**
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.76 J**	**0.87 J**	**0.91 J**	**1.1**	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,3-dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichlorodifluoromethane (Freon 12)	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dichloromethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Methyl tert-Butyl Ether	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane (Freon 11)	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorotrifluoroethane (Freon 113)	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1-Chloro-1,1-difluoroethane (Freon 142b)	NE	NA	< 5.0	< 5.0	< 5.0	NA	< 5.0	< 5.0	< 5.0	NA	< 5.0	< 5.0	< 5.0	NA	< 5.0	< 5.0	< 5.0
Subtotal Non-Project VOCs		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.8**	**0.9**	**0.9**	**1.1**	**3.4**	**4.0**	0.0	**3.1**
Total VOCs[2]		0.0	0.0	0.0	0.0	**55.1**	**39.6**	**38.1**	**38.3**	**4.1**	**4.7**	**4.0**	**4.3**	**3.4**	**4.0**	0.0	**3.7**
1,4-Dioxane		**0.42**	**0.33**	**0.41**	**0.47**	**2.2**	**1.4**	**1.7**	**1.5**	**0.41**	**0.32**	**0.35**	**0.39**	**0.21 J**	**0.15 J**	**0.17 J**	**0.23 J**

Notes and abbreviations on last page.

Table 10
Summary of Remedial Well Groundwater Sample Analytical Results - VOCs
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

Abbreviations, Notes, Qualifiers, and Units:

ASP	Analytical Services Protocol
ELAP	Environmental Laboratory Approval Program
NA	Not Analyzed
NE	Not Established
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OLM	Ozone Limited Method
OM&M	Operation, Maintenance, and Monitoring
SCGs	Standards, Criteria, and Guidance values
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1. Water samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per NYSDEC ASP 2005, Method OLM 4.3 (prior to September 1, 2014) and per EPA Method 8260C (after September 1, 2014). Results validated following protocols specified in Sampling and Analysis Plan in the DRAFT Bethpage Park Groundwater Containment System OM&M Manual (Arcadis 2016). See previous quarterly reports for historical analytical results.

2. "Total VOCs" represents the sum of individual concentrations of the VOCs detected.

	Bold cell outline indicates an exceedance of an SCG
8.1	Bold data indicates a detection
< 1.0	Compound not detected above its laboratory quantification limit
J	Compound detected below its reporting limit; value is estimated
µg/L	micrograms per liter

Table 11
Summary of Water-Level Elevations
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Well Identification	Well Casing Elevation (ft msl)	Event Date	Baseline [1] 5/8/2009 (ft msl)		1 Q 2019 2/8/2019 (ft. msl)		2Q 2019 5/30/2019 (ft. msl)		3Q 2019 7/2/2019 (ft. msl)		4Q 2019 11/25/2019 (ft. msl)
Recovery Wells											
RW-1	125.18		69.75		68.78		70.50		71.18		69.98
RW-2	124.48		72.27		59.98		64.45		62.18		70.73
RW-3	122.84		69.40		65.44		67.35		67.94		66.70
RW-4	121.24		69.25		68.24		69.92		70.54		69.46
Monitoring Wells											
B24MW-2	126.96		74.31		72.38		73.51		74.27		73.74
B24MW-3	127.11		72.63		NM		73.62		73.84		73.01
B30MW-1	128.33		73.55		71.20		73.04		73.30		71.54
BCPMW-1	125.73		73.16		71.23		NM		NM		NM
BCPMW-2	126.39		72.55		70.29		NM		NM		NM
BCPMW-3	124.94		72.46		70.02		NM		NM		NM
BCPMW-4-1	128.71		72.30		69.80		71.59		71.79		70.97
BCPMW-4-2	129.33		72.58		70.06		71.87		72.05		71.25
BCPMW-4-3	129.20		72.32		69.97		71.75		71.92		71.14
BCPMW-5-1	129.37		72.79		70.47		NM		NM		NM
BCPMW-6-1	126.01		72.12		69.65		71.40		71.70		70.92
BCPMW-6-2	125.16		71.74		69.33		71.08		71.34		70.59
BCPMW-7-1	124.81		72.00		69.71		71.46		71.79		71.01
MW-200-1	123.49		72.16		69.93		71.68		71.94		71.08
MW-201-1	121.69		72.04		69.60		71.40		71.65		70.85
MW-202-1	119.27		71.90		69.55		71.37		71.71		70.84
MW-203-1	118.25		71.83		69.56		71.30		71.58		70.81
MW-204-1[2]	124.95		--		69.84		71.65		71.86		71.05
MW-205-1[2]	123.47		--		69.42		71.35		71.57		70.75
MW-206-1[2]	120.80		--		69.56		71.35		71.57		70.84
MW-207A-1R[2]	120.38		--		69.26		70.99		71.27		70.51
MW-207B-1R[2]	120.48		--		69.52		71.19		71.42		70.70
MW-208-1[2]	118.56		--		69.05		70.25		71.00		70.86
Piezometers											
PZ-1a	128.82		72.56		69.32		71.09		71.34		70.49
PZ-1b	128.92		72.47		69.65		71.49		71.66		70.84
PZ-1c	128.96		72.47		69.93		71.66		71.86		71.12
PZ-2a	128.36		72.47		69.63		71.40		71.63		70.81
PZ-2b	128.37		72.43		69.58		71.39		71.56		70.77
PZ-2c	128.55		72.41		69.84		71.97		71.78		71.03
PZ-3	124.99		72.52		69.49		71.34		71.50		70.68
PZ-4	125.31		72.50		69.64		44.10		45.11		44.51
PZ-5a	129.07		72.50		70.44		72.16		72.39		71.56
PZ-5b	129.06		72.50		70.34		72.05		72.26		71.47
PZ-5c[2]	128.84		--		69.87		71.98		72.20		71.42
PZ-6a	125.67		72.50		68.43		71.20		71.48		70.68
PZ-6b	125.74		72.50		69.36		71.14		71.40		70.62
PZ-7a	125.10		72.50		69.73		71.22		71.84		71.03
PZ-7b	125.06		72.50		69.55		71.29		71.51		70.81
PZ-8a[2]	127.63		--		69.37		71.16		71.45		70.61
PZ-8b[2]	127.54		--		69.44		71.23		71.45		70.66
PZ-8c[2]	127.57		--		69.73		71.48		69.67		70.95
PZ-9a[2]	125.30		--		NM		NM		NM		NM
PZ-10a[2]	125.27		--		70.46		72.13		72.54		66.73

Notes and abbreviations on last page.

Table 11
Summary of Water-Level Elevations
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Notes and Abbreviations:

1.	Baseline readings were taken prior to system startup, which occurred on July 21, 2009.
2.	Wells installed by EMAGIN in 2017 to replace monitoring wells MW-207-1a (replaced by MW-207A-1R) and MW-207-1b (replaced by MW-207B-1R) installed by ERM in 2015.
ft msl	Feet relative to mean sea level
NM	Not measured due to In-Situ Thermal Remediation activities

Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	B24MW-2 12/28/2015	B24MW-2 12/29/2016	B24MW-2 8/4/2017	B24MW-2 8/9/2018	*B24MW-2 7/18/2019*
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,2-Dichloroethane	0.6	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,2-Dichloropropane	1	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
2-Butanone	NE	< 10	< 10	< 10	< 10	*< 10*
2-Hexanone	50	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Acetone	NE	< 10	< 10	< 10	< 10	*< 10*
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	*< 0.50*
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorodifloromethane (Freon 22)	NE	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
cis-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Dichlorodifloromethane (Freon 12)	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Methyl-Tert-Butylether	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Methylene Chloride	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
trans-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Trichloroethene	5	**2.7**	**2.4**	**2.1**	**2.5**	***4.0***
Trichlorotrifloroethane (Freon 113)	5	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Vinyl Chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
m,p-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Total VOCs [4]		**2.7**	**2.4**	**2.1**	**2.5**	***4***
Project VOCs [4]		**2.7**	**2.4**	**2.1**	**2.5**	***4***
1,4-Dioxane		**0.185**	**0.417**	**0.348**	**0.16 J**	***0.29***

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	B24MW-3 12/28/2015	B24MW-3 1/20/2017	B24MW-3 8/2/2017	B24MW-3 8/9/2018	*B24MW-3 7/16/2019*
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,2-Dichloroethane	0.6	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,2-Dichloropropane	1	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
2-Butanone	NE	< 10	< 10	< 10	< 10	*< 10*
2-Hexanone	50	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Acetone	NE	< 10	< 10	< 10	< 10	*< 10*
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	*< 0.50*
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorodifloromethane (Freon 22)	NE	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chloroform	7	**0.30 J**	< 1.0	< 1.0	< 1.0	*< 1.0*
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	**0.59 J**	< 1.0	***3.2***
cis-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Dichlorodifloromethane (Freon 12)	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Methyl-Tert-Butylether	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Methylene Chloride	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
trans-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Trichloroethene	5	**0.25 J**	< 1.0	< 1.0	< 1.0	***1.3***
Trichlorotrifloroethane (Freon 113)	5	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Vinyl Chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
m,p-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Total VOCs [4]		**0.55**	0	**0.59**	0	***4.5***
Project VOCs [4]		**0.25**	0	**0.59**	0	***4.5***
1,4-Dioxane		**0.257**	**0.918**	**0.675**	**0.11 J**	*< 0.24*

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	B30MW-1 12/31/2015	B30MW-1 1/4/2017	B30MW-1 8/3/2017	B30MW-1 8/9/2018	*B30MW-1 7/17/2019*
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,2-Dichloroethane	0.6	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,2-Dichloropropane	1	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
2-Butanone	NE	< 10	< 10	< 10	< 10	*< 10*
2-Hexanone	50	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Acetone	NE	< 10	< 10	< 10	< 10	*< 10*
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	*< 0.50*
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorodifloromethane (Freon 22)	NE	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
cis-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Dichlorodifloromethane (Freon 12)	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Methyl-Tert-Butylether	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Methylene Chloride	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
trans-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Trichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Trichlorotrifloroethane (Freon 113)	5	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Vinyl Chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
m,p-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Total VOCs [4]		0	0	0	0	*0*
Project VOCs [4]		0	0	0	0	*0*
1,4-Dioxane		< 0.10	< 0.200	< 0.200	< 0.24	*< 0.24*

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	BCPMW-4-1 10/8/2015	BCPMW-4-1 12/30/2015	BCPMW-4-1 12/28/2016	BCPMW-4-1 7/31/2017	BCPMW-4-1 7/24/2018
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	**4.2**	**7.3**	**0.36 J**	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	1	**1.1**	**1.7**	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	**13.3**	**27.1**	**3.2**	**1.6**	**0.87 J**
1,1-Dichloroethene	5	**0.98 J**	**1.7**	**0.42 J**	< 1.0	< 1.0
1,2-Dichloroethane	0.6	**0.97 J**	**1.3**	**0.87 J**	< 1.0	< 1.0
1,2-Dichloropropane	1	**0.95**	**1.5**	< 1.0	< 1.0	< 1.0
2-Butanone	NE	< 10	< 10	< 10	< 10	< 10
2-Hexanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	NE	< 10	< 10	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodifloromethane (Freon 22)	NE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	**0.70 J**	**1.1**	**1.4**	**0.76 J**	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	**156**	**252 D**	**81.4**	**53.5**	**30.7**
cis-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichlorodifloromethane (Freon 12)	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl-Tert-Butylether	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**1.1**	**1.1**	**0.50 J**	< 1.0	< 1.0
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	**0.86 J**	**0.49 J**	< 1.0	< 1.0
trans-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	**68.1**	**81.5**	**48.2**	**21.9**	**13.5**
Trichlorotrifloroethane (Freon 113)	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl Chloride	2	**13**	**197**	**3.3**	< 1.0	< 1.0
o-Xylene	5	< 1.0	**0.70 J**	< 1.0	< 1.0	< 1.0
m,p-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs [4]		**260**	**570**	**140**	**78**	**45**
Project VOCs [4]		**260**	**570**	**140**	**77**	**45**
1,4-Dioxane		--	**37.7**	**39.3**	**2.64**	**0.68**

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	*BCPMW-4-1* *7/11/2019*	BCPMW-4-2 10/8/2015	BCPMW-4-2 12/31/2015	BCPMW-4-2 (REP) 12/31/2015	BCPMW-4-2 12/22/2016
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	1	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	***0.73 J***	**0.48 J**	**0.23 J**	**0.24 J**	**0.22 J**
1,1-Dichloroethene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	0.6	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	1	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone	NE	*< 10*	< 10	< 10	< 10	< 10
2-Hexanone	50	*< 5.0*	< 5.0	< 5.0	< 5.0	< 5.0
4-Methyl-2-Pentanone	50	*< 5.0*	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	NE	*< 10*	< 10	< 10	< 10	< 10
Benzene	1	*< 0.50*	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	*< 2.0*	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	60	*< 2.0*	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodifloromethane (Freon 22)	NE	*< 5.0*	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	*< 1.0*	**1.3**	**2.0**	**2.0**	**3.9**
Chloromethane	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	***20.7***	**29.7**	**13.3**	**13.2**	**16.9**
cis-1,3-Dichloropropene	0.4	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	50	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Dichlorodifloromethane (Freon 12)	5	*< 2.0*	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Methyl-Tert-Butylether	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	*< 2.0*	< 2.0	< 2.0	< 2.0	< 2.0
Styrene (Monomer)	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	**0.62 J**
trans-1,3-Dichloropropene	0.4	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	***8.9***	**25.6**	**16.0**	**16.3**	**18.0**
Trichlorotrifloroethane (Freon 113)	5	*< 5.0*	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl Chloride	2	*< 1.0*	**3.7**	**0.96 J**	**0.92 J**	< 1.0
o-Xylene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
m,p-Xylene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs [4]		***30***	**61**	**32**	**33**	**40**
Project VOCs [4]		***30***	**59**	**30**	**31**	**36**
1,4-Dioxane		***7.4***	--	**0.858**	**0.982**	**2.34**

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	BCPMW-4-2 (REP) 12/22/2016	BCPMW-4-2 7/31/2017	BCPMW-4-2 7/24/2018	*BCPMW-4-2 7/11/2019*	BCPMW-4-3 12/31/2015
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,1-Dichloroethane	5	**0.23 J**	**0.25 J**	**0.87 J**	***0.97 J***	< 1.0
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,2-Dichloroethane	0.6	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,2-Dichloropropane	1	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
2-Butanone	NE	< 10	< 10	< 10	*< 10*	< 10
2-Hexanone	50	< 5.0	< 5.0	< 5.0	*< 5.0*	< 5.0
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	*< 5.0*	< 5.0
Acetone	NE	< 10	< 10	< 10	*< 10*	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	*< 0.50*	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	*< 2.0*	< 2.0
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	*< 2.0*	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chlorodifloromethane (Freon 22)	NE	< 5.0	< 5.0	< 5.0	*< 5.0*	< 5.0 J
Chloroethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chloroform	7	**3.6**	**2.3**	**1.3**	*< 1.0*	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
cis-1,2-Dichloroethene	5	**17.4**	**19.9**	**58.1**	***68.5***	< 1.0
cis-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Dichlorodifloromethane (Freon 12)	5	< 2.0	< 2.0	< 2.0	*< 2.0*	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Methyl-Tert-Butylether	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Methylene Chloride	5	< 2.0	< 2.0	< 2.0	*< 2.0*	< 2.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Tetrachloroethene	5	**0.27 J**	< 1.0	< 1.0	*< 1.0*	< 1.0
Toluene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
trans-1,2-Dichloroethene	5	**0.58 J**	< 1.0	< 1.0	*< 1.0*	< 1.0
trans-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Trichloroethene	5	**18.1**	**17.6**	**61.5**	***37.0***	< 1.0
Trichlorotrifloroethane (Freon 113)	5	< 5.0	< 5.0	< 5.0	*< 5.0*	< 5.0 J
Vinyl Chloride	2	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
m,p-Xylene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Total VOCs [4]		**40**	**40**	**120**	***110***	0
Project VOCs [4]		**37**	**38**	**120**	***110***	0
1,4-Dioxane		**2.40**	**1.35**	**2.4**	***0.77***	**0.263**

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	BCPMW-4-3 12/22/2016	BCPMW-4-3 8/3/2017	BCPMW-4-3 8/8/2018	*BCPMW-4-3 7/11/2019*	BCPMW-6-1 12/23/2015
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,2-Dichloroethane	0.6	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,2-Dichloropropane	1	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
2-Butanone	NE	< 10	< 10	< 10	*< 10*	< 10
2-Hexanone	50	< 5.0	< 5.0	< 5.0	*< 5.0*	< 5.0
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	*< 5.0*	< 5.0
Acetone	NE	< 10	< 10	< 10	*< 10*	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	*< 0.50*	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	*< 2.0*	< 2.0
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	*< 2.0*	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chlorodifloromethane (Freon 22)	NE	< 5.0	< 5.0	< 5.0	*< 5.0*	< 5.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chloroform	7	**0.52 J**	< 1.0	< 1.0	*< 1.0*	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
cis-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Dichlorodifloromethane (Freon 12)	5	< 2.0	< 2.0	< 2.0	*< 2.0*	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Methyl-Tert-Butylether	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Methylene Chloride	5	< 2.0	< 2.0	< 2.0	*< 2.0*	< 2.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Toluene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
trans-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Trichloroethene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Trichlorotrifloroethane (Freon 113)	5	< 5.0	< 5.0	< 5.0	*< 5.0*	< 5.0
Vinyl Chloride	2	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
m,p-Xylene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Total VOCs [4]		**0.52**	0	0	*0*	0
Project VOCs [4]		0	0	0	*0*	0
1,4-Dioxane		**0.776**	**0.616**	**0.43**	***0.41***	< 0.10

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	BCPMW-6-1 12/27/2016	BCPMW-6-1 8/1/2017	BCPMW-6-1 8/6/2018	*BCPMW-6-1 7/15/2019*	BCPMW-6-2 12/23/2015
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,2-Dichloroethane	0.6	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,2-Dichloropropane	1	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
2-Butanone	NE	< 10	< 10	< 10	*< 10*	< 10
2-Hexanone	50	< 5.0	< 5.0	< 5.0	*< 5.0*	< 5.0
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	*< 5.0*	< 5.0
Acetone	NE	< 10	< 10	< 10	*< 10*	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	*< 0.50*	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	*< 2.0*	< 2.0
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	*< 2.0*	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chlorodifloromethane (Freon 22)	NE	< 5.0	< 5.0	**3.7 J**	***4.1 J***	< 5.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chloroform	7	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
cis-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Dichlorodifloromethane (Freon 12)	5	< 2.0	< 2.0	< 2.0	*< 2.0*	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Methyl-Tert-Butylether	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Methylene Chloride	5	< 2.0	< 2.0	< 2.0	*< 2.0*	< 2.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Toluene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
trans-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Trichloroethene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Trichlorotrifloroethane (Freon 113)	5	< 5.0	< 5.0	< 5.0	*< 5.0*	< 5.0
Vinyl Chloride	2	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
m,p-Xylene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Total VOCs [4]		0	0	**3.7**	***4.1***	0
Project VOCs [4]		0	0	0	*0*	0
1,4-Dioxane		< 0.200	< 0.200	< 0.24	*< 0.23*	< 0.10

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	BCPMW-6-2 12/27/2016	BCPMW-6-2 8/2/2017	BCPMW-6-2 8/6/2018	*BCPMW-6-2 7/16/2019*	BCPMW-7-1 12/22/2015
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,1-Dichloroethane	5	< 1.0	**0.21 J**	< 1.0	*< 1.0*	< 1.0
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,2-Dichloroethane	0.6	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
1,2-Dichloropropane	1	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
2-Butanone	NE	< 10	< 10	< 10	*< 10*	< 10
2-Hexanone	50	< 5.0	< 5.0	< 5.0	*< 5.0*	< 5.0
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	*< 5.0*	< 5.0
Acetone	NE	< 10	< 10	< 10	*< 10*	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	*< 0.50*	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	*< 2.0*	< 2.0
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	*< 2.0*	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chlorodifloromethane (Freon 22)	NE	< 5.0	< 5.0	< 5.0	*< 5.0*	< 5.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chloroform	7	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	**0.97 J**	***0.92 J***	< 1.0
cis-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Dichlorodifloromethane (Freon 12)	5	< 2.0	< 2.0	< 2.0	*< 2.0*	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Methyl-Tert-Butylether	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Methylene Chloride	5	< 2.0	< 2.0	< 2.0	*< 2.0*	< 2.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Toluene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
trans-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Trichloroethene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Trichlorotrifloroethane (Freon 113)	5	< 5.0	< 5.0	< 5.0	*< 5.0*	< 5.0
Vinyl Chloride	2	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
m,p-Xylene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	< 1.0
Total VOCs [4]		0	**0.21**	**0.97**	***0.92***	0
Project VOCs [4]		0	**0.21**	**0.97**	***0.92***	0
1,4-Dioxane		< 0.200	< 0.100	**0.092 J**	***0.096 J***	< 0.10

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	BCPMW-7-1 12/28/2016	BCPMW-7-1 8/1/2017	BCPMW-7-1 8/3/2018	BCPMW-7-1 8/8/2018	*BCPMW-7-1 7/10/2019*
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,2-Dichloroethane	0.6	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,2-Dichloropropane	1	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
2-Butanone	NE	< 10	< 10	< 10	< 10	*< 10*
2-Hexanone	50	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Acetone	NE	< 10	< 10	< 10	< 10	*< 10*
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	*< 0.50*
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorodifloromethane (Freon 22)	NE	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
cis-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Dichlorodifloromethane (Freon 12)	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Methyl-Tert-Butylether	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Methylene Chloride	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
trans-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Trichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Trichlorotrifloroethane (Freon 113)	5	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Vinyl Chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
m,p-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Total VOCs [4]		0	0	0	0	*0*
Project VOCs [4]		0	0	0	0	*0*
1,4-Dioxane		< 0.200	< 0.200	--	< 0.24	*< 0.24*

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	MW-200-1 12/24/2015	MW-200-1 1/17/2017	MW-200-1 8/7/2017	MW-200-1 7/30/2018	*MW-200-1 7/8/2019*
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0 J	*< 1.0*
1,2-Dichloroethane	0.6	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,2-Dichloropropane	1	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
2-Butanone	NE	< 10	< 10	< 10	< 10	*< 10*
2-Hexanone	50	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Acetone	NE	< 10	< 10	< 10	< 10	*< 10*
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	*< 0.50*
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	< 2.0 J	*< 2.0*
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorodifloromethane (Freon 22)	NE	< 5.0	< 5.0	< 5.0	< 5.0 J	*< 5.0*
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
cis-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Dichlorodifloromethane (Freon 12)	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Methyl-Tert-Butylether	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Methylene Chloride	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
trans-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Trichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Trichlorotrifloroethane (Freon 113)	5	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Vinyl Chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
m,p-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Total VOCs [4]		0	0	0	0	*0*
Project VOCs [4]		0	0	0	0	*0*
1,4-Dioxane		**0.309**	**0.725**	**0.537**	**0.40**	***0.26***

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	MW-201-1 12/24/2015	MW-201-1 1/18/2017	MW-201-1 8/8/2017	MW-201-1 8/1/2018	*MW-201-1 7/8/2019*
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,2-Dichloroethane	0.6	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,2-Dichloropropane	1	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
2-Butanone	NE	< 10	< 10	< 10	< 10	*< 10*
2-Hexanone	50	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Acetone	NE	< 10	< 10	< 10	< 10	*< 10*
Benzene	1	< 1.0	< 0.50	< 0.50	< 0.50	*< 0.50*
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Bromoform	50	< 4.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorodifloromethane (Freon 22)	NE	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chloroform	7	**0.43**	< 1.0	< 1.0	< 1.0	*< 1.0*
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
cis-1,2-Dichloroethene	5	**2.0**	**2.0**	**1.5**	**0.87 J**	*< 1.0*
cis-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Dichlorodifloromethane (Freon 12)	5	< 5.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Methyl-Tert-Butylether	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Methylene Chloride	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Styrene (Monomer)	5	< 5.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
trans-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Trichloroethene	5	**2.3**	**1.6**	**1.3**	**0.90 J**	***0.69 J***
Trichlorotrifloroethane (Freon 113)	5	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Vinyl Chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
m,p-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Total VOCs [4]		**4.7**	**3.6**	**2.8**	**1.8**	***0.69***
Project VOCs [4]		**4.3**	**3.6**	**2.8**	**1.8**	***0.69***
1,4-Dioxane		**0.262**	**0.655**	**0.676**	**0.40**	***0.30***

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	MW-202-1 12/31/2015	MW-202-1 1/19/2017	MW-202-1 8/9/2017	MW-202-1 7/31/2018	*MW-202-1 7/10/2019*
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1-Dichloroethane	5	**2.4**	**0.66 J**	**0.80 J**	< 1.0	*< 1.0*
1,1-Dichloroethene	5	**1.5**	**0.33 J**	< 1.0	< 1.0	*< 1.0*
1,2-Dichloroethane	0.6	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,2-Dichloropropane	1	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
2-Butanone	NE	< 10	< 10	< 10	< 10	*< 10*
2-Hexanone	50	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Acetone	NE	< 10	< 10	< 10	< 10	*< 10*
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	*< 0.50*
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorodifloromethane (Freon 22)	NE	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
cis-1,2-Dichloroethene	5	**1.2**	**0.45 J**	< 1.0	< 1.0	*< 1.0*
cis-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Dichlorodifloromethane (Freon 12)	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Methyl-Tert-Butylether	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Methylene Chloride	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Tetrachloroethene	5	**2.5**	**1.3**	**1.4**	**1.1**	*< 1.0*
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
trans-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Trichloroethene	5	**1.3**	**0.68 J**	**0.96 J**	**0.70 J**	*< 1.0*
Trichlorotrifloroethane (Freon 113)	5	**1.1 J**	< 5.0	< 5.0	< 5.0	*< 5.0*
Vinyl Chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
m,p-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Total VOCs [4]		**10**	**3.4**	**3.2**	**1.8**	*0*
Project VOCs [4]		**8.9**	**3.4**	**3.2**	**1.8**	*0*
1,4-Dioxane		**0.404**	**0.396**	**0.518**	**0.30**	***0.17 J***

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	MW-203-1 12/30/2015	MW-203-1 1/20/2017	MW-203-1 8/10/2017	MW-203-1 8/2/2018	*MW-203-1 7/9/2019*
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,1-Dichloroethane	5	**0.38 J**	**0.30 J**	**0.34 J**	< 1.0	*< 1.0*
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,2-Dichloroethane	0.6	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
1,2-Dichloropropane	1	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
2-Butanone	NE	< 10	< 10	< 10	< 10	*< 10*
2-Hexanone	50	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	*< 5.0*
Acetone	NE	< 10	< 10	< 10	< 10	*< 10*
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	*< 0.50*
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorodifloromethane (Freon 22)	NE	**1.9 J**	**2.0 J**	**3.3 J**	< 5.0	*< 5.0*
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chloroform	7	**0.32 J**	**0.27 J**	**0.35 J**	< 1.0	*< 1.0*
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
cis-1,2-Dichloroethene	5	**0.35 J**	**0.92 J**	**0.55 J**	< 1.0	*< 1.0*
cis-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Dichlorodifloromethane (Freon 12)	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Methyl-Tert-Butylether	5	**0.58 J**	< 1.0	< 1.0	< 1.0	*< 1.0*
Methylene Chloride	5	< 2.0	< 2.0	< 2.0	< 2.0	*< 2.0*
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Tetrachloroethene	5	**1.2**	**0.76 J**	**1.2**	< 1.0	***1.2***
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
trans-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Trichloroethene	5	**2.5**	**3.9**	**2.9**	**2.6**	***2.3***
Trichlorotrifloroethane (Freon 113)	5	**0.56 J**	< 5.0	< 5.0	< 5.0	*< 5.0*
Vinyl Chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
m,p-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	*< 1.0*
Total VOCs [4]		**7.8**	**8.2**	**8.6**	**2.6**	***3.5***
Project VOCs [4]		**4.4**	**5.9**	**5.0**	**2.6**	***3.5***
1,4-Dioxane		**0.134**	**0.401**	**0.262**	**0.19 J**	***0.24***

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	MW-204-1 12/24/2015	MW-204-1 1/17/2017	MW-204-1 8/7/2017	MW-204-1 (REP) 8/7/2017	MW-204-1 7/30/2018
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J
1,2-Dichloroethane	0.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone	NE	< 10	< 10	< 10	< 10	< 10
2-Hexanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	NE	< 10	< 10	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0 J
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodifloromethane (Freon 22)	NE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	**0.50 J**	**0.24 J**	< 1.0	< 1.0	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	**2.5**	**3.4**	< 1.0	< 1.0	< 1.0
cis-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichlorodifloromethane (Freon 12)	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl-Tert-Butylether	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	**4.0**	**4.1**	**2.4**	**2.5**	**0.63 J**
Trichlorotrifloroethane (Freon 113)	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl Chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m,p-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs [4]		**7.0**	**7.7**	**2.4**	**2.5**	**0.63**
Project VOCs [4]		**6.5**	**7.5**	**2.4**	**2.5**	**0.63**
1,4-Dioxane		< 0.11	**0.350**	**0.306**	**0.319**	**0.25 J**

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	*MW-204-1 7/8/2019*	MW-205-1 12/29/2015	MW-205-1 1/18/2017	MW-205-1 8/8/2017	MW-205-1 8/1/2018
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	1	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	0.6	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	1	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone	NE	*< 10*	< 10	< 10	< 10	< 10
2-Hexanone	50	*< 5.0*	< 5.0	< 5.0	< 5.0	< 5.0
4-Methyl-2-Pentanone	50	*< 5.0*	**3.0 J**	< 5.0	< 5.0	< 5.0
Acetone	NE	*< 10*	< 10	< 10	< 10	< 10
Benzene	1	*< 0.50*	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	*< 2.0*	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	60	*< 2.0*	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodifloromethane (Freon 22)	NE	*< 5.0*	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	*< 1.0*	< 1.0	**0.64 J**	< 1.0	< 1.0
Chloromethane	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	*< 1.0*	**1.1**	**0.39 J**	**0.62 J**	**0.76 J**
cis-1,3-Dichloropropene	0.4	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	50	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Dichlorodifloromethane (Freon 12)	5	*< 2.0*	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Methyl-Tert-Butylether	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	*< 2.0*	< 2.0	< 2.0	< 2.0	< 2.0
Styrene (Monomer)	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	0.4	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	*< 1.0*	**0.76 J**	**0.91 J**	**0.41 J**	< 1.0
Trichlorotrifloroethane (Freon 113)	5	*< 5.0*	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl Chloride	2	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
m,p-Xylene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs [4]		*0*	**4.9**	**1.9**	**1.0**	**0.76**
Project VOCs [4]		*0*	**1.9**	**1.3**	**1.0**	**0.76**
1,4-Dioxane		***0.14 J***	**0.162**	**0.366**	**0.714**	**0.40**

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	*MW-205-1 7/8/2019*	MW-206-1 12/29/2015	MW-206-1 1/19/2017	MW-206-1 8/9/2017	MW-206-1 7/31/2018
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	*< 1.0*	< 1.0	**0.27 J**	**0.76 J**	< 1.0
1,1,2,2-Tetrachloroethane	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	1	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	*< 1.0*	**0.44 J**	**0.74 J**	**3.0**	**0.96 J**
1,1-Dichloroethene	5	*< 1.0*	< 1.0	**0.27 J**	**1.7**	< 1.0
1,2-Dichloroethane	0.6	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	1	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone	NE	*< 10*	< 10	< 10	< 10	< 10
2-Hexanone	50	*< 5.0*	< 5.0	< 5.0	< 5.0	< 5.0
4-Methyl-2-Pentanone	50	*< 5.0*	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	NE	*< 10*	< 10	< 10	< 10	< 10
Benzene	1	*< 0.50*	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	*< 2.0*	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	60	*< 2.0*	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodifloromethane (Freon 22)	NE	*< 5.0*	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	*< 1.0*	**0.32 J**	**0.92 J**	**1.3**	**0.56 J**
cis-1,3-Dichloropropene	0.4	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	50	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Dichlorodifloromethane (Freon 12)	5	*< 2.0*	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Methyl-Tert-Butylether	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	*< 2.0*	< 2.0	< 2.0	< 2.0	< 2.0
Styrene (Monomer)	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	*< 1.0*	**0.45 J**	**0.56 J**	**2.8**	**1.4**
Toluene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	0.4	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	*< 1.0*	< 1.0	< 1.0	**0.65 J**	**0.79 J**
Trichlorotrifloroethane (Freon 113)	5	*< 5.0*	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl Chloride	2	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
m,p-Xylene	5	*< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs [4]		*0*	**1.2**	**2.8**	**10**	**3.7**
Project VOCs [4]		*0*	**1.2**	**2.8**	**10**	**3.7**
1,4-Dioxane		***0.16 J***	< 0.10	**0.301**	**1.06**	**0.34**

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	*MW-206-1 7/9/2019*	*MW-207A-1R 7/10/2019*	*MW-207B-1R 7/10/2019*	MW-208-1 12/29/2015	MW-208-1 1/20/2017
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
1,1,2-Trichloroethane	1	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
1,1-Dichloroethane	5	*< 1.0*	*< 1.0*	*< 1.0*	**2.9**	**2.1**
1,1-Dichloroethene	5	*< 1.0*	*< 1.0*	*< 1.0*	**0.89 J**	**0.70 J**
1,2-Dichloroethane	0.6	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
1,2-Dichloropropane	1	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	**0.35 J**
2-Butanone	NE	*< 10*	*< 10*	*< 10*	< 10	< 10
2-Hexanone	50	*< 5.0*	*< 5.0*	*< 5.0*	< 5.0	< 5.0
4-Methyl-2-Pentanone	50	*< 5.0*	*< 5.0*	*< 5.0*	< 5.0	< 5.0
Acetone	NE	*< 10*	*< 10*	*< 10*	< 10	< 10
Benzene	1	*< 0.50*	*< 0.50*	*< 0.50*	< 0.50	< 0.50
Bromodichloromethane	50	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
Bromoform	50	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
Bromomethane	5	*< 2.0*	*< 2.0*	*< 2.0*	< 2.0	< 2.0
Carbon Disulfide	60	*< 2.0*	*< 2.0*	*< 2.0*	< 2.0	< 2.0
Carbon Tetrachloride	5	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
Chlorobenzene	5	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
Chlorodifloromethane (Freon 22)	NE	*< 5.0*	*< 5.0*	*< 5.0*	< 5.0	< 5.0
Chloroethane	5	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
Chloroform	7	*< 1.0*	*< 1.0*	*< 1.0*	**3.1**	**2.8**
Chloromethane	5	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	*< 1.0*	*< 1.0*	*< 1.0*	**546 D**	**597**
cis-1,3-Dichloropropene	0.4	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
Chlorodibromomethane	50	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
Dichlorodifloromethane (Freon 12)	5	*< 2.0*	*< 2.0*	*< 2.0*	< 2.0	< 2.0
Ethylbenzene	5	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
Methyl-Tert-Butylether	5	*< 1.0*	*< 1.0*	*< 1.0*	**0.39 J**	**0.43 J**
Methylene Chloride	5	*< 2.0*	*< 2.0*	*< 2.0*	< 2.0	< 2.0
Styrene (Monomer)	5	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
Tetrachloroethene	5	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
Toluene	5	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	**0.60 J**
trans-1,3-Dichloropropene	0.4	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
Trichloroethene	5	*< 1.0*	*< 1.0*	***0.88 J***	**17.4**	**10.9**
Trichlorotrifloroethane (Freon 113)	5	*< 5.0*	*< 5.0*	*< 5.0*	< 5.0	< 5.0
Vinyl Chloride	2	*< 1.0*	*< 1.0*	*< 1.0*	**6.4**	**3.3**
o-Xylene	5	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
m,p-Xylene	5	*< 1.0*	*< 1.0*	*< 1.0*	< 1.0	< 1.0
Total VOCs [4]		*0*	*0*	***0.88***	**580**	**620**
Project VOCs [4]		*0*	*0*	***0.88***	**570**	**610**
1,4-Dioxane		***0.21 J***	***0.45***	***0.68***	**0.526**	**1.02**

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Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

Compound [1,2,3] (units in µg/L)	Sample Location: Sample Date:	MW-208-1 8/10/2017	MW-208-1 8/2/2018	MW-208-1 (REP) 8/2/2018	*MW-208-1 7/9/2019*	*MW-208-1 (REP) 7/9/2019*
	NYSDEC SCGs					
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
1,1,2-Trichloroethane	1	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
1,1-Dichloroethane	5	**1.1**	**0.61 J**	< 1.0	***0.69 J***	*< 1.0*
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
1,2-Dichloroethane	0.6	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
1,2-Dichloropropane	1	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
2-Butanone	NE	< 10	< 10	< 10	*< 10*	*< 10*
2-Hexanone	50	< 5.0	< 5.0	< 5.0	*< 5.0*	*< 5.0*
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	*< 5.0 J*	*< 5.0*
Acetone	NE	< 10	< 10	< 10	*< 10*	*< 10*
Benzene	1	< 0.50	< 0.50	< 0.50	*< 0.50*	*< 0.50*
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
Bromoform	50	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
Bromomethane	5	< 2.0	< 2.0	< 2.0	*< 2.0*	*< 2.0*
Carbon Disulfide	60	< 2.0	< 2.0	< 2.0	*< 2.0*	*< 2.0*
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
Chlorodifloromethane (Freon 22)	NE	< 5.0	< 5.0	< 5.0	*< 5.0*	*< 5.0*
Chloroethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
Chloroform	7	**1.4**	**0.75 J**	**0.71 J**	***0.53 J***	***0.62 J***
Chloromethane	5	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
cis-1,2-Dichloroethene	5	**268**	**129**	**135**	***176 J***	***166***
cis-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
Chlorodibromomethane	50	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
Dichlorodifloromethane (Freon 12)	5	< 2.0	< 2.0	< 2.0	*< 2.0*	*< 2.0*
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
Methyl-Tert-Butylether	5	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
Methylene Chloride	5	< 2.0	< 2.0	< 2.0	*< 2.0*	*< 2.0*
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
Toluene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
trans-1,2-Dichloroethene	5	**1.6**	< 1.0	< 1.0	*< 1.0*	*< 1.0*
trans-1,3-Dichloropropene	0.4	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
Trichloroethene	5	**12.8**	**11.7**	**11.4**	***9.1***	***9.4***
Trichlorotrifloroethane (Freon 113)	5	< 5.0	< 5.0	< 5.0	*< 5.0*	*< 5.0*
Vinyl Chloride	2	**1.8**	**1.1**	**0.98 J**	*< 1.0*	*< 1.0*
o-Xylene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
m,p-Xylene	5	< 1.0	< 1.0	< 1.0	*< 1.0*	*< 1.0*
Total VOCs [4]		**290**	**140**	**150**	***190***	***180***
Project VOCs [4]		**290**	**140**	**150**	***190***	***180***
1,4-Dioxane		**0.800**	**0.51**	**0.35**	***0.38***	***0.40***

See Notes and Abbreviations on Last Page

Table 12
Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Grondwater Containment System, OU3 (Former Settling Ponds) Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Notes and Abbreviations

1. Historic data available in previous quarterly reports.
2. Results are validated at 20% frequency, per protocols specified in Sampling and Analysis Plan in the Bethpage Park Groundwater Containment System OM&M Manual (ARCADIS 2016).
3. Samples analyzed for the TCL VOCs using USEPA Method 8260C. Samples analyzed for 1,4-Dioxane using USEPA Method 8270D SIM (prior to 2016), per USEPA Method 522 SIM (2016-2017) and per USEPA Method 8270D SIM (since 2018).
4. "Total VOCs" represents the sum of individual concentrations of the VOCs detected. TVOCs were rounded to two significant figures. "Project VOCs" represents the sum of individual concentrations of 1,1,1-Trichloroethane; 1,1-Dichloroethane; 1,2-Dichloroethane; 1,1-Dichloroethene; Tetrachloroethene; Trichloroethene; Vinyl Chloride; cis-1,2-Dichloroethene; trans-1,2-Dichloroethene; Benzene; Toluene; and Xylenes-o,m, and p.

	Bolded outline indicates an exceedance of an SCG.
< 5	Compound not detected above its laboratory quantification limit.
2.1	Bold value indicates a detection.
italicized indicates most recent data	
D	Constituent identified from secondary dilution
J	Result is estimated
ug/L	Micrograms per liter
NE	Not Established
ASP	Analytical Services Protocol
--	Not Analyzed
NYSDEC	New York State Department of Environmental Conservation
REP	Field Replicate QA/QC sample
SCGs	Standards, Criteria, and Guidance values
SIM	Selective Ion Monitoring
TCL	Target compound list.
USEPA	United State Environmental Protection Agency
VOC	Volatile Organic Compound
OU	Operable Unit

Table 13
Concentrations of Metals in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Groundwater Containment System, OU 3 (Former Settling Ponds), Bethpage, New York

Constituents (units in ug/L)	Sample Location: Sample Date:	B24MW-3 8/9/2018	B30MW-1 8/9/2018	BCPMW-4-1 10/8/2015	BCPMW-4-1 12/30/2015	BCPMW-4-1 12/28/2016	BCPMW-4-1 7/31/2017	BCPMW-4-1 7/24/2018
	NYSDEC SCGs							
Cadmim, Total	5	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Cadmim, Dissolved	5	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Chromim, Total	50	**12.5**	< 10	**24.9**	**22.7**	< 10	< 10	< 10
Chromim, Dissolved	50	< 10	< 10	**22.1**	**19.2**	< 10	< 10	< 10

Table 13
Concentrations of Metals in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Groundwater Containment System, OU 3 (Former Settling Ponds), Bethpage, New York

Constituents (units in ug/L)	Sample Location: Sample Date:	*BCPMW-4-1* *7/11/2019*	BCPMW-4-2 10/8/2015	BCPMW-4-2 12/31/2015	BCPMW-4-2 12/22/2016	BCPMW-4-2 (REP) 12/22/2016	BCPMW-4-2 7/31/2017
	NYSDEC SCGs						
Cadmim, Total	5	*< 3.0*	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Cadmim, Dissolved	5	*< 3.0*	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Chromim, Total	50	***19.4***	< 10	< 10	**17.3**	**20.5**	< 10
Chromim, Dissolved	50	***17.2***	< 10	< 10	< 10	< 10	< 10

Table 13
Concentrations of Metals in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Groundwater Containment System, OU 3 (Former Settling Ponds), Bethpage, New York

Constituents (units in ug/L)	Sample Location: Sample Date:	BCPMW-4-2 7/24/2018	*BCPMW-4-2 7/11/2019*	BCPMW-4-3 10/9/2015	BCPMW-4-3 12/31/2015	BCPMW-4-3 12/22/2016	BCPMW-4-3 8/3/2017
	NYSDEC SCGs						
Cadmim, Total	5	< 3.0	< *3.0*	< 3.0	< 3.0	< 3.0	< 3.0
Cadmim, Dissolved	5	< 3.0	< *3.0*	< 3.0	< 3.0	< 3.0	< 3.0
Chromim, Total	50	< 10	< *10*	< 10	< 10	**11.2**	< 10
Chromim, Dissolved	50	< 10	< *10*	< 10	< 10	< 10	< 10

Table 13
Concentrations of Metals in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Groundwater Containment System, OU 3 (Former Settling Ponds), Bethpage, New York

Constituents (units in ug/L)	Sample Location: Sample Date:	BCPMW-4-3 8/8/2018	*BCPMW-4-3 7/11/2019*	BCPMW-6-1 12/23/2015	BCPMW-6-1 12/27/2016	BCPMW-6-1 8/1/2017	BCPMW-6-1 8/6/2018
	NYSDEC SCGs						
Cadmim, Total	5	< 3.0	< *3.0*	< 3.0	< 3.0	< 3.0	< 3.0
Cadmim, Dissolved	5	< 3.0	< *3.0*	< 3.0	< 3.0	< 3.0	< 3.0
Chromim, Total	50	< 10	< *10*	< 10	**223**	< 10	< 10
Chromim, Dissolved	50	< 10	< *10*	< 10	< 10	< 10	< 10

Table 13
Concentrations of Metals in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Groundwater Containment System, OU 3 (Former Settling Ponds), Bethpage, New York

Constituents (units in ug/L)	Sample Location: Sample Date:	*BCPMW-6-1* *7/15/2019*	BCPMW-6-2 12/23/2015	BCPMW-6-2 12/27/2016	BCPMW-6-2 8/2/2017	BCPMW-6-2 8/6/2018
	NYSDEC SCGs					
Cadmim, Total	5	< *3.0*	< 3.0	< 3.0	**3.3**	< 3.0
Cadmim, Dissolved	5	< *3.0*	< 3.0	< 3.0	< 3.0	< 3.0
Chromim, Total	50	< *10*	< 10	**13.5**	**87.7**	< 10
Chromim, Dissolved	50	< *10*	< 10	< 10	< 10	< 10

Table 13
Concentrations of Metals in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Groundwater Containment System, OU 3 (Former Settling Ponds), Bethpage, New York

Constituents (units in ug/L)	Sample Location: Sample Date:	BCPMW-7-1 12/22/2015	BCPMW-7-1 12/28/2016	BCPMW-7-1 8/1/2017	BCPMW-7-1 8/3/2018	BCPMW-7-1 8/8/2018	*BCPMW-7-1 7/10/2019*
	NYSDEC SCGs						
Cadmim, Total	5	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	*< 3.0*
Cadmim, Dissolved	5	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	*< 3.0*
Chromim, Total	50	< 10	**66.0**	< 10	< 10	< 10	*< 10*
Chromim, Dissolved	50	< 10	< 10	< 10	< 10	< 10	*< 10*

Table 13
Concentrations of Metals in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Groundwater Containment System, OU 3 (Former Settling Ponds), Bethpage, New York

Constituents (units in ug/L)	Sample Location: Sample Date:	MW-200-1 12/24/2015	MW-200-1 1/17/2017	MW-200-1 8/7/2017	MW-200-1 7/30/2018	*MW-200-1 7/8/2019*
	NYSDEC SCGs					
Cadmim, Total	5	< 3.0	< 3.0	< 3.0	< 3.0	*< 3.0*
Cadmim, Dissolved	5	< 3.0	< 3.0	< 3.0	< 3.0	*< 3.0*
Chromim, Total	50	**54.2**	< 10	**11.1**	**12.4**	***11.5***
Chromim, Dissolved	50	**29.5**	< 10	< 10	< 10	*< 10*

Table 13
Concentrations of Metals in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Groundwater Containment System, OU 3 (Former Settling Ponds), Bethpage, New York

Constituents (units in ug/L)	Sample Location: Sample Date:	MW-201-1 12/30/2015	MW-201-1 1/18/2017	MW-201-1 8/8/2017	MW-201-1 8/1/2018	*MW-201-1* 7/8/2019	MW-202-1 12/31/2015	MW-202-1 1/19/2017
	NYSDEC SCGs							
Cadmim, Total	5	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Cadmim, Dissolved	5	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Chromim, Total	50	< 10	< 10	**11.7**	< 10	< 10	**34.9**	< 10
Chromim, Dissolved	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Table 13
Concentrations of Metals in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Groundwater Containment System, OU 3 (Former Settling Ponds), Bethpage, New York

Constituents (units in ug/L)	Sample Location: Sample Date:	MW-202-1 8/9/2017	MW-202-1 7/31/2018	*MW-202-1 7/10/2019*	MW-203-1 12/20/2015	MW-203-1 1/20/2017	MW-203-1 8/10/2017
	NYSDEC SCGs						
Cadmim, Total	5	< 3.0	< 3.0	< *3.0*	< 3.0	< 3.0	< 3.0
Cadmim, Dissolved	5	< 3.0	< 3.0	< *3.0*	< 3.0	< 3.0	< 3.0
Chromim, Total	50	**73.4**	**21.4**	***26.5***	**81.6**	< 10	**138**
Chromim, Dissolved	50	**14.4**	< 10	< *10*	< 10	< 10	< 10

Table 13
Concentrations of Metals in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Groundwater Containment System, OU 3 (Former Settling Ponds), Bethpage, New York

Constituents (units in ug/L)	Sample Location: Sample Date:	MW-203-1 8/2/2018	*MW-203-1 7/9/2019*	MW-204-1 12/24/2015	MW-204-1 1/17/2017	MW-204-1 8/7/2017	MW-204-1 (REP) 8/7/2017
	NYSDEC SCGs						
Cadmim, Total	5	< 3.0	< *3.0*	< 3.0	< 3.0	< 3.0	< 3.0
Cadmim, Dissolved	5	< 3.0	< *3.0*	< 3.0	< 3.0	< 3.0	< 3.0
Chromim, Total	50	**22.7**	< 10	**85.3**	**57.0**	**175**	**171**
Chromim, Dissolved	50	< 10	< 10	**38.5**	**31.1**	**87.0**	**85.3**

Table 13
Concentrations of Metals in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Groundwater Containment System, OU 3 (Former Settling Ponds), Bethpage, New York

Constituents (units in ug/L)	Sample Location: Sample Date:	MW-204-1 7/30/2018	*MW-204-1 7/8/2019*	MW-205-1 12/29/2015	MW-205-1 1/18/2017	MW-205-1 8/8/2017	MW-205-1 8/1/2018	*MW-205-1 7/8/2019*
	NYSDEC SCGs							
Cadmim, Total	5	< 3.0	< *3.0*	< 3.0	< 3.0	< 3.0	< 3.0	< *3.0*
Cadmim, Dissolved	5	< 3.0	< *3.0*	< 3.0	< 3.0	< 3.0	< 3.0	< *3.0*
Chromim, Total	50	**239**	***30.1***	**11.4**	**73.4**	**134**	**88.7**	***70.2***
Chromim, Dissolved	50	**89.1**	< *10*	< 10	< 10	< 10	**23.7**	***22.1***

Table 13
Concentrations of Metals in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Groundwater Containment System, OU 3 (Former Settling Ponds), Bethpage, New York

Constituents (units in ug/L)	Sample Location: Sample Date:	MW-206-1 12/29/2015	MW-206-1 1/19/2017	MW-206-1 8/9/2017	MW-206-1 7/31/2018	*MW-206-1 7/9/2019*	*MW-207A-1R 7/10/2019*	*MW-207B-1R 7/10/2019*
	NYSDEC SCGs							
Cadmim, Total	5	< 3.0	< 3.0	< 3.0	< 3.0	*< 3.0*	*< 3.0*	*< 3.0*
Cadmim, Dissolved	5	< 3.0	< 3.0	< 3.0	< 3.0	*< 3.0*	*< 3.0*	*< 3.0*
Chromim, Total	50	**12.6**	**162**	**82.0**	**13.6**	***10.7***	*< 10*	***86.6***
Chromim, Dissolved	50	< 10	< 10	**10.7**	< 10	*< 10*	*< 10*	*< 10*

Table 13
Concentrations of Metals in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Groundwater Containment System, OU 3 (Former Settling Ponds), Bethpage, New York

Constituents (units in ug/L)	Sample Location: Sample Date:	MW-208-1 12/29/2015	MW-208-1 1/20/2017	MW-208-1 8/10/2017	MW-208-1 8/2/2018	MW-208-1 (REP) 8/2/2018	*MW-208-1 7/9/2019*	*MW-208-1 (REP) 7/9/2019*
	NYSDEC SCGs							
Cadmim, Total	5	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	*< 3.0*	*< 3.0*
Cadmim, Dissolved	5	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	*< 3.0*	*< 3.0*
Chromim, Total	50	< 10	< 10	< 10	< 10	< 10	*< 10*	*< 10*
Chromim, Dissolved	50	< 10	< 10	< 10	< 10	< 10	*< 10*	*< 10*

Table 13
Concentrations of Metals in Groundwater Samples Collected from Monitoring Wells, Bethpage Park Groundwater Containment System, OU 3 (Former Settling Ponds), Bethpage, New York

ARCADIS Design & Consultancy for natural and built assets

Notes and Abbreviations:

1. Historic data available in previous quarterly reports.
2. Results are validated at 20% frequency, per protocols specified in Sampling and Analysis Plan in the DRAFT Bethpage Park Groundwater Containment System OM&M Manual (ARCADIS 2016).
3. Samples analyzed for metals using USEPA Method 6010.

italicized indicates most recent data

ug/L	Micrograms per liter
	Indicates an exceedance of an SCG
12.5	Bold indicates a detection
< 3.0	Compound not detected above its laboratory quantification limit
--	Not Analyzed
NYSDEC	New York State Department of Environmental Conservation
SCGs	Standards, Criteria, and Guidance values
OU	Operable Unit

FIGURES

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

BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

SITE LOCATION

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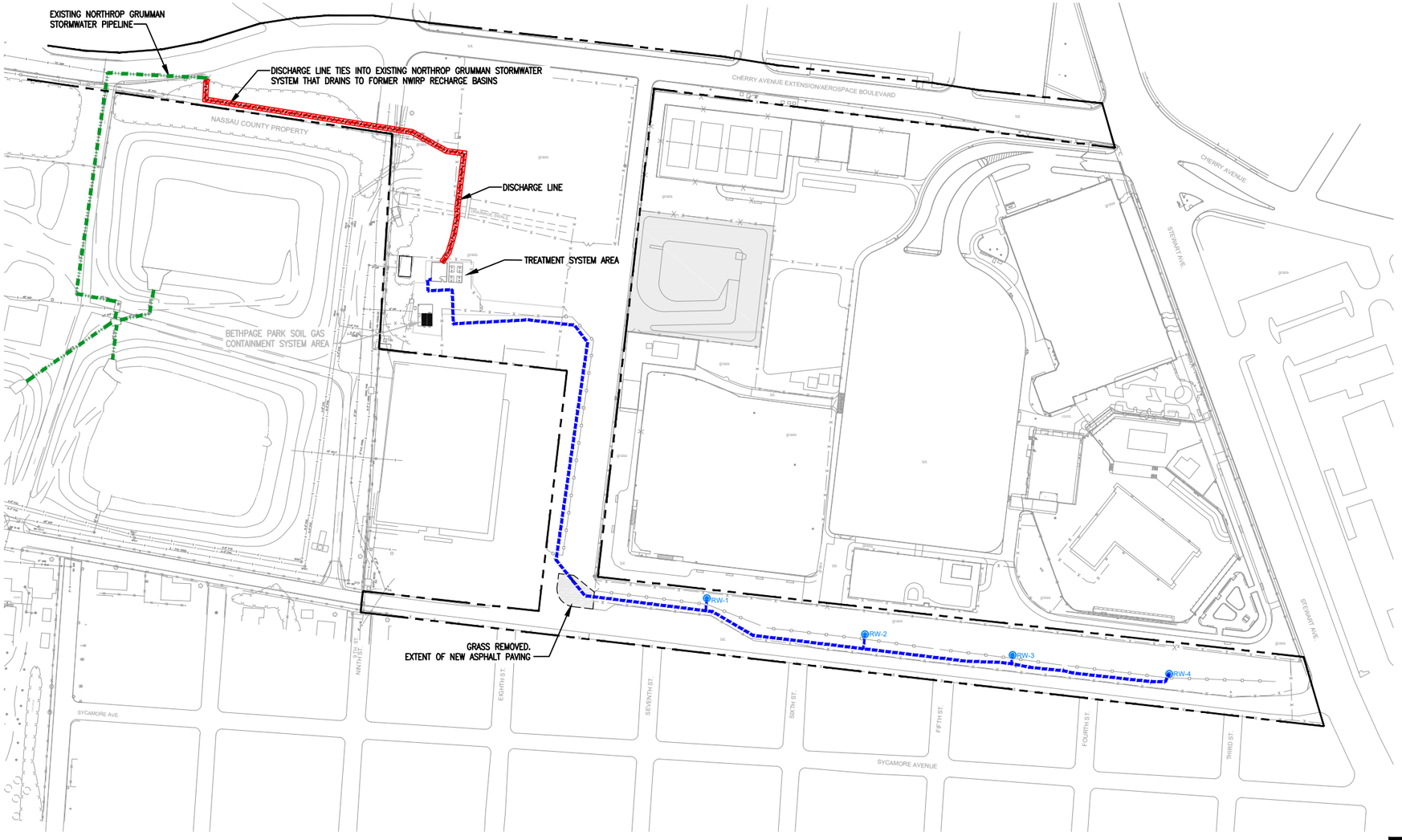
FIGURE
1

CITY:SYRACUSE-NY DIV/GROUP:ENV DB:A.SANCHEZ LD: PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\NY001496\1114\OMM\4\NY1496_B01.dwg LAYOUT: BETHPAGE PARK SAVED: 11/11/2015 4:51 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 11/11/2015 4:54 PM BY: STOWELL, GARY

XREFS: IMAGES: AMITYVILLE.TIF FREEPORT.TIF HICKSVILLE.TIF HUNTINGTON.TIF PROJECTNAME: ----



LEGEND:

- NORTHROP GRUMMAN PROPERTY LINE
- FENCE
- bit. BITUMINOUS PAVEMENT
- INFLUENT PIPELINE AND ELECTRICAL CONDUITS
- EFFLUENT PIPELINE
- EXISTING NORTHROP GRUMMAN STORMWATER PIPELINE
- RW-4 REMEDIAL WELL
- NWIRP NAVAL WEAPONS INDUSTRIAL RESERVE PLANT (NOW OWNED BY NASSAU COUNTY)

0 200' 400'

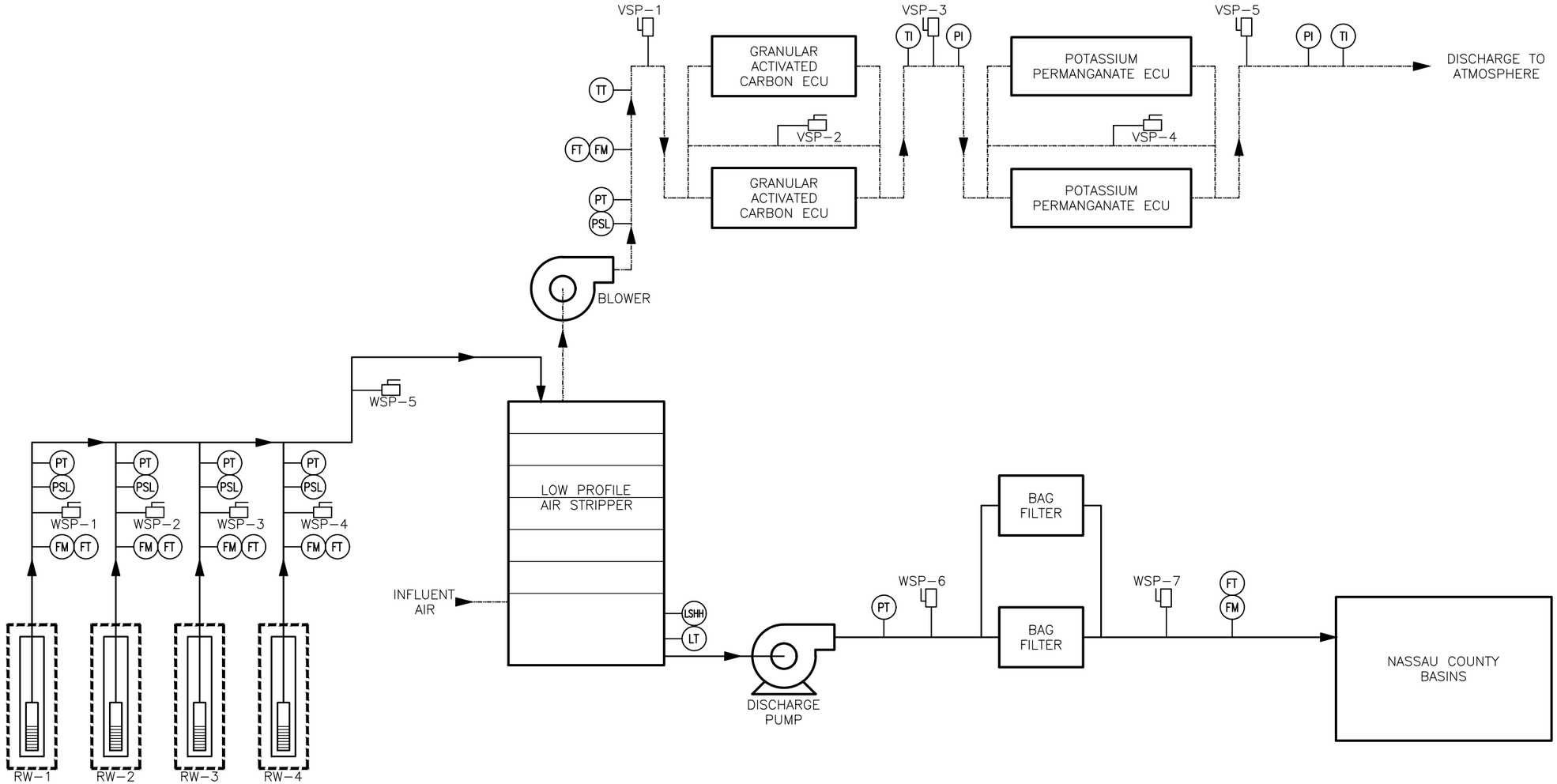
SCALE IN FEET

BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

SITE AND GROUNDWATER CONTAINMENT SYSTEM

ARCADIS Design & Consultancy for natural and built assets

FIGURE 2



LEGEND:

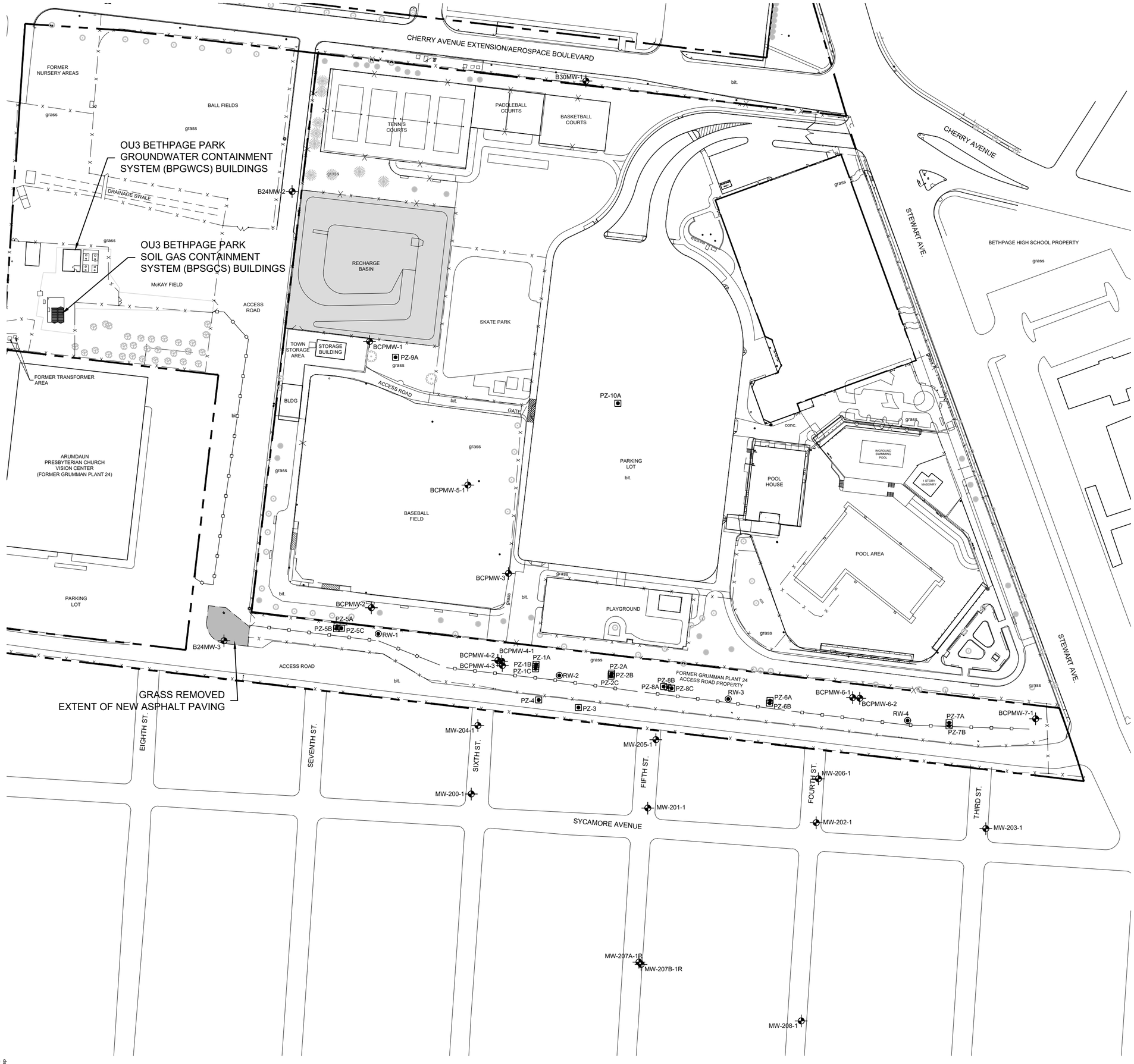
- PROCESS WATER
- PROCESS AIR
- FM — INSTRUMENT
- SAMPLE PORT
- FLOW DIRECTION
- FM FLOW METER
- FT FLOW RATE TRANSMITTER
- PSL PRESSURE VACUUM LOW
- PT PRESSURE TRANSMITTER
- PI PRESSURE INDICATOR
- LSHH LEVEL SWITCH HIGH HIGH
- LT LEVEL TRANSMITTER
- TT TEMPERATURE TRANSMITTER
- TI TEMPERATURE INDICATOR
- WSP WATER SAMPLE PORT
- VSP VAPOR SAMPLE PORT
- ECU EMISSION CONTROL UNIT

BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

GROUNDWATER TREATMENT SYSTEM PROCESS SCHEMATIC AND MONITORING LOCATIONS

ARCADIS Design & Consultancy for natural and built assets

FIGURE 3



EXPLANATION:

- NORTHROP GRUMMAN PROPERTY LINE
- FENCE
- BASIN
- bit. BITUMINOUS PAVEMENT
- MW-200-1 MONITORING WELL
- RW-2 REMEDIAL WELL
- PZ-2C PIEZOMETER

NOTES:

1. MONITORING WELLS, REMEDIAL 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.

0 100' 200'

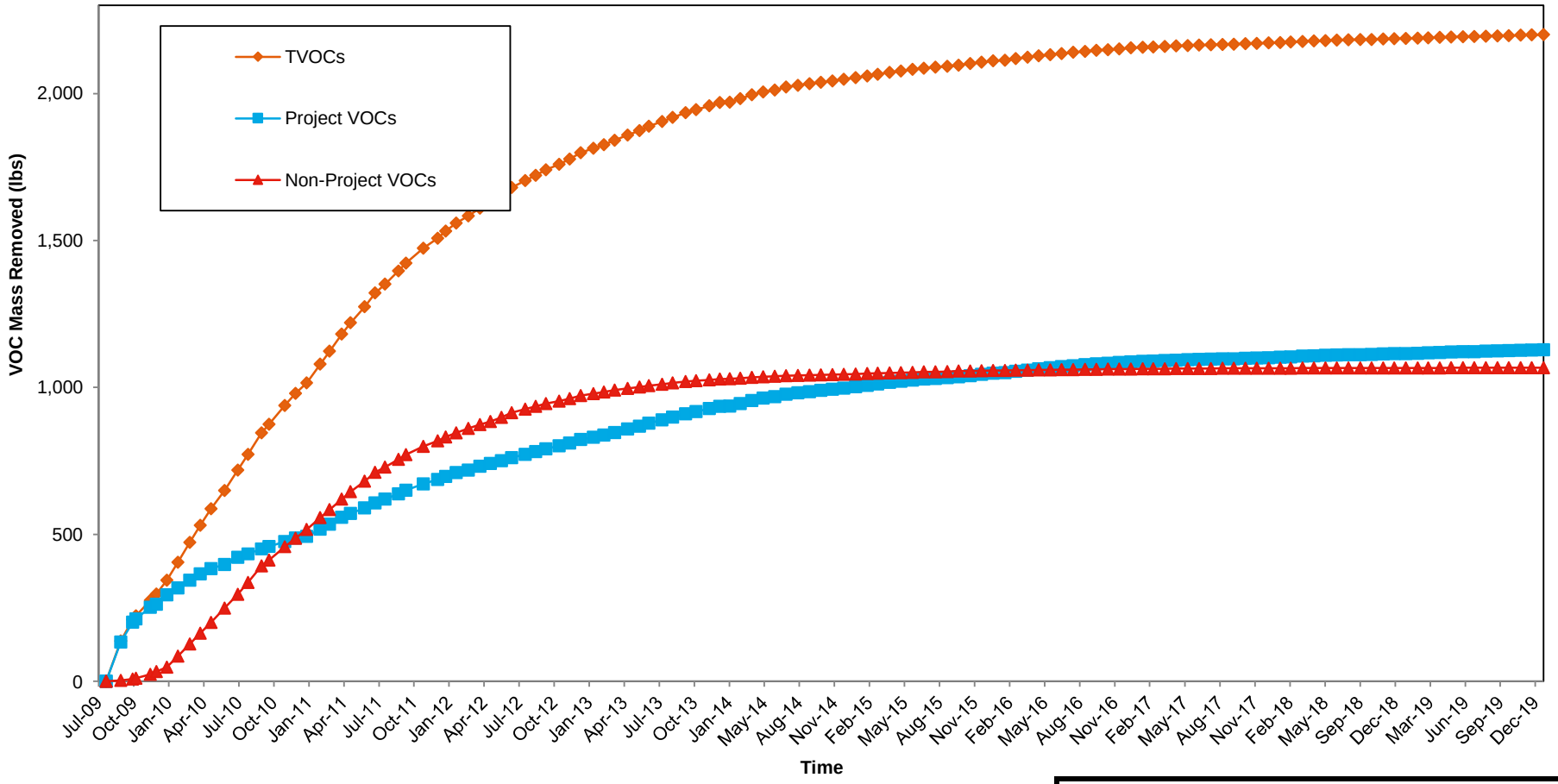
APPROXIMATE SCALE IN FEET

BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

GROUNDWATER MONITORING NETWORK SITE PLAN

ARCADIS Design & Consultancy for natural and built assets

FIGURE 4



Abbreviations, Notes, and Units:

VOC = Volatile Organic Compound
TVOCs = Total VOCs detected

Project VOCs = sum of 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethene; vinyl chloride; cis-1,2-dichloroethene; trans-1,2-dichloroethene; benzene; toluene; and total xylenes.
Non-Project VOCs = sum of VOCs that are not Project VOCs.

lbs = pounds

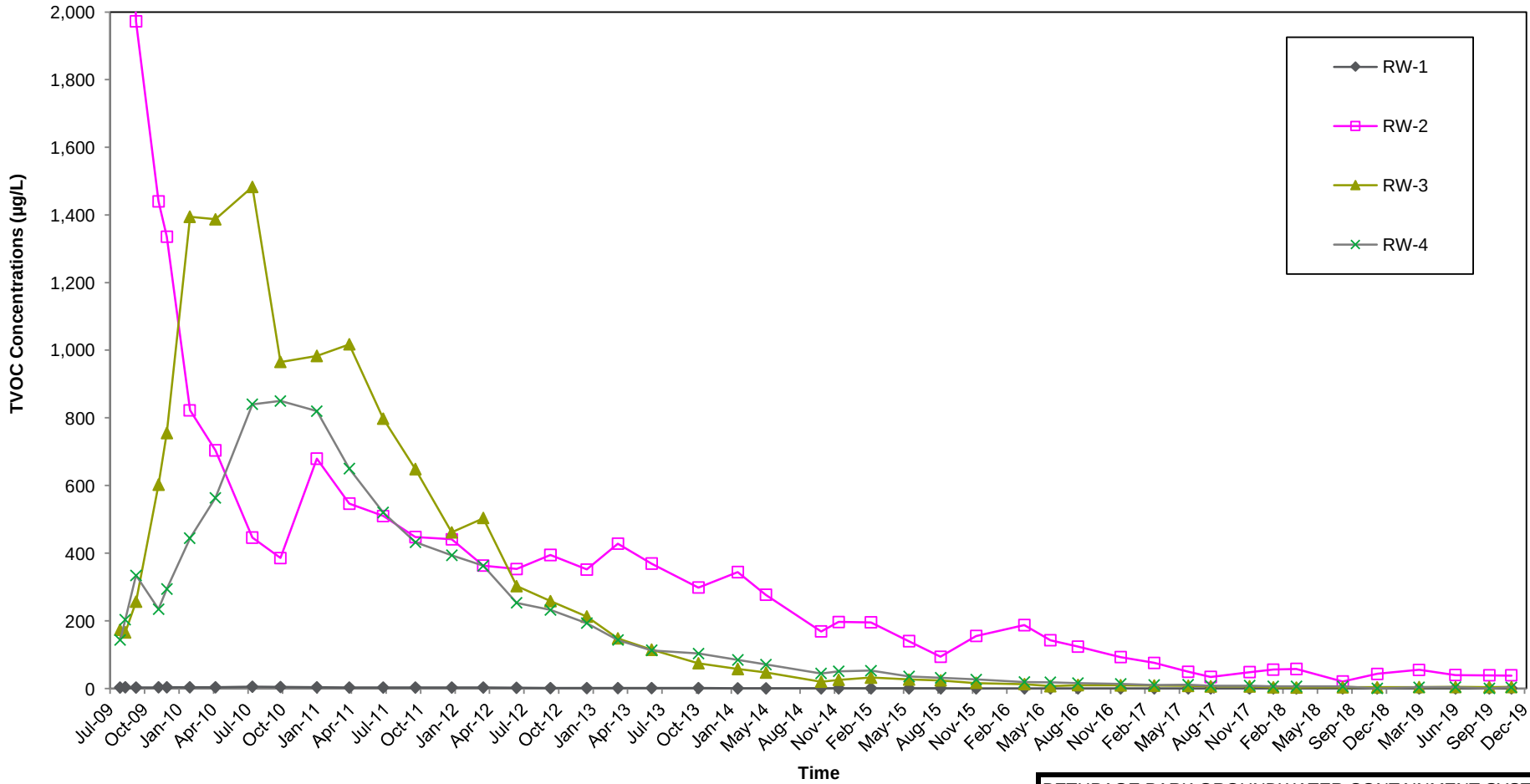
BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

CUMULATIVE TOTAL, PROJECT, AND NON-PROJECT VOC MASS REMOVED

ARCADIS

FIGURE
5

G:\APROJECT\Northrop Grumman Bethpage\OU3.2 Groundwater Containment System\10 Final Reports-Presentations\OM&M Reports\2019 Q4\Raw Files\Q4_Table 2-8Figure 5 TVOC Mass Graph



Abbreviations, Notes, and Units:

VOC = Volatile Organic Compound
TVOCs = Total VOCs detected

1. Results prior to September 10, 2009 are not shown to improve figure clarity. The TVOC concentrations are greater than 2,000 µg/L. See previous reports for full data set.

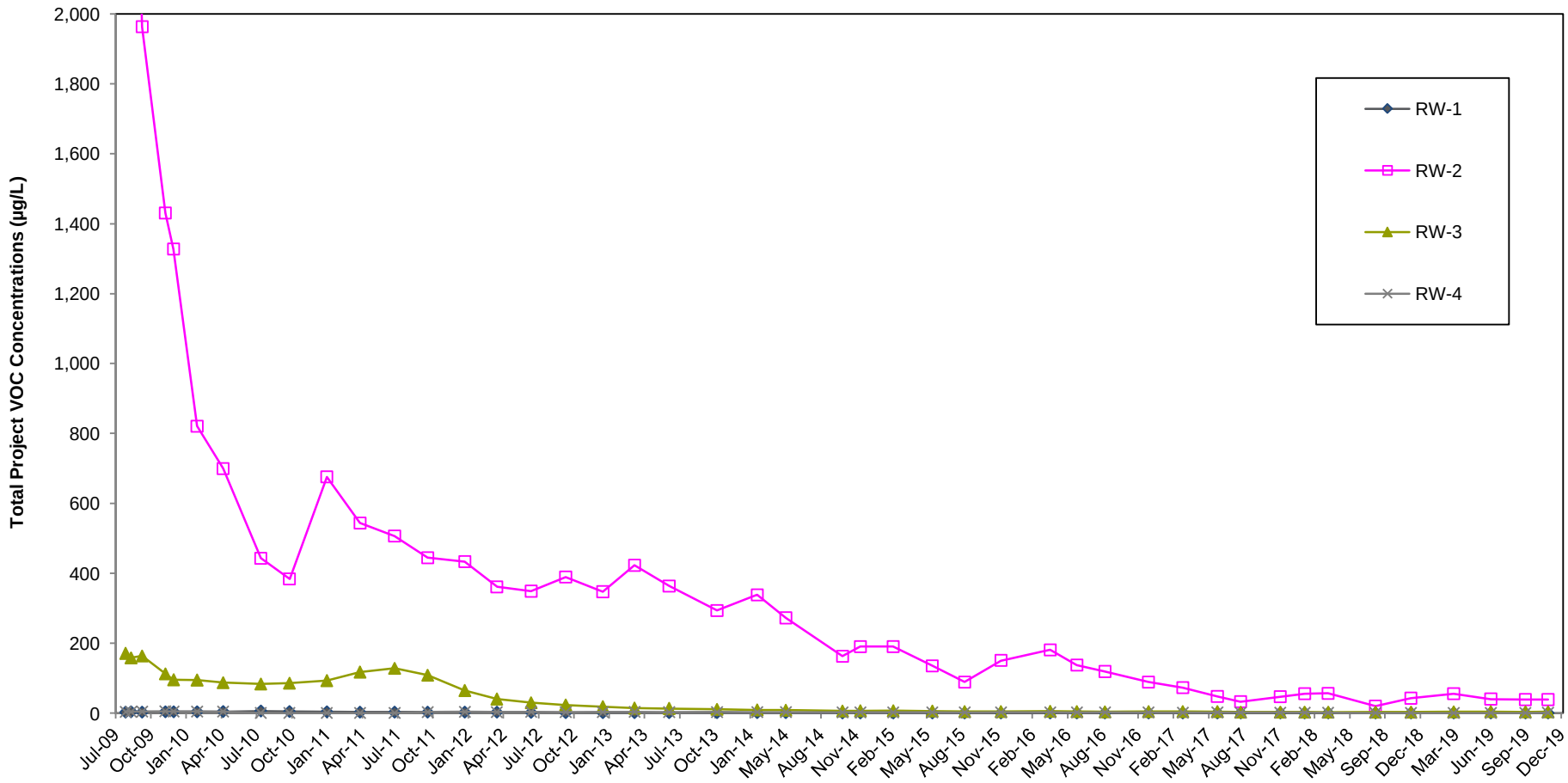
µg/L = micrograms per liter

BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

REMEDIAL WELL TOTAL VOC CONCENTRATIONS

ARCADIS

FIGURE
6A



Abbreviations, Notes, and Units:

VOC = Volatile Organic Compound
TVOCs = Total VOCs detected

Project VOCs = sum of 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethene; vinyl chloride; cis-1,2-dichloroethene; trans-1,2-dichloroethene; benzene; toluene; and total xylenes.

1. Results prior to September 10, 2009 are not shown to improve figure clarity. Total Project VOC concentrations are greater than 2,000 µg/L. See previous reports for full data set.

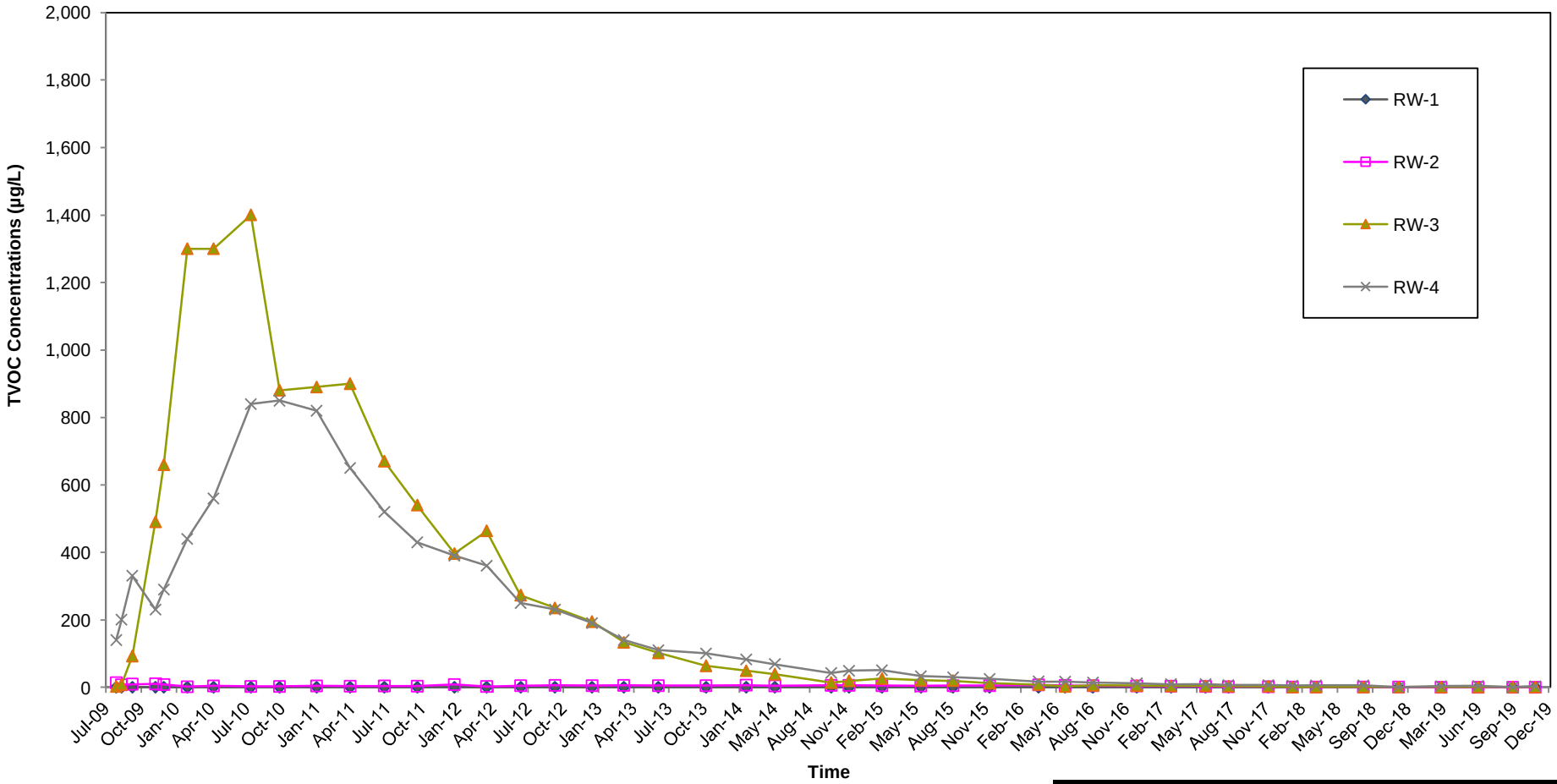
µg/L = micrograms per liter

BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

REMEDIAL WELL PROJECT VOC CONCENTRATIONS

ARCADIS

FIGURE
6B



Abbreviations, Notes, and Units:

VOC = Volatile Organic Compound
TVOCs = Total VOCs detected.

Non-Project VOCs = sum of TVOCs that are not Project VOCs.

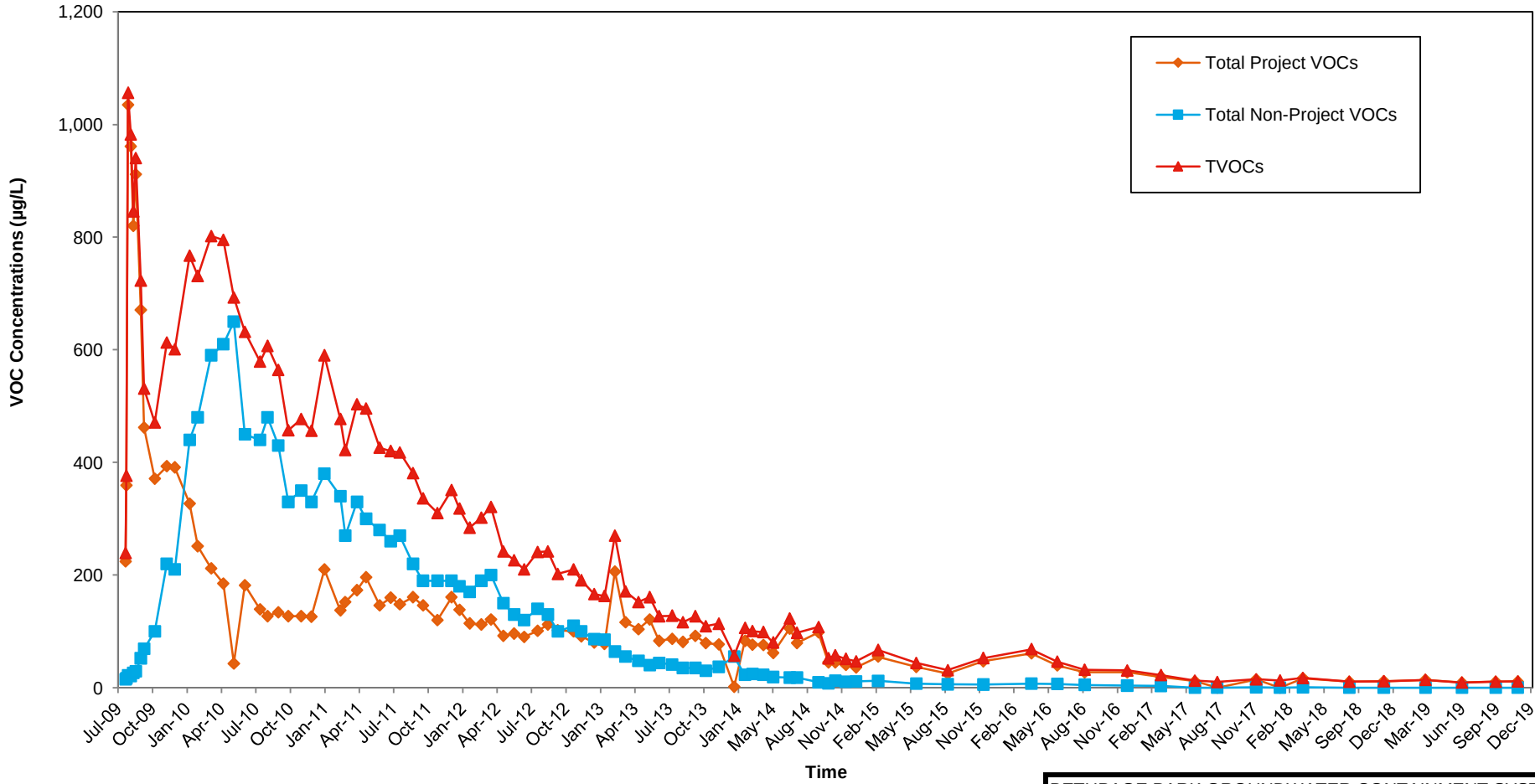
µg/L = micrograms per liter

BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

REMEDIAL WELL NON-PROJECT VOC CONCENTRATIONS

ARCADIS

FIGURE
6C



Abbreviations, Notes, and Units:

VOC = Volatile Organic Compound
TVOCs = Total VOCs detected.

Project VOCs = sum of 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethene; vinyl chloride; cis-1,2-dichloroethene; trans-1,2-dichloroethene; benzene; toluene; and total xylenes.

Non-Project VOCs = sum of VOCs that are not Project VOCs.

µg/L = micrograms per liter

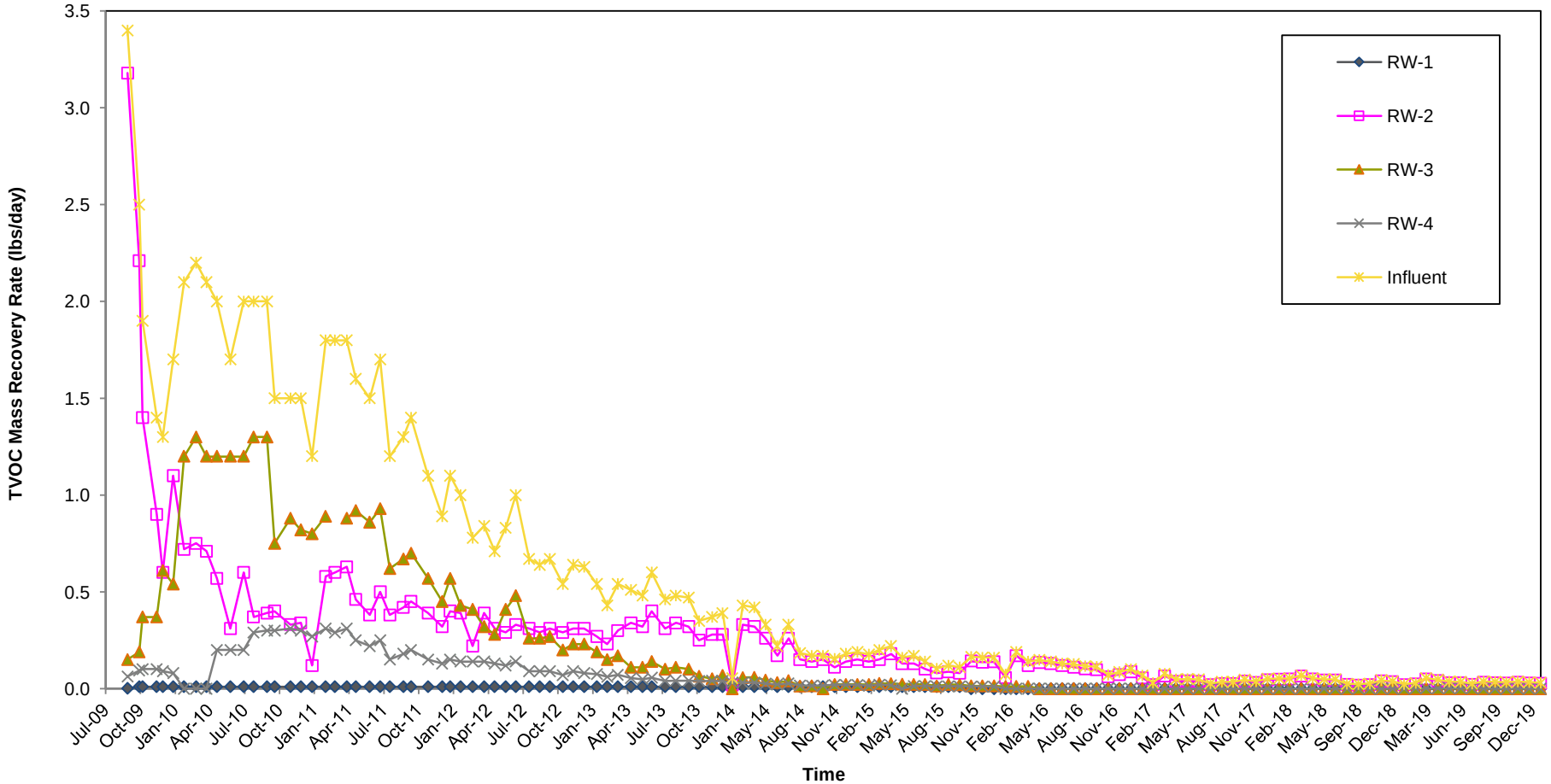
BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

INFLUENT TOTAL, PROJECT AND NON-PROJECT VOC CONCENTRATIONS

ARCADIS

FIGURE 7

G:\APROJECT\Northrop Grumman Bethpage\OU3.2 Groundwater Containment System\10 Final Reports-Presentations\OM&M Reports\2019 Q4\Raw Files\Q4_Table 2-8Figure 7 Comb. Inf. VOC Conc.



Abbreviation, Notes, and Units:

VOC = Volatile Organic Compound
TVOCs = Total VOCs detected

lbs/day = pounds per day

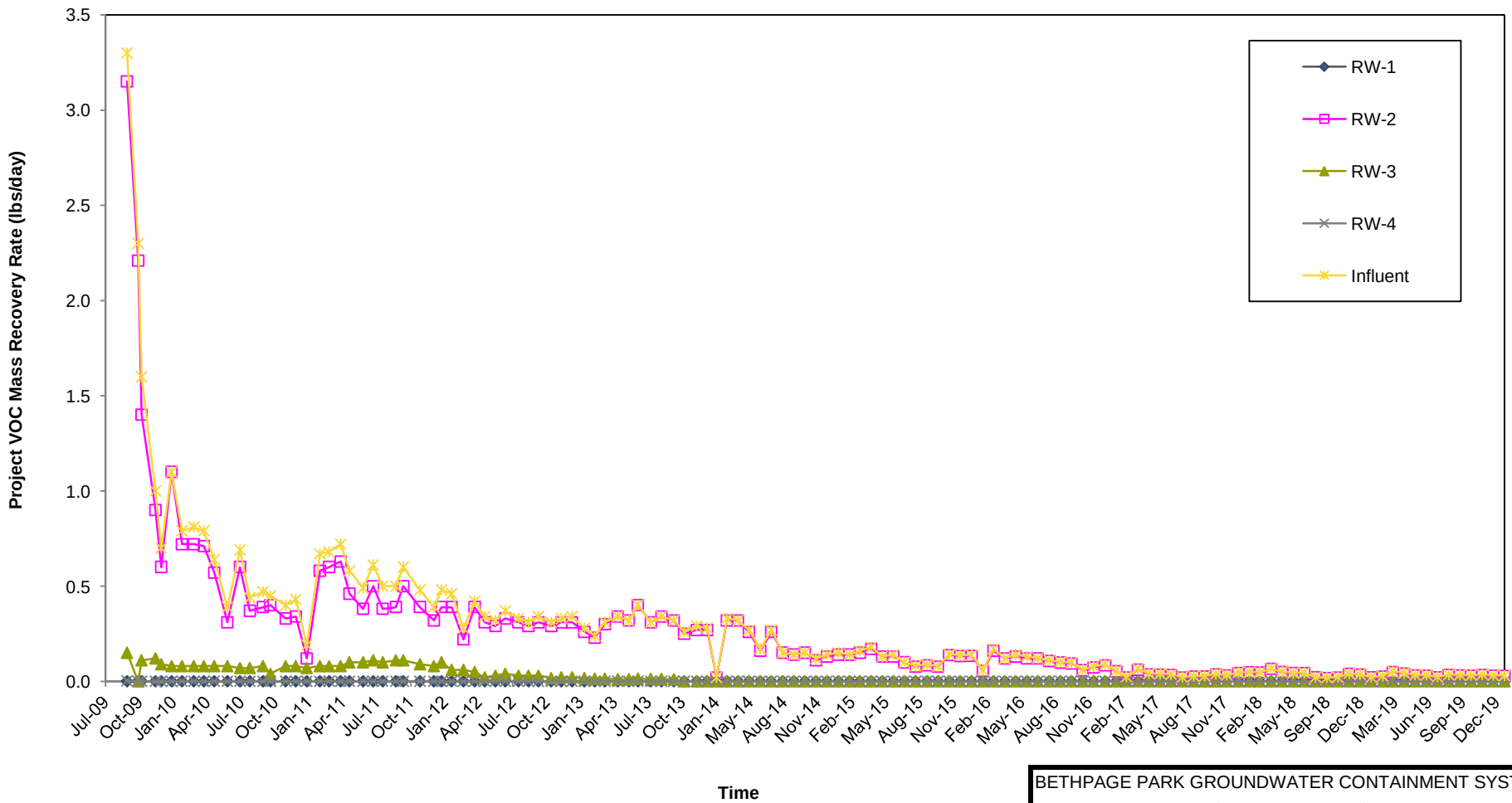
BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

TOTAL VOC MASS RECOVERY RATES

ARCADIS

FIGURE
8A

G:\APROJECT\Northrop Grumman Bethpage\OU3.2 Groundwater Containment System\10 Final Reports-Presentations\OM&M Reports\2019 Q4\Raw Files\Q4_Table 2-8Figure 8A VOC Recovery Rates



Abbreviations, Notes, and Units:

VOC = Volatile Organic Compound

Project VOCs = Sum of 1,1,1-trichloroethane; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethene; vinyl chloride; cis-1,2-dichloroethene; trans-1,2-dichloroethene; benzene; toluene; and total xylenes

lbs/day = pounds per day

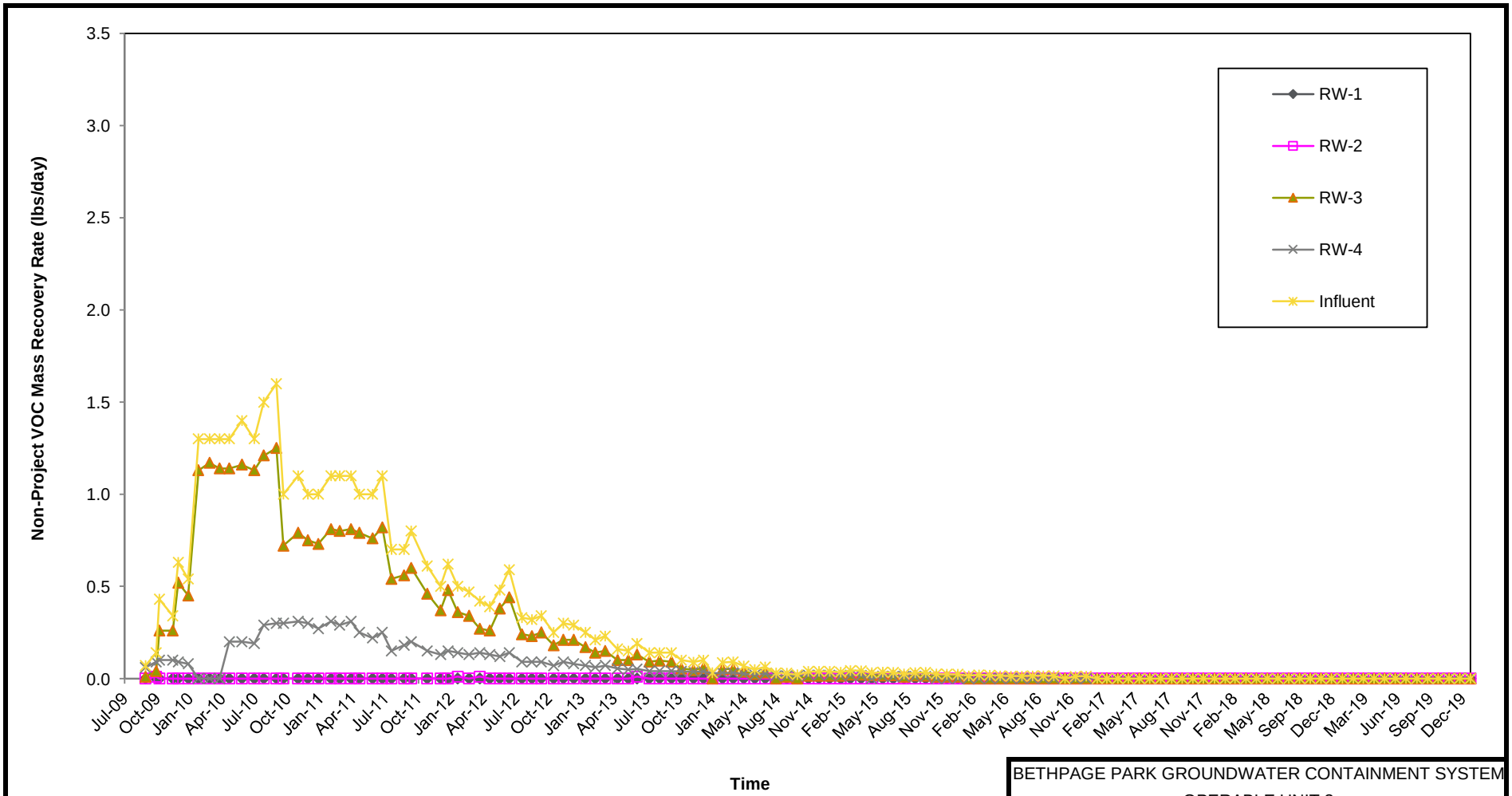
BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

PROJECT VOC MASS RECOVERY RATES

ARCADIS

FIGURE
8B

G:\APROJECT\Northrop Grumman Bethpage\OU3.2 Groundwater Containment System\10 Final Reports-Presentations\OM&M Reports\2019 Q4\Raw Files\Q4_Table 2-8Figure 8B VOC Recovery Rates



Abbreviations, Notes, and Units:

VOC = Volatile Organic Compound

Non-Project VOCs = sum of VOCs that are not Project VOCs.

lbs/day = pounds per day

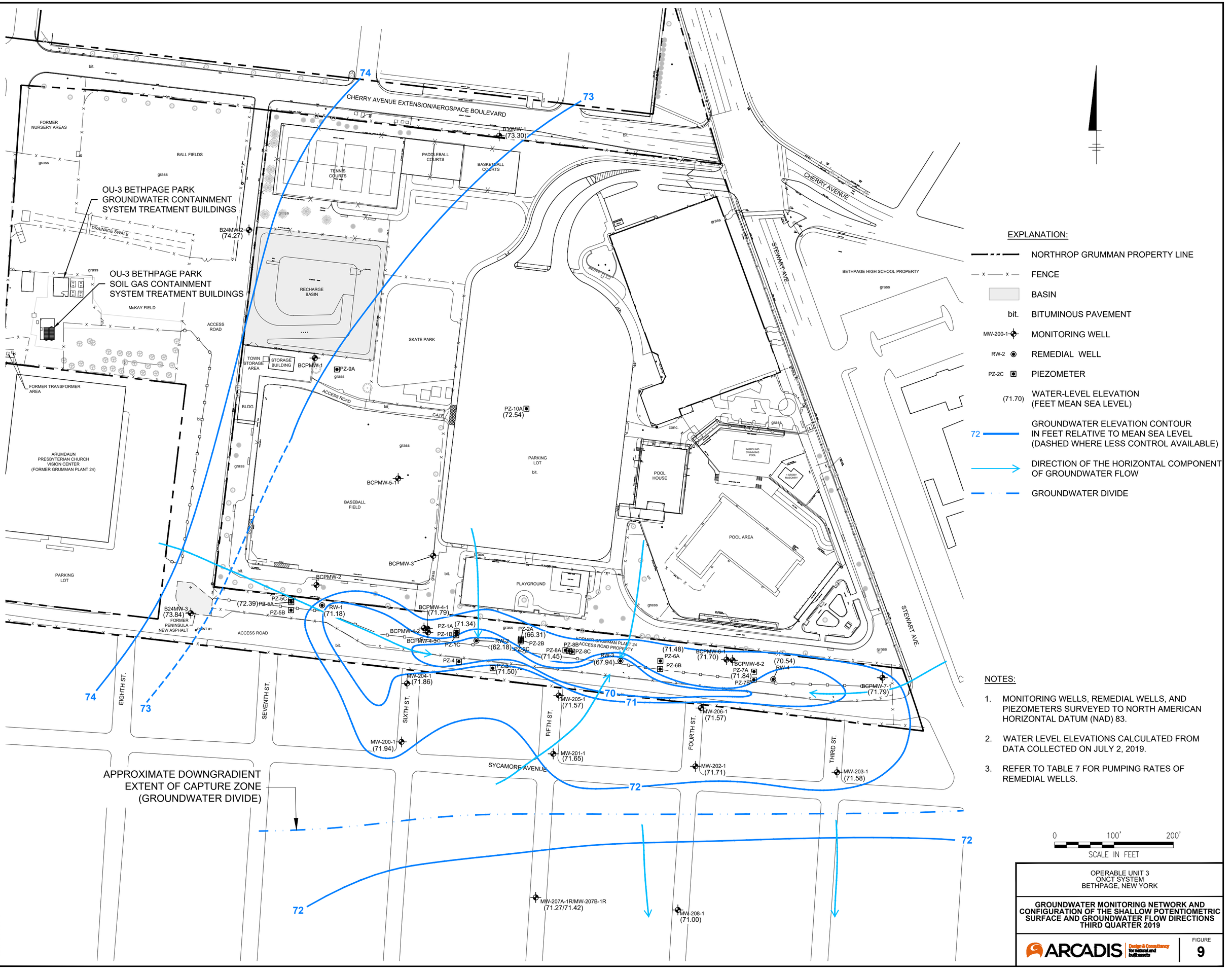
BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

NON-PROJECT VOC MASS RECOVERY RATES

ARCADIS

FIGURE
8C

G:\APROJECT\Northrop Grumman Bethpage\OU3.2 Groundwater Containment System\10 Final Reports-Presentations\OM&M Reports\2019 Q4\Raw Files\Q4_Table 2-8Figure 8C VOC Recovery Rates



NOTES:

1. MONITORING WELLS, REMEDIAL WELLS, AND PIEZOMETERS SURVEYED TO NORTH AMERICAN HORIZONTAL DATUM (NAD) 83.
2. WATER LEVEL ELEVATIONS CALCULATED FROM DATA COLLECTED ON JULY 2, 2019.
3. REFER TO TABLE 7 FOR PUMPING RATES OF REMEDIAL WELLS.

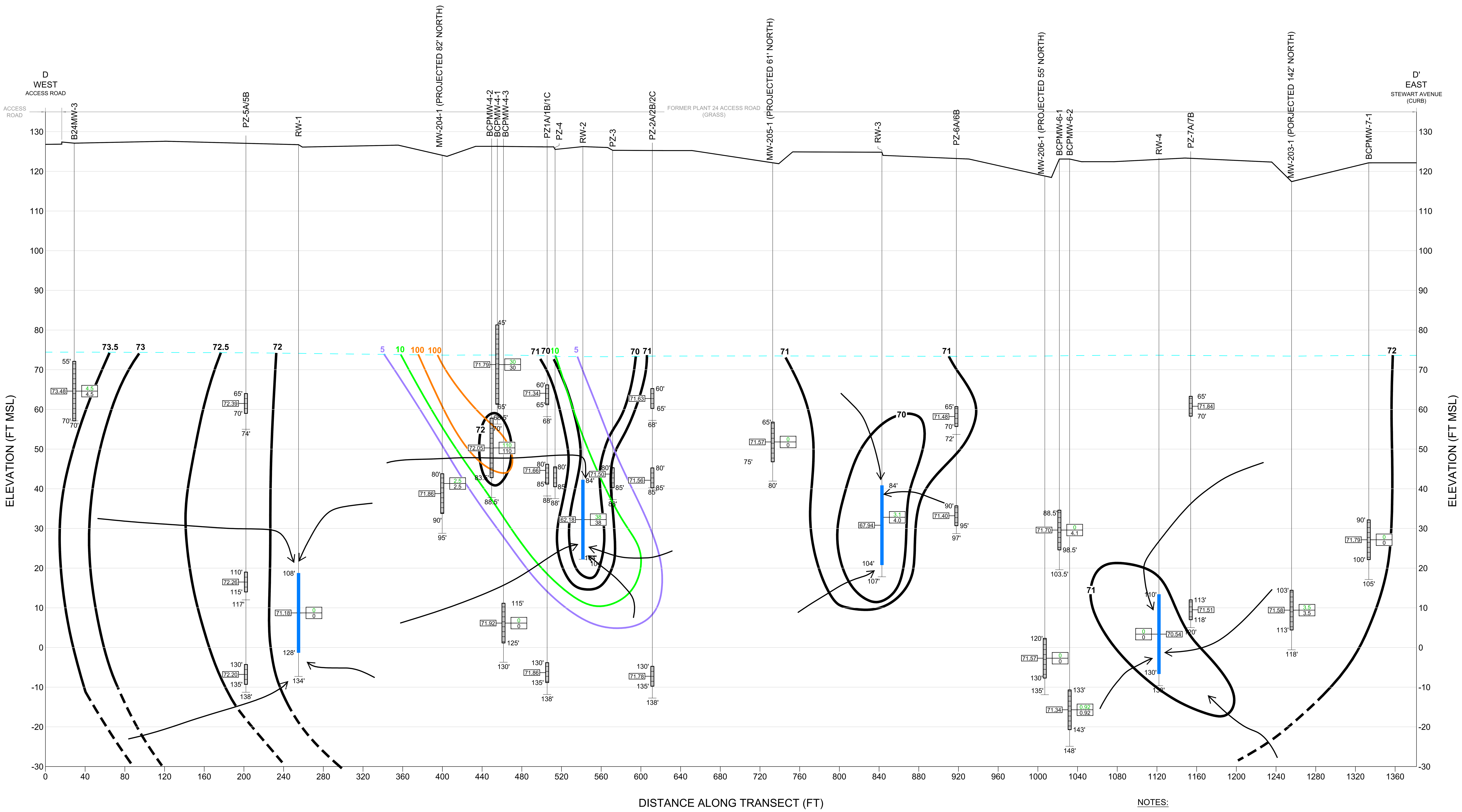
0 100' 200'
SCALE IN FEET

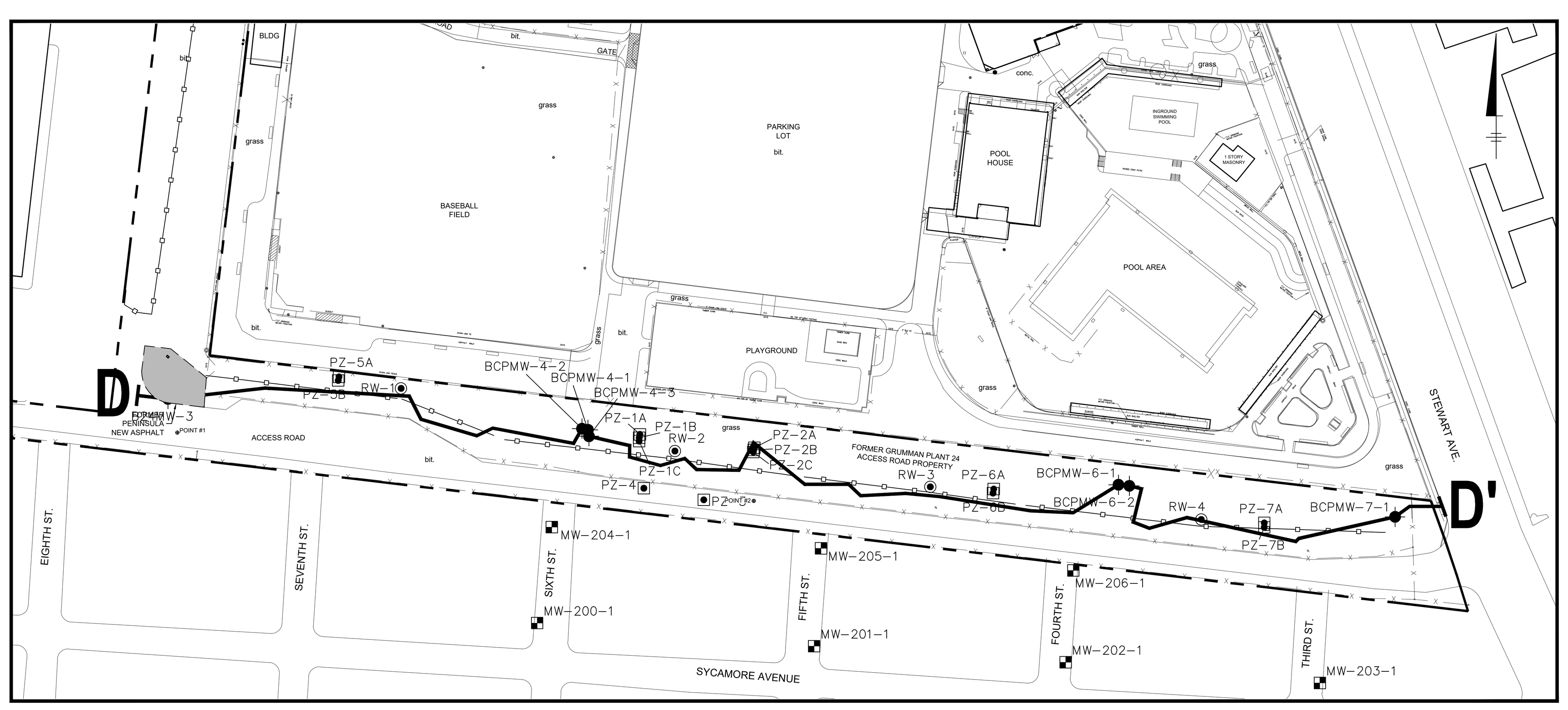
OPERABLE UNIT 3
ONCT SYSTEM
BETHPAGE, NEW YORK

GROUNDWATER MONITORING NETWORK AND CONFIGURATION OF THE SHALLOW POTENTIOMETRIC SURFACE AND GROUNDWATER FLOW DIRECTIONS THIRD QUARTER 2019

ARCADIS Design & Consultancy for natural and built assets

FIGURE 9

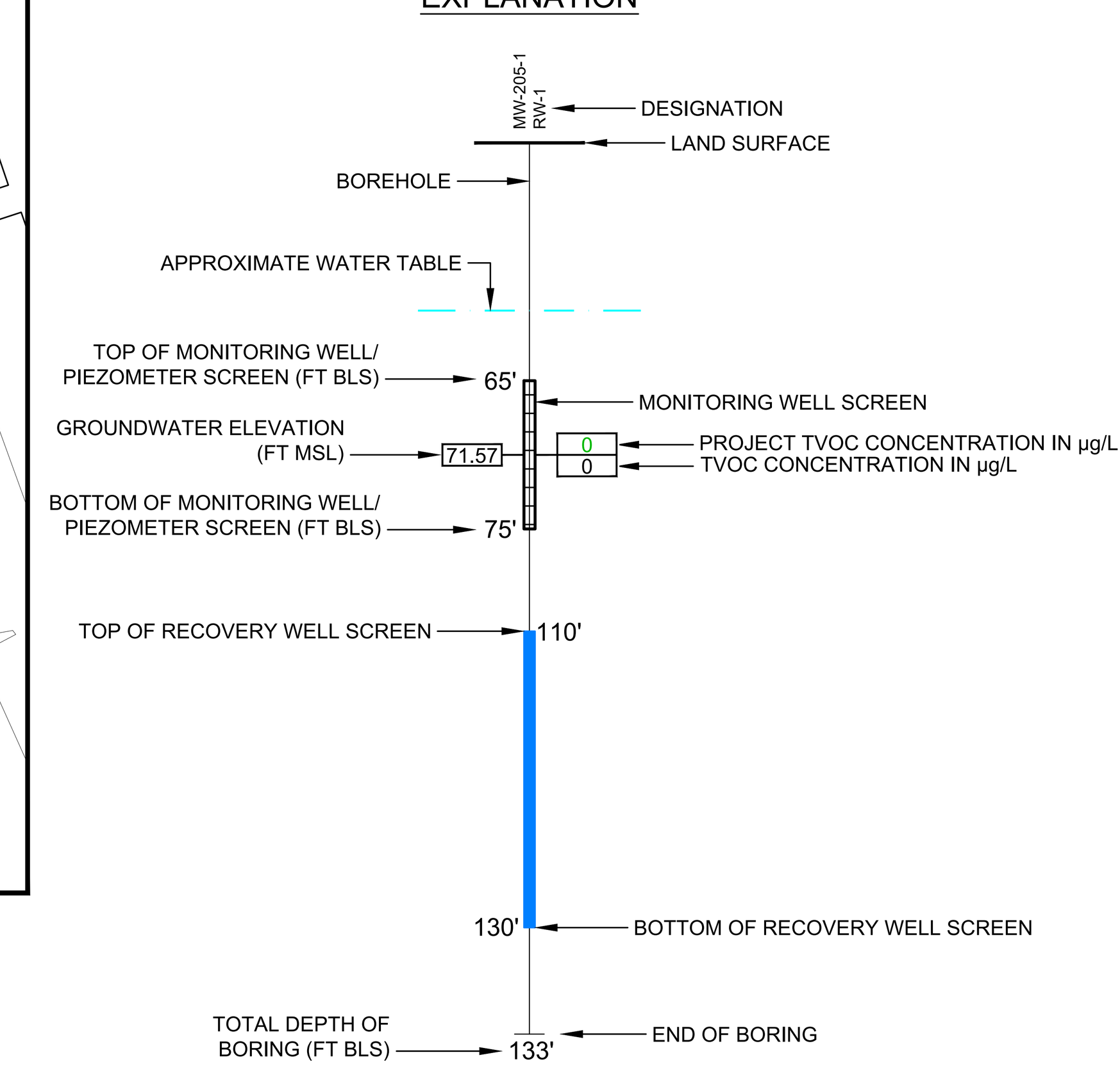




KEY PLAN
SHOWING CROSS SECTION D-D'

0 100' 200'
APPROXIMATE SCALE IN FEET

EXPLANATION



VERTICAL SCALE IN FEET
EXAGGERATION: 4x
0 40
HORIZONTAL SCALE IN FEET

DEFINITIONS:
FT - FEET
MSL - MEAN SEA LEVEL
BLS - BELOW LAND SURFACE
µg/L - MICROGRAMS PER LITER
TVOC - TOTAL VOLATILE ORGANIC COMPOUND
NM - NOT MEASURED

LEGEND:

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

← VERTICAL DIRECTION OF GROUNDWATER FLOW

10 — PROJECT TVOC CONTOUR IN µg/L, DASHED WHERE LESS CONTROL AVAILABLE

NOTES:

1. WATER LEVEL ELEVATIONS CALCULATED FROM DATA COLLECTED ON JULY 2, 2019.
2. WELL TVOC/PROJECT TVOC DATA FROM THE JULY 2019 SAMPLING ROUND. RESULT REPRESENTATIVE OF ENTIRE WELL SCREEN INTERVAL.
3. TVOC CONTOURS ARE BASED ON PROJECT TVOC DATA, SEE NOTE 2 AND 5.
4. APPROXIMATE DOWNGRADIENT EXTENT OF CAPTURE ZONE IS SOUTH OF WELLS MW-200-1, MW-201-1, MW-202-1, AND MW-203-1, SEE FIGURE 9.
5. THE BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM 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.
6. 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. PLEASE REFER TO THE REPORT TABLES FOR LISTS OF PROJECT AND NON-PROJECT VOCS.
7. REFER TO TABLE 7 FOR PUMPING RATES OF REMEDIAL WELLS.

OPERABLE UNIT 3
ONCT SYSTEM
BETHPAGE, NEW YORK

CROSS SECTION D-D' SHOWING TVOCs IN GROUNDWATER AND DIRECTION OF VERTICAL GROUNDWATER FLOW THIRD QUARTER 2019

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FIGURE
10

APPENDIX A

Well Construction Information and Environmental Effectiveness Monitoring Program

Appendix A
Well Construction Information and Environmental Effectiveness Monitoring Program
Bethpage Park Groundwater Containment System
Operable unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

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Well ID	Well Diameter (inches)	Depth to Screen		Screen Length (ft)	Well Depth (ft)	Well Materials	Water Levels [3]	MONITORING ACTIVITY			
		Top (ft bls)	Bottom (ft bls)					WATER QUALITY [4]			
								VOC	SVOC	Cd/Cr	Fe/Mn
Monitoring Wells											
BCPMW-1	2	50	65	15	65	Sch. 40 PVC	Quarterly	Baseline	--	Baseline	--
BCPMW-2	2	60	75	15	75	Sch. 40 PVC	Quarterly	Baseline	--	Baseline	Baseline
BCPMW-3	2	59	74	15	74	Sch. 40 PVC	Quarterly	Baseline	--	Baseline	Baseline
BCPMW-4-1	4	45	65	20	70	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Semiannual	Baseline/Annual	Baseline
BCPMW-4-2	4	68.5	83.5	15	88.5	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Semiannual	Baseline/Annual	Baseline
BCPMW-4-3	4	115	125	10	130	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Semiannual	Baseline/Annual	Baseline
BCPMW-5-1	4	50	65	15	70	Sch. 80 PVC/ SS	Quarterly	Baseline	--	Baseline	Baseline
BCPMW-6-1	4	88.5	98.5	10	103.5	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Semiannual	Baseline/Annual	--
BCPMW-6-2	4	133	143	10	148	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Semiannual	Baseline/Annual	--
BCPMW-7-1	4	90	100	10	105	Sch. 40 PVC	Quarterly	Baseline/Semiannual [5]	Semiannual	Baseline/Annual	--
B24MW-2	2	54	74	20	74	PVC	Quarterly	Baseline/Annual	Annual	Baseline	--
B24MW-3	2	55	70	15	70	PVC	Quarterly	Baseline/Annual	Annual	Baseline	--
B30MW-1	2	57	72	15	72	PVC	Quarterly	Baseline/Annual	Annual	Baseline	--
MW-200-1	4	85	95	10	100	Sch. 40 PVC/ SS	Quarterly	Baseline/Semiannual [5]	Semiannual	Baseline/Annual	--
MW-201-1	4	70	80	10	85	Sch. 40 PVC/ SS	Quarterly	Baseline/Semiannual [5]	Semiannual	Baseline/Annual	--
MW-202-1	4	125	135	10	140	Sch. 40 PVC/ SS	Quarterly	Baseline/Semiannual [5]	Semiannual	Baseline/Annual	--
MW-203-1	4	103	113	10	118	Sch. 40 PVC/ SS	Quarterly	Baseline/Semiannual [5]	Semiannual	Baseline/Annual	--
MW-204-1	4	80	90	10	95	Sch. 40 PVC/ SS	Quarterly	Annual	Annual	--	--
MW-205-1 [6]	4	65	75	10	80	Sch. 40 PVC/ SS	Quarterly	Annual	Annual	--	--
MW-206-1 [6]	4	120	130	10	135	Sch. 40 PVC/ SS	Quarterly	Annual	Annual	--	--
MW-207A-1R [7]	4	120	130	10	135	Sch. 40 PVC/ SS	Quarterly	Annual	Annual	--	--
MW-207B-1R [7]	4	210	220	10	225	Sch. 40 PVC/ SS	Quarterly	Annual	Annual	--	--
MW-208-1 [6]	4	80	90	10	92	Sch. 40 PVC/ SS	Quarterly	Annual	Annual	--	--
Remedial Wells [4]											
RW-01	8	108	128	20	134	Sch. 80 PVC/SS	Quarterly	Baseline/Quarterly	Quarterly	Baseline/Annual	--
RW-02	6	84	104	20	104	Steel/SS	Quarterly	Baseline/Quarterly	Quarterly	Baseline/Annual	--
RW-03	8	84	104	20	107	Sch. 80 PVC/SS	Quarterly	Baseline/Quarterly	Quarterly	Baseline/Annual	--
RW-04	8	110	130	20	133	Sch. 80 PVC/SS	Quarterly	Baseline/Quarterly	Quarterly	Baseline/Annual	--

Notes and Abbreviations on Last Page

Well ID	Well Diameter (inches)	Depth to Screen		Screen Length (ft)	Well Depth (ft)	Well Materials	Water Levels [3]	MONITORING ACTIVITY			
								WATER QUALITY [4]			
		Top (ft bls)	Bottom (ft bls)					VOC	SVOC	Cd/Cr	Fe/Mn
Piezometers											
PZ-01a	2	60	65	5	68	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-01b	1	80	85	5	88	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-01c	1	130	135	5	138	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-02a	2	60	65	5	68	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-02b	1	80	85	5	85	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-02c	1	130	135	5	138	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-03	1	80	85	5	88	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-04	1	80	85	5	88	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-05a	2	65	70	5	74	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-05b	1	110	115	5	117	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-05c [6]	2	130	135	5	138	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-06a	2	65	70	5	72	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-06b	1	90	95	5	97	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-07a	2	65	70	5	72	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-07b	1	113	118	5	120	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-08a [6]	2	60	65	5	68	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-08b [6]	2	80	85	5	88	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-08c [6]	2	130	135	5	138	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-09a [6]	2	57	62	5	67	Sch. 40 PVC	Quarterly	--	--	--	--
PZ-10a [6]	2	65	70	5	75	Sch. 40 PVC	Quarterly	--	--	--	--

Notes and Abbreviations on Last Page

Notes and Abbreviations:

(1) Water samples will be collected and analyzed in accordance with the method and procedures described in the BPGWCS OM&M Manual (Arcadis 2016) .

(2) Approximate locations of the wells and piezometers in the OU3 BPGWCS Monitoring Program are shown in Figure 4.

(3) Water Levels will be measured in all wells/piezometers during the baseline monitoring event in accordance with the procedures presented in the BPGWCS OM&M Manual (Arcadis 2016) .

(4) See BPGWCS OM&M Manual (Arcadis 2016) for details of water quality analysis.

(5) Semiannual wells will be monitored annually after Year 1.

(7) Wells installed by ERM in 2015.

(8) Wells installed by EMAGIN in 2017.

Sch. 80 PVC: schedule 80 polyvinyl chloride
Sch. 40 PVC: schedule 40 polyvinyl chloride
BPGWCS: Bethpage Park Groundwater Containment System
SS: stainless steel
Steel: low carbon steel
ft: feet
ft bls: feet below land surface

Table 2. Remedial System Monitoring Program, Bethpage Park Groundwater Containment System, Operable Unit 3 (Former Grumman Settling Ponds), Northrop Grumman Systems, Corporation, Bethpage, New York. [1]

Sample Location/Instrument [1]	Parameter (Method) [2]	Frequency	
		Long-Term [3]	SCADA Data Acquisition
Water Samples [4]			
Remedial Well 1 (WSP-1)	VOCs (USEPA 8260)	Quarterly	NA
	Iron (USEPA 6010)	Annually	NA
	1,4-Dioxane (USEPA 8270)	Quarterly	NA
Remedial Well 2 (WSP-2)	VOCs (USEPA 8260)	Quarterly	NA
	Iron (USEPA 6010)	Annually	NA
	1,4-Dioxane (USEPA 8270)	Quarterly	NA
Remedial Well 3 (WSP-3)	VOCs (USEPA 8260)	Quarterly	NA
	Iron (USEPA 6010)	Annually	NA
	1,4-Dioxane (USEPA 8270)	Quarterly	NA
Remedial Well 4 (WSP-4)	VOCs (USEPA 8260)	Quarterly	NA
	Iron (USEPA 6010)	Annually	NA
	1,4-Dioxane (USEPA 8270)	Quarterly	NA
Air Stripper Influent (WSP-5)	VOCs (USEPA 8260)	Quarterly	NA
	Iron (USEPA 6010)	Quarterly	NA
	1,4-Dioxane (USEPA 8270)	Quarterly	NA
Air Stripper Effluent (WSP-6)	Iron (USEPA 6010)	As Needed	NA
Plant Effluent (WSP-7)	**VOCs (USEPA 8260)**	**Monthly**	NA
	1,4-Dioxane (USEPA 8270)	**Monthly**	NA
	Iron (USEPA 6010)	**Monthly**	NA
	ph (field)	**Monthly**	NA
	Mercury	**Monthly**	NA
Air Samples [4] [5]			
Air Stripper Effluent/ECU-1 Influent (VSP-1)	VOCs (TO-15 Modified)	Quarterly	NA
ECU-1 Effluent/ECU-2 Influent (VSP-2)	VOCs (TO-15 Modified)	As Needed	NA
ECU-2 Effluent/ECU-3 Influent (VSP-3)	VOCs (TO-15 Modified)	As Needed	NA
ECU-3 Effluent/ECU-4 Influent (VSP-4)	VOCs (TO-15 Modified)	As Needed	NA
Total Effluent (VSP-5)	**VOCs (TO-15 Modified)**	**Quarterly**	NA

Table 2. Remedial System Monitoring Program, Bethpage Park Groundwater Containment System, Operable Unit 3 (Former Grumman Settling Ponds), Northrop Grumman Systems, Corporation, Bethpage, New York. [1]

Sample Location/Instrument [1]	Parameter (Method) [2]	Frequency	
		Long-Term [3]	SCADA Data Acquisition
Water Flow Measurements			
Remedial Well RW-1 (FT - 110)	Flow rate (gpm + total gal.)	Weekly	Continuously
Remedial Well RW-2 (FT - 120)	Flow rate (gpm + total gal.)	Weekly	Continuously
Remedial Well RW-3 (FT - 130)	Flow rate (gpm + total gal.)	Weekly	Continuously
Remedial Well RW-4 (FT - 140)	Flow rate (gpm + total gal.)	Weekly	Continuously
Combined Influent (FR - 200)	Flow rate (gpm + total gal.)	Weekly	Continuously
System Effluent (FT-700)	Flow rate (gpm + total gal.)	Weekly	Continuously
Air Flow Measurements			
Air Stripper Effluent (FT-500)	Flow rate (SCFM)	Weekly	Continuously
Water Pressure Measurements			
Remedial Well RW-1 (PT - 110)	Pressure (i.w.g.)	Weekly	Continuously
Remedial Well RW-2 (PT - 120)	Pressure (i.w.g.)	Weekly	Continuously
Remedial Well RW-3 (PT - 130)	Pressure (i.w.g.)	Weekly	Continuously
Remedial Well RW-4 (PT - 140)	Pressure (i.w.g.)	Weekly	Continuously
Air Stripper Effluent (PT-700)	Pressure (i.w.g.)	Weekly	Continuously
Air Temperature & Relatively Humidity Measurements			
Air Stripper Effluent (TT-500)	Temperature	Weekly	Continuously
ECU Mid-Train (TI-503)	Temperature	Weekly	NA
Effluent (TI-603)	Temperature	Weekly	NA

Table 2. Remedial System Monitoring Program, Bethpage Park Groundwater Containment System, Operable Unit 3 (Former Grumman Settling Ponds), Northrop Grumman Systems, Corporation, Bethpage, New York. (1)

Sample Location/Instrument (1)	Parameter (Method) (2)	Frequency	
		Long-Term (3)	SCADA Data Acquisition
Air Pressure Measurements			
Air Stripper Effluent (PT-500)	Pressure (i.w.g.)	Quarterly	Continuously
ECU #1 Influent (PI-501)	Pressure (i.w.g.)	Quarterly	NA
ECU #2 Influent (PI-502)	Pressure (i.w.g.)	Quarterly	NA
ECU #3 Influent (PI-601)	Pressure (i.w.g.)	Quarterly	NA
ECU #4 Influent (PI-602)	Pressure (i.w.g.)	Quarterly	NA
System Effluent (PI-603)	Pressure (i.w.g.)	Quarterly	NA

Notes:

(1) Refer to Appendix E of the Operation, Maintenance and Monitoring Manual for a diagram showing referenced sample locations and measurement points.

(2) Parameters/methods may be modified based on review of short-term and/or long-term testing results. Parameters shown in **Bold** indicate parameters that require NYSDEC notification/approval prior to change in monitoring schedule.

(3) Long-term schedule is tentative. Modification may be required/recommended based on the results of water quality trends.

(4) Samples will be analyzed in accordance with the methods and procedures described in the Sampling and Analysis Plan.

(5) Additional air samples will be collected to help calculate media usage rates and to help determine media changeout frequencies.

Acronyms:

NA	Not applicable	NYSDEC	New York State Department of Environmental Conservation
ECU	Emissions control unit	EPA	U.S. Environmental Protection Agency
VOCs	Volatile organic compounds	SCADA	Supervisory Control And Data Acquisition
gal.	Gallons		
gpm	Gallons per minute		
i.w.g.	Inches water gauge		

APPENDIX B

Compliance and Performance Program

Appendix B-1
Compliance and Performance Program Elements
Bethpage Park Groundwater Containment System
Operable Unit 3 (Former Grumman Settling Ponds)
Bethpage, New York

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Sample Location/Instrument [1]	Parameter (Method) [2]	Frequency			
		Short-Term [3]		Long-Term [4]	SCADA Data Acquisition
		(First month)	(Five month period following first month)		
Water Samples [5]					
Remedial Well 1 (WSP-1)	VOCs (USEPA Method 8260C)	Bi-Weekly	Quarterly	Quarterly	NA
	Iron (USEPA 6010C)	Bi-Weekly	Annually	Annually	NA
	Cadmium and Chromium (USEPA 6010C)[11]				
	---		Annually	Annually	NA
	1,4-Dioxane (USEPA Method 522)[12]		Quarterly	Quarterly	NA
Remedial Well 2 (WSP-2)	VOCs (USEPA Method 8260C)	Bi-Weekly	Quarterly	Quarterly	NA
	Iron (USEPA 6010C)	Bi-Weekly	Annually	Annually	NA
	Cadmium and Chromium (USEPA 6010C)[11]				
	---		Annually	Annually	NA
	1,4-Dioxane (USEPA Method 522)[12]		Quarterly	Quarterly	NA
Remedial Well 3 (WSP-3)	VOCs (USEPA Method 8260C)	Bi-Weekly	Quarterly	Quarterly	NA
	Iron (USEPA 6010C)	Bi-Weekly	Annually	Annually	NA
	Cadmium and Chromium (USEPA 6010C)[11]				
	---		Annually	Annually	NA
	1,4-Dioxane (USEPA Method 522)		Quarterly	Quarterly	NA
Remedial Well 4 (WSP-4)	VOCs (USEPA Method 8260C)	Bi-Weekly	Quarterly	Quarterly	NA
	Iron (USEPA 6010C)	Bi-Weekly	Annually	Annually	NA
	Cadmium and Chromium (USEPA 6010C)[11]				
	---		Annually	Annually	NA
	1,4-Dioxane (USEPA Method 522)[12]		Quarterly	Quarterly	NA
Air Stripper Influent (WSP-5)	VOCs (USEPA Method 8260C)	1-hr [6]; Days 1, 3, & Weekly	Monthly	Quarterly	NA
	Iron (USEPA 6010C)	1-hr [6]; Days 1, 3, & Weekly	Monthly	Quarterly	NA
	1,4-Dioxane (USEPA Method 522)[12]		Quarterly	Quarterly	NA
Air Stripper Effluent (WSP-6)	Iron (USEPA 6010C)	1-hr [6]; As Needed	As Needed	As Needed	NA
Plant Effluent (WSP-7)	**VOCs (USEPA Method 8260C and 624)[13]**	**1-hr [6]; Days 1, 3, & Weekly**	**Monthly**	**Monthly**	NA
	Iron (USEPA 6010C)	**1-hr [6]; Days 1, 3, & Weekly**	**Monthly**	**Monthly**	NA
	Mercury (USEPA 7470A) [7]	**1-hr [6]; Days 1, 3, & Weekly**	**Monthly**	**Monthly**	NA
	1,4-Dioxane (USEPA Method 522)[12]		**Monthly**	**Monthly**	NA
	Cadmium and Chromium (USEPA 6010C)[11]				
	---		**Quarterly**	**Quarterly**	NA
	Total Nitrogen, Nitrate + Nitrite (USEPA Method 353.2)[13]		**Monthly**	**Monthly**	NA
	TKN (USEPA Method 351.2)[13]		**Monthly**	**Monthly**	NA
	pH (field) [8]	**1-hr [6]; Days 1, 3, & Weekly**	**Monthly**	**Monthly**	NA
	and		Quarterly	Quarterly	NA
Air Samples [9] [10]					
Air Stripper Effluent/ECU-1 Influent (VSP-1)	VOCs (TO-15 Modified)	Monthly	Monthly	Quarterly	NA
ECU-1 Effluent/ECU-2 Influent (VSP-2)	VOCs (TO-15 Modified)	As Needed	As Needed	As Needed	NA
ECU-2 Effluent/ECU-3 Influent (VSP-3)	VOCs (TO-15 Modified)	As Needed	As Needed	As Needed	NA
ECU-3 Effluent/ECU-4 Influent (VSP-4)	VOCs (TO-15 Modified)	As Needed	As Needed	As Needed	NA
Total Effluent (VSP-5)	**VOCs (TO-15 Modified)**	**Monthly**	**Monthly**	**Quarterly**	NA

See notes on last page.

Sample Location/Instrument [1]	Parameter (Method) [2]	Frequency			
		Short-Term [3]		Long-Term [4]	SCADA Data Acquisition
		(First month)	(Five month period following first month)		
Water Flow Measurements					
Remedial Well RW-1 (FT - 110)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-2 (FT - 120)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-3 (FT - 130)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-4 (FT - 140)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Combined Influent (FR - 200)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
System Effluent (FT-700)	Flow rate (gpm + total gal.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Air Flow Measurements					
Air Stripper Effluent (FT-500)	Flow rate (SCFM)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Water Pressure Measurements					
Remedial Well RW-1 (PT - 110)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-2 (PT - 120)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-3 (PT - 130)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Remedial Well RW-4 (PT - 140)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Air Stripper Effluent (PT-700)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Weekly	Weekly	Continuously
Air Temperature & Relatively Humidity Measurements					
Air Stripper Effluent (TT-500)	Temperature	Weekly	Weekly	Weekly	Continuously
ECU Mid-Train (TI-503)	Temperature	Weekly	Weekly	Weekly	NA
Effluent (TI-603)	Temperature	Weekly	Weekly	Weekly	NA
Air Pressure Measurements					
Air Stripper Effluent (PT-500)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	Continuously
ECU #1 Influent (PI-501)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	NA
ECU #2 Influent (PI-502)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	NA
ECU #3 Influent (PI-601)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	NA
ECU #4 Influent (PI-602)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	NA
System Effluent (PI-603)	Pressure (i.w.g.)	(Daily -1st week) Weekly	Monthly	Quarterly	NA

See notes on last page.

Abbreviations, Notes and Units:

(1) Refer to Figure 3 of this Operation, Maintenance, & Monitoring (OM&M) Report and Appendix E of the Groundwater IRM OM&M Manual (OM&M Manual (ARCADIS 2009)) for a diagram showing referenced sample locations and measurement points.
(2) Parameters/methods may be modified based on review of short-term and/or long-term testing results. Parameters shown in **Bold** indicate parameters that require NYSDEC notification/approval prior to change in monitoring schedule.
(3) Short-term schedule is tentative. Modification may be required/recommended based on the results of start-up and performance testing.
(4) Long-term schedule is tentative. Modification may be required/recommended based on the results of short-term testing or water quality trends.
(5) Water samples will be collected in accordance with the methods described in the Sampling and Analysis Plan, which is included as Appendix A of the OM&M Manual (ARCADIS 2009). Samples will be analyzed in accordance with the methods and procedures described in the Sampling and Analysis Plan.
(6) Per NYSDEC request, a 1-hr pilot test was performed during system shake-down. The 1-hr pilot test samples were also analyzed for Mercury (Hg).
(7) Per the interim treated effluent (water) discharge criteria provided in the NYSDEC letter dated March 19, 2009, select samples were analyzed for Mercury (Hg).
(8) As authorized by the NYSDEC, the pH monitoring frequency was reduced from weekly to monthly beginning on February 8, 2010.
(9) Air samples collected and analyzed in accordance with methods described in the Sampling and Analysis Plan, which is included as Appendix A of the OM&M Manual (ARCADIS 2009).
(10) Additional air samples will be collected to help calculate media usage rates and to help determine media changeout frequencies.
(11) Cadium and Chromium analyses are part of the Environmental Effectiveness Monitoring Program (Table A-1) and the original discharge permit application. They are included here for consistency.
(12) As of July 11 2018, 1,4-Dioxane is analyzed per USEPA Method 8270-SIM-CLLE.
(13) As of November 2017, plant effluent was analyzed for permit equivalency Volatile Organic Compounds (VOCs) using USEPA Method 624; Total Nitrogen is calculated as the sum of Nitrogen, (Nitrate+Nitrite) and Total Kjeldahl Nitrogen (TKN), (CAS number: 14797-55-8, 14797-65-0, and 7727-37-9, respectively) by USEPA Methods 353.2 and 351.2, respectively; Total Iron and Manganese using USEPA Method 200.7.

ECU	Emissions Control Unit
EPA	U.S. Environmental Protection Agency
NA	Not Applicable
---	Not Required
NYSDEC	New York State Department of Environmental Conservation
OM&M	Operation, Maintenance and Monitoring
SCADA	Supervisory Control And Data Acquisition
SPDES	State Pollutant Discharge Elimination System
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds (refer Tables D-3 and D-5 in the Quality Assurance Project Plan (QAPP) (Appendix D of the OM&M Manual (ARCADIS 2009)) for the analyte lists for aqueous and air samples, respectively)
gal	gallons
gpm	gallons per minute
i.w.g.	inches water gauge

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