AECOM Environment

Prepared for:
Superfund Standby Program
NYSDEC
625 Broadway
Albany, New York 12233

Prepared by:
AECOM
Latham, New York
January 2017

Three-Year Periodic Review Report
September 2013 – September 2016
Armonk Private Wells Site
Site No. 3-60-005
Work Assignment No. D007626-27

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Engineering Certification

For each institutional or engineering control identified for the site, I, Daniel Servetas, certify that all of the following statements are true:

(a) the institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by DER;

(b) nothing has occurred that would impair the ability of such control to protect public health and the environment;

(c) nothing has occurred that would constitute a violation or failure to comply with any Site Management Plan for this control;

(d) access to the site will continue to be provided to DER to evaluate the remedy, including access to evaluate the continued maintenance of this control.

(e) if a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for their intended purpose under the document.

AECOM Technical Services, Inc.

STATE OF NEW YORK
DANIEL T. SERVETAS
079068
LICENSED PROFESSIONAL ENGINEER

1/13/17

Daniel Servetas, PE
Registered Professional Engineer
New York License No. 079068

Date

In accordance with New York State Education Law, it is a violation for any person, unless he is acting under the direction of a licensed professional engineer, to alter this report in any way.

Contents

List of Tables

List of Figures

List of Appendices

Executive Summary

The Armonk Private Wells Superfund site (the "Site") is located in the Hamlet of Armonk, in the town of North Castle, New York (**Figure 1**). According to the March 1990 Record of Decision (ROD) the Site was originally 34 acres and encompassed approximately 55 private homes and small businesses. In 2001, the New York State Department of Environmental Conservation (NYSDEC) reclassified the Site, reducing the size of the Site to approximately 3.2 acres and to include only five tax parcels (Section 2, Block 14, Lots 3, 6, 8, 9, and 9A; **Figure 2**).

The Site was defined after sampling of private and non-community water supply wells identified contamination by volatile organic compounds (VOCs), primarily tetrachloroethene (PCE), trichloroethene (TCE), and cis-1,2-dichloroethene (DCE). The Phase I and Phase II Remedial Investigations (RI) identified several sources of contamination, all dry cleaning establishments in the village, equipped with septic systems. The contamination from these establishments affected approximately 17 wells.

The 1990 ROD classified the Site as a Class 2 site and called for the following remedies: 1) the removal and off site treatment of liquid wastes and sludge from a septic tank, 2) the collection of soil gas by a soil vapor extraction (SVE) system with on-site treatment of extracted gases using carbon adsorption, 3) the installation of a municipal water supply, 4) groundwater restoration by an on-site groundwater extraction and treatment system (GWETS) using carbon adsorption, and 5) the monitoring of soil gas, groundwater, and the Wampus River. The selected remedies established in the ROD include groundwater remediation to applicable state and federal guidelines, and vadose zone remediation to contaminant levels that no longer pose a threat to groundwater. Vadose zone contamination is to be reduced to concentrations of less than 250 micrograms per cubic meter ($\mu g/m^3$). Groundwater contaminant concentrations are to be reduced to 5.0 micrograms per liter (µg/l) based on applicable criteria for contaminants identified at the Site.

The remediation was conducted in conformance with the ROD and the primary sources of contamination were removed or remain controlled. The GWETS has been in operation since 1998, with the goal to remove contamination to the greatest extent possible. Upon completion of the initial remedial efforts (i.e., construction and implementation of the GWETS), the NYSDEC reclassified the Site to a Class 4 site in 2001.

Regular maintenance is conducted on the treatment system by a NYSDEC contractor and includes daily remote system monitoring via computer link, and monthly visits to change bag filters and to collect influent and effluent VOC samples. Groundwater sampling is performed to monitor the effects of the remedy on the groundwater contamination.

The periodic review process is used for determining if a remedy continues to be properly managed, as set forth in the Site Management Plan (SMP), and continues to be protective of human health and the environment. The SVE system was reportedly installed at the Site in 1998 to lower the concentrations of contaminants to values that do not pose a threat to human health. No documentation is available regarding system installation; however, the June 2006 Preliminary Soil Vapor Investigation Summary Report indicates that in 1998 the SVE was operated until VOC soil gas concentrations diminished. In 2005, air samples were collected from structures determined to be at the highest risk, and the resulting contaminant concentrations were determined to pose no significant risk to the occupants. Establishment of the public water supply system provided a potable water source that is free of contaminants ending the direct ingestion exposure pathway.

The GWETS has run with little downtime during the reporting period and continues to remove contaminants and protect the environment. The concentrations of VOCs reported in Site groundwater samples collected between 2013 and 2016 remain consistent with available data (January 2002 to October 2011). These indicate that selected remedies established in the March 1990 ROD continue to capture and treat the core of the contaminant plume and are, through a continuing effort, generally protective of human health and the environment. The results of the monitoring program also indicate the need for continued groundwater use restrictions for the Site.

Contaminants migrating beyond the Wampus River have been identified, but to date no Site contaminants of concern (COCs) have been reported at a concentration greater than the reporting limit in samples collected from the sentinel wells (AW-204S and AW-204R), located just across the river from the Site.

The Site is primarily influenced by the GWETS. Groundwater samples collected from accessible wells near the GWETS continue to report COCs greater than NYS Ambient Water Quality Standards (AWQS) and Guidance Values (GV), including the results of the most recent groundwater sampling event (July 2016). The capture zone for the GWETS, as demonstrated in the previous periodic review reports (PRR; AECOM, 2010 and 2014), does not effectively influence the contaminants in southern areas of the Site (near on-site monitoring well AW-205RN), areas north of the Site (near off-site monitoring wells AW-4S, AW-4R, and AW-4D), or areas southeast of the Site (near off-site monitoring wells AW-8 and AW-6).

The remedy is performing properly, however, is only partially effective. Conclusions and recommendations to mitigate contamination are presented in this report. Recommendations include repairing existing wells, locating and sampling wells that have been paved over, and developing a strategy that may accelerate attainment of remedial goals.

The three-year cost for operation of the treatment system and completion of all required monitoring and reporting was approximately $248,875 ($82,958 annually).

AECOM recommends that a field oversight periodic review be performed every 3 years.

1.0 Site Overview

The Site is located in the central business district of the Hamlet of Armonk, in the town of North Castle, New York (**Figure 1**). In 1990, the NYSDEC classified the Site as a Class 2 site, signifying that the Site presents a significant threat to public health and/or the environment and action is required. The Site was originally 34 acres and encompassed approximately 55 private homes and small businesses.

After the installation of the remedial system, the NYSDEC reclassified the Site in 2001 to a Class 4 site, indicating the Site has been properly closed, but requires continued site management consisting of operation, maintenance and monitoring (OM&M). The Site definition was reduced to 3.2 acres and to include only five tax parcels (Section 2, Block 14, Lots 3, 6, 8, 9, and 9A) located within the boundaries of Route 128 (Main Street) to the west, Maple Avenue to the north, a cemetery to the east, and Bedford Road to the south (**Figures 2** and **3**).

Geologic materials underlying the Site generally consist of fractured gneiss bedrock with widely variable depths of glacial soils and alluvium ranging from 10 feet to greater than 125 feet thick. A site conceptual model has been developed and integrated with a geologic cross section (**Figure 4**). The glacial soils consist mainly of sand, but contain a varying amount of silt and gravel. The depth to bedrock increases rapidly in the vicinity of the Wampus River, and borings were terminated at 125 feet below ground surface (bgs) before reaching bedrock. The depth to bedrock measurements are interpreted to indicate a bedrock surface that slopes from the north-northwest to the south-southeast (**Figure 5**).

Groundwater flow in the glacial soil aquifer as well as the bedrock aquifer is generally from the northwest to the southeast with estimated velocities ranging from 5×10^{-4} to 2×10^{1} feet per day. The Wampus River appears to be the localized discharge area for groundwater present in the upper portions of the aquifers, while deeper in the aquifers groundwater appears to flow below the river. Surface water at the Site flows either overland, or through the storm water sewer system until its eventual discharge into the Wampus River.

Halogenated VOCs (PCE, TCE and DCE) and methyl tert-butyl ether (MTBE) were identified as the primary contaminants present in samples collected from the Site. A variety of other contaminants were identified in the multimedia sampling events conducted to date at the Site. However, source(s) were not identified. Halogenated VOCs are used widely as dry cleaning fluids, as well as industrial degreasers. The distribution of primary contaminants when considered in conjunction with the businesses that utilized these chemicals lead to the conclusion that three drycleaners were the sources of contamination: Nails Etc. (formerly 396 Limited Dry Cleaners), Country Cleaners Dry Cleaner, and Cleaning by Fredericks Dry Cleaners. The drycleaners discharged waste fluids through septic tanks and leach fields which contaminated the shallow soils, and groundwater in the vicinity of each business. The businesses' connections to the sanitary sewer system in 1984 ended the discharge of chemicals through the septic systems.

The two primary exposure routes associated with the contaminants have been identified as inhalation and ingestion. The ingestion of contaminants could be completed through the use of contaminated water withdrawn from private wells. The inhalation exposure route can be completed in the local residences and business as contaminated vapors intrude through the structure from contaminated groundwater present below the building and/or being released as a vapor from plumbing traps and during water usage at fixtures (e.g., spigots, showerheads and faucets).

According to the ROD, the risk assessment results indicate that long term ingestion of the contaminated groundwater would lead to an additional 20 to 39 cancers, and inhalation of vapors would lead to one additional cancer in the surrounding population.

1.1 Objectives of the Periodic Review

The periodic review process is used for determining if a remedy continues to be properly managed, as set forth in the SMP, and continues to be protective of human health and the environment. In addition to the SMP (AECOM, May 2014), the evaluations are completed with reference to industry standards and available OM&M documents. The objectives of the periodic review for sites in the State Superfund Program (SSF) are as follows:

- Evaluate compliance with the decision document(s) and the SMP,
- Evaluate all treatment units, and recommend repairs or changes, if necessary,
- Evaluate the condition of the remedy,
- Certify, if appropriate, that the intent of institutional controls (IC) continues to be met, and that engineering controls (EC) remain in place, and are effective, and
- Evaluate costs.

1.2 Remedial History

In 1978 the Westchester County Health Department (WCHD) initiated a study to evaluate groundwater quality in the vicinity of past and current dry cleaning establishments. Armonk was not serviced by a municipal water supply system. Generally, each residence or business obtained its water from a private water supply well, which withdrew water from the local glacial soil aquifer, or underlying bedrock aquifer. The WCHD study sampled 36 wells at the Site in March of 1979. Reported concentrations of halogenated solvents from nine of the wells exceeded New York State Department of Health (NYSDOH) standards. The primary contaminant compounds identified in this initial sampling event consisted of PCE, TCE, and DCE.

The results identified in this initial sampling event led to the expansion of the investigation with the assistance of the United States Environmental Protection Agency (USEPA) Region II Technical Assistance Team. The expanded investigation included 68 private water supply wells; 350 samples were collected and analyzed between March 1979 and April 1987. Samples collected from 37 wells reported combined contaminant concentrations of TCE and PCE that were detectable, but did not exceed 100 µg/l. Samples collected from 13 wells reported combined contaminant concentrations exceeding 100 µg/l. The remaining 18 wells that were sampled had reported TCE and PCE concentrations that were less than the instrument detection limit. Residents and businesses that utilized private water supply wells found to be contaminated by halogenated compounds were given notice of the findings and instructed to boil water prior to usage, or provided bottled water as an interim protective measure. The USEPA argued that the contamination present justified the provision of a public water supply system for the residents of Armonk, which was completed in 1992.

Investigation into the sources and extent of contamination present were also being conducted by the NYSDEC in order to determine an appropriate remedial program to meet site cleanup goals and restore contaminated soil and groundwater. NYSDEC procured Wehran Engineering, P.C. to complete a Phase I Investigation in 1983. The Phase I Investigation concurred with the findings of the NYSDOH/USEPA investigation identifying a number of private water supply wells that had been

contaminated with halogenated solvents. The Phase I Investigation concluded that the situation posed a health threat to the residents.

Wehran Engineering, P.C. was retained by the NYSDEC to complete a Phase II Investigation in 1985. The Phase II Investigation led to the assignment of a Hazard Ranking System score of 37.9. This Hazard Ranking System score indicates a potential to cause harm to humans and the environment. These studies were not sufficient to determine the nature, extent and potential for further harm to be caused by the contamination. The NYSDEC procured TAMS Consultants, Inc. along with its sub-consultant Goldberg-Zoino and Associates of New York, P.C. (GZA) to complete a Remedial Investigation/Feasibility Study (RI/FS) in order to provide a greater understanding of the extent of contamination present and evaluate potential remedial options.

A public participation program was initiated by the NYSDEC in 1987 to keep interested parties informed of the results and findings of the RI/FS. A public meeting was held in July 1987 prior to the initiation of RI/FS activities. The meeting was held to discuss the RI/FS process and present to the public the objectives and required activities to meet those objectives. The purpose of the remedial investigation was to determine the nature, extent, and sources of contamination. The RI included: the installation and sampling of 18 monitoring wells, a soil gas survey, surface water sampling, soil sampling, and sediment sampling.

A public meeting was held (April 1989) at the conclusion of the remedial investigation to discuss the results and introduce the feasibility study. A public meeting was held (January 1990) to present the proposed remedial alternatives based on the conclusions of the FS. Remedial alternatives for the Site were developed in order to address the two media found to be contaminated: the Vadose Zone and Groundwater. The Vadose Zone was further subdivided into the sources (Septic Tanks and Leach Fields), and source vicinities or contaminated areas immediately adjacent to the sources. Groundwater was further subdivided into shallow portions of the glacial soil aquifer and the bedrock aquifer including deep portions of the glacial soil aquifer.

A March 1990 Record of Decision (ROD) classified the Site as a Class 2 site and called for the completion of the following remedies:

Vadose Zone:

1) Removal and off site treatment/disposal of septic tanks including associated liquid waste and sludge,

2) Collection of soil gas by vacuum extraction with on-site treatment of extracted gases using carbon adsorption,

3) Long term monitoring of soil gases to verify the effectiveness of the remedy, and

4) Application and enforcement of appropriate land use restrictions through the remedial period.

Groundwater:

1) Installation of a municipal water supply,

2) Long term monitoring of groundwater to verify the effectiveness of the remedy,

   a. Groundwater contaminant concentrations are to be reduced to 5.0 µg/l based on applicable criteria for contaminants identified at the Site.

3) Groundwater restoration by on-site pump and treatment using carbon adsorption,

4) Discharge of the treated water to the Wampus River, and

5) Application and enforcement of appropriate groundwater use and well installation restrictions through the remedial period.

A scope of work, schedule, and Health and Safety Plan were approved in May 1990 by the NYSDEC. TAMS Consultants, Inc. subcontracted Clean Venture Inc. to begin the source removal activities. Remedial activities began in March 1991 with the removal of the septic tank utilized by Country Cleaners. The excavated septic tank was found to be intact and dry and was therefore broken in place and removed. Following the excavation the adjacent soils were found to be in native condition and were left in place. The void was filled with compacted sand and the area was restored to conditions similar to those prior to excavation. Observations documented in the Design Support Testing and Hydrogeologic Testing Report (TAMS, 1995) indicate the tanks at the other two source areas had been removed prior to the 1994 investigation. Details of the removals were not available.

Construction of the municipal water supply system was completed in 1992 under the direction of the USEPA. Residents and businesses were connected to the system mitigating the potential for consumption of contaminated groundwater supplied from private wells.

Additional investigations were performed to better characterize the aquifer. In 1995 the results of the additional investigations were published as a conceptual design plan for a groundwater recovery and treatment system. The system design consisted of three groundwater extraction wells, a carbon adsorption treatment unit, and a surface water discharge permit for the Wampus River.

Construction of the system and necessary facilities was initiated in September 1997. Extraction well installation began in October 1997 and wells EW-1 and EW-3 were completed in new borings, and well AW-201R was retrofitted to become EW-2. The wells were outfitted with submersible pumps discharging through a pitless adaptor, pressure transducers which control the pump on and off cycling, and a pressure monitor that cuts the pump off at the pressure rating of the pitless adaptor via the ProControl system.

Piping installation was completed in trenches dug to below the frost line to protect the lines from freezing. The influent trench contained a 1-inch high density polyethylene (HDPE) water line, a 2-inch polyvinyl chloride (PVC) influent line, and a 2-inch PVC electrical conduit. Potable water was supplied from the public water supply.

Construction of the Parkline Treatment building was initiated in January 1998 and construction was complete in February 1998. Upon completion of the plumbing, the system was tested to a pressure of 20 pounds per square inch (psi) in order to ensure that connections would not leak at operating pressures. The groundwater treatment system consisted of extraction wells which were capable of providing 60 gallons per minute (gpm) of contaminated groundwater into the system, two 10 micron bag filters in parallel followed by two 6,000 pound carbon treatment vessels. The system was designed to receive 30 gpm from the extraction wells, but has been operated at rates exceeding the design limits without causing discharge limits to be exceeded. Following treatment, the water is discharged to a 300 gallon effluent holding tank, a 1/3 hp pump discharges the water to a catch basin on Bedford Road, eventually draining by gravity to the Wampus River.

The system is controlled by the ProControl Unit and a telemetry network provides information relating to system pressures from critical points, filters, tanks and discharge lines, as flow rates and volumes being produced from the extraction wells. System failures trigger an alarm code, and provide notice to the O&M contractor for corrective action.

Monitoring, maintenance and reporting of the system's performance for compliance with permit requirements, and efficiency of operation have been conducted according to the frequency indicated in Section 3. Operation and maintenance of the system began in April 1998, and a final inspection was completed in October 1998.

Six monitoring wells were abandoned (AW-1S, AW-1D, AW-12, AW-13, AW-2, and AW-3) as the investigation was completed and the groundwater remedial system was brought online. The monitoring well abandonment procedure consisted of:

- removal of the above ground components,
- removal of the riser to approximately four feet below ground, with the minimum of one foot below ground surface,
- grouting in place to approximately five feet below the remaining riser,
- filling the remaining riser with concrete, and plugging the excavation with concrete to below the ground surface, and
- backfilling the remaining excavation with soil and restoring the surface to conditions similar to original.

To accommodate the recent redevelopment of the property, two wells (recovery well EW-3 and monitoring well AW-206R/AW-205R) were abandoned and replaced in July 2012, and two were paved over (AW-1R and AW-RS). Replacement recovery well EW-3N was installed approximately 40 feet east of EW-1 and replacement monitoring well AW-205RN was installed approximately 10 feet west of AW-206R/AW-205R (**Figure 3**). Details were provided in Appendix A (the Engineering Report for the Remediation System Retrofit) of the 2014 PRR for the July 2010 – June 2013 reporting period.

2.0 Evaluate Remedy Performance, Effectiveness and Protectiveness

2.1 Operation and Maintenance Plan Compliance Report

The following summarizes the current O&M program, with field implementation provided by a NYSDEC callout contractor (Aztech Environmental Technologies [Aztech]):

- Operation and maintenance of the activated carbon groundwater pump and treatment system, specifically:
    - Remote system monitoring via computer link;
    - Changing bag filters;
    - Collecting influent and effluent VOC and metals samples;
    - Managing the removal and exchange of granular activated carbon; and
    - Repairing/replacing pumps, transducers, and control system components.

2.1.1 O&M Plan Compliance Report

Activity	Required Frequency (X)			Compliance Dates
	Daily	Monthly	Quarterly	
Remote System Monitoring	X			2013 - 2016
Change Bag Filters		X		2013 - 2016
Influent and Effluent Sampling		X		2013 - 2016
Exchange of Granular Activated Carbon	As Necessary			May 2011

2.1.2 Evaluation of O&M Activities

GROUNDWATER ELEVATIONS

The monitoring well network established for the Site includes wells open to the groundwater at different elevations and located in both upland areas of groundwater recharge as well as lowland areas of groundwater seepage. The shallow glacial deposit displays a wide range of hydraulic properties consistent with its heterogeneity. A deep glacial channel in the vicinity of the Wampus River extends to the west across the Site (**Figure 6**).

Prior to installation of the GWETS in 1998, the groundwater elevation gradient at the Site reached an average value of 0.005, and the general groundwater flow direction was from the west to the east. Since the installation of the GWETS, the general groundwater flow at the Site is to the southeast while being influenced by the GWETS. The GWETS has caused a capture zone that runs

from west to east. Groundwater not captured by the GWETS flows southeast toward the Wampus River.

Groundwater measurements taken after the installation of the GWETS show the average groundwater elevation gradient is approximately 0.017 at the Site. The gradient increases to 0.033 in the area significantly influenced by the GWETS illustrating the increased flow into the system.

AECOM measured the depth-to-groundwater in all accessible monitoring wells during the sampling events (June 2014, June 2015, and July 2016) conducted during this reporting period. The measurements were used to calculate groundwater elevations (**Table 1**). Groundwater isoelevation maps are included for each of these events (**Figures 7 – 9**, respectively).

GROUNDWATER ANALYTICAL

AECOM conducted three groundwater sampling events during this reporting period (September 2013 – September 2016). All samples were analyzed for VOCs by EPA method 8260. Maps displaying the reported concentrations of analytes during the June 2014, June 2015, and July 2016 sampling events and VOC isoconcentration contours developed from these analytical results are included as **Figures 10 – 12**, respectively.

The primary COCs listed in the ROD are Halogenated VOCs (PCE, TCE, and DCE) and MTBE. These COCs were detected at concentrations in excess of groundwater AWQS and/or GV in several of the monitoring wells during the last three sampling events (**Table 2**). Historical and current total VOC concentrations for individual wells were plotted versus time in **Figures 13 – 15**. Note the variable vertical scales on each figure.

Contaminant concentrations reported for the June 2014 sampling event indicate that:

- Five of the 15 monitoring wells sampled were reported to exceed the Class GA groundwater AWQS and/or GV, including AW-4S, AW-6, AW-8, AW-202S, and AW-205RN.

- PCE was detected in four monitoring wells at concentrations ranging from 1.1 µg/l (AW-202I) to 25.0 µg/l (AW-4S). PCE concentrations exceeded the Class GA criterion of 5.0 µg/l in AW-4S (25.0 µg/l) only.

- TCE was detected in three monitoring wells at concentrations ranging from 2.6 µg/l (AW-4S) to 5.0 µg/l (AW-202S). TCE concentrations did not exceed the Class GA criterion of 5.0 µg/l in any of the wells sampled in October 2014.

- Cis-1,2-DCE was detected in four monitoring wells at concentrations ranging from 1.4 µg/l (AW-202I) to 10.0 µg/l (AW-4S). Cis-1,2-DCE concentrations were reported as exceeding the Class GA criterion of 5.0 µg/l in AW-4S (10.0 µg/l) and AW-202S (5.1 µg/l).

- MTBE was detected in five monitoring wells at concentrations ranging from 2.1 (AW-202I) µg/l to 55.0 µg/l (AW-205RN). MTBE concentrations exceeded the Class GA guidance value (GV) of 10.0 µg/l in AW-6 (29.0 µg/l), AW-8 (19.0 µg/l), and AW-205RN (55.0 µg/l).

Contaminant concentrations reported for the June 2015 sampling event indicate that:

- Four of the 14 monitoring wells sampled were reported to exceed AWQS and/or GV, including AW-4S, AW-10, AW-202I, and AW-202S.

- PCE was detected in three monitoring wells at concentrations ranging from 1.3 µg/l (AW-202S) to 16.0 µg/l (AW-4S). PCE concentrations exceeded the AWQS (5.0 µg/l) in AW-4S (16.0 µg/l) and AW-10 (5.6 µg/l).

- TCE was detected in four monitoring wells at concentrations ranging from 0.9 µg/l (AW-10) to 8.2 µg/l (AW-202S). TCE concentrations exceeded the AWQS (5.0 µg/l) in AW-202I (5.2 µg/l) and AW-202S (8.2 µg/l).

- Cis-1,2-DCE was detected in four monitoring wells at concentrations ranging from 1.9 µg/l (AW-202I) to 7.6 µg/l (AW-202S). Cis-1,2-DCE concentrations were reported as exceeding the AWQS of 5.0 µg/l in only one well, AW-202S (7.6 µg/l).

- MTBE was detected in four monitoring wells at concentrations ranging from 0.58 µg/l (AW-202S) to 7.7 µg/l (AW-8). MTBE concentrations did not exceed the GV of 10.0 µg/l in any of the wells sampled in 2015.

Contaminant concentrations reported for the July 2016 sampling event indicate that:

- Six of the ten monitoring wells sampled were reported to exceed AWQS and/or GV, including AW-4S, AW-6, AW-202I, AW-202S, AW-203I, and AW-205RN.

- PCE was detected in four monitoring wells at concentrations ranging from 1.0 µg/l (AW-202I) to 18.0 µg/l (AW-4S). PCE concentrations exceeded the AWQS (5.0 µg/l) in only one well, AW-4S (18.0 µg/l).

- TCE was detected in three monitoring wells at concentrations ranging from 2.1 µg/l (AW-4S) to 13.0 µg/l (AW-202S). TCE concentrations exceeded the AWQS (5.0 µg/l) in AW-202I (8.2 µg/l) and AW-202S (13.0 µg/l).

- Cis-1,2-DCE was detected in four monitoring wells at concentrations ranging from 3.6 µg/l (AW-4S) to 12.0 µg/l (AW-202S). Cis-1,2-DCE concentrations were reported as exceeding the AWQS of 5.0 µg/l in AW-202I (5.1 µg/l) and AW-202S (12.0 µg/l).

- MTBE was detected in five monitoring wells at concentrations ranging from 3.1 µg/l (AW-202I) to 68.0 µg/l (AW-205RN). MTBE concentrations exceed the GV of 10.0 µg/l in AW-6 (45.0 µg/l), AW-203I (11 µg/l), and AW-205RN (68.0 µg/l).

In the area north of the Site, groundwater samples collected from AW-4R, AW-4D, and AW-9 continued to contain no detectable concentrations of VOCs (i.e., concentrations less than the method detection limits [MDLs]) and were dropped from the sampling scope by July 2016. Groundwater samples collected from AW-4S continue to report exceedances of PCE and reported an exceedance of cis-1,2-DCE in July 2014.

In the floodplain of the Wampus River, east of AW-4S, AW-4R, and AW-4D, two groundwater monitoring wells (AW-10 and AW-11) are sampled to monitor the concentration plume in this area. The samples collected from AW-10 indicate there were estimated concentrations of cis-1,2-DCE and PCE in this well in 2014 and 2016, and an exceedance of PCE in 2015. An estimated concentration of TCE was also detected in this well in 2015. Total VOCs at AW-10 were reported to be 8.8, 11.2, and 9.3 µg/l from 2014 to 2016. The results of the groundwater samples collected from AW-11 throughout this reporting period indicate no compounds with concentrations greater than MDLs were detected.

The monitoring wells near the GWETS, in what is considered the main source area, continue to show fluctuating concentrations of contamination. Prior to the October 2011 groundwater sampling event, the concentrations of PCE in AW-1R and AW-RS were reported to be decreasing. However, these wells were paved over during redevelopment of the Site and have not been sampled since October 2011.

MTBE was identified as a site contaminant in the initial site investigation by the WCHD in 1978 and 1979; however, the source of the MTBE was not investigated. Analysis of contaminant concentrations indicates that multiple sources of MTBE may be present in the area surrounding the Site. The greatest reported concentrations of MTBE were located in the area south of the Site, primarily in well AW-8. The MTBE concentration in AW-8 has declined significantly since the 2002 sampling event (see **Table 2**), and in June 2015 and July 2016 was reported to be less than the GV (10.0 µg/l).

Downgradient well AW-6 was reported to contain concentrations similar to the October 2011 groundwater sampling event in 2014 and 2016 with MTBE reported at concentrations greater than the GV. During the 2015 groundwater sampling event, this well contained no detectable concentrations of VOCs.

AW-205RN, installed as a replacement well for AW-206R, was first sampled in 2014. The results of this well are similar to the results of AW-206R in that MTBE was detected at concentrations greater than the GV during the 2014 and 2016 sampling events. However, the other compounds that were typically detected in AW-206R (PCE, and TCE) were not detected in the groundwater sample collected from AW-205RN during this reporting period.

AW-204S and AW-204R were installed as sentinel wells to determine if the Wampus River acts as a barrier to contaminant transport. Migration of COCs beyond the Wampus River would be indicative of continued contaminant migration, or lack of plume control by the GWETS. COCs have not been detected at concentrations greater than the reporting limit in groundwater samples collected from the AW-204 well pair since January 2002.

Evaluation of Treatment Units

Unless the pump had been intentionally shut down, each of the three extraction wells (EW-1, EW-2, and EW-3N) was sampled on a monthly basis, as well as combined influent and system effluent. All samples were analyzed for select VOCs by EPA method 601. In addition to VOCs, Iron and Zinc were analyzed for in all effluent samples by EPA method 6010 and in select recovery wells sporadically throughout the reporting period. Combined influent, extraction well, and effluent analytical data are presented in **Tables 3 – 7**.

The carbon treatment was very effective: there were no detections of VOCs in any effluent sample collected during the reporting period.

The total cumulative discharge from each extraction well is presented in **Table 8**. A chart displaying the annual VOCs removal and cumulative VOC removal by the system for the period of 2005 – 2016 is included as **Figure 16**. As of September 30, 2016, the system had removed more than 340 pounds of VOCs. The system has treated approximately 132 million gallons of water since 2005. Approximately 16 million gallons of water were treated during the three-year period.

In the Conceptual Design Report (TAMS, 1995), a remedial goal of 250 µg/l across the aquifer to a depth of 200 feet bgs was established. However, the remedial goal set in the ROD is 5.0 µg/l for individual COCs at the Site.

As of September 7, 2016, system influent data indicates that the remedial goal of 250 µg/l across the aquifer has not been met. The sample collected from EW-1 in September 2016 reported a total VOC concentration of 732 µg/l. However, total VOC concentrations in EW-2 and EW-3N in August 2016 (the last time the two wells were sampled) were reported to be 25.0 µg/l and 17.0 µg/l, respectively. Overall, results from water collected from the extraction wells (EW-1, EW-2, and EW-3N) demonstrated a significant reduction in contaminant concentrations since their installation (**Figure 17**).

While activated, the average discharge rates of EW-1, EW-2, and EW-3N during this reporting period were approximately 4 gpm, 7 gpm, and 2 gpm, respectively.

SITE MAINTENANCE

Routine maintenance activities are conducted as necessary by NYSDEC's callout contractor. Due to low total VOC concentrations and minimal mass removal, EW-2 and EW-3N were deactivated on January 8, 2015 and May 2, 2016, respectively. These wells are activated occasionally for short durations when contaminant concentrations rebound, and to collect samples and perform routine maintenance (see **Table 5** and its footnotes regarding pulsed operation of EW-2).

Notable repairs and/or enhancements to treatment system, as reported by NYSDEC's contractor, included:

- October 10, 2013 –Pulled and cleaned probes on the effluent storage tank.
- October 21, 2013 – System shut down to prime and paint carbon vessels, piping, and valves. Dehumidifiers brought in to control condensation on vessels.
- October 28, 2013 – System back up and running after shut down for priming and painting.
- November 15, 2013 – Cleaned probes on effluent storage tank.
- December 31, 2013 – EW-1 down upon arrival due to high pressure alarm on December 29; started EW-1 pump; high pressure condition quickly shut pump down again.
- January 29, 2014 – Painted manifold.
- February 27, 2014 – Replaced flow meters and totalizers. Switched pump operation from timer to level sensor. Adjusted sensors for proper pump drawdown.
- February 28, 2014 – Investigating sources of EW-1 alarms and temperamental behavior; unsuccessful and will return March 4.
- March 4, 2014 – Further investigation of EW-1; pump back up and running.
- March 10, 2014 – Replaced pump and motor within EW-1 with existing spare on site.
- March 14, 2014 – Replaced motor control start and overload relay.
- March 18, 2014 – EW-1 pump causing "tripped overload relay"; repeatedly reset breaker after tripping.
- March 24, 2014 – Rewired EW-1 pump.
- March 25, 2014 – System restarted; all three extraction wells operational.
- April 2, 2014 – Continued to rewire and organize control panel. Cleaned up and inspected the system.
- April 7, 2014 – Troubleshot EW-2 and discovered faulty wiring causing shutdown of the pump.
- April 8, 2014 – Rewired EW-2 pump motor.
- April 9, 2014 – Completed EW-2 troubleshooting.
- April 24, 2014 – Pressure sensor before the carbon was replaced.
- April 28, 2014 – Carbon vessels backwashed to reduce pressure build up in the vessels.
- May 7, 2014 – EW-3N not operational upon arrival. Pump was not properly wired in electrical box at the well; will have to be rewired another day.
- May 19-20, 2014 – Rewired EW-3N.

- July 29, 2014 – Well inspection with building contractor for the extension of three monitoring wells.
- August 4, 2014 – The three monitoring wells were extended to meet grade change behind the old shopping plaza. The wells were surveyed, and changes in well height were recorded.
- September 3, 2014 – Monitoring wells were inspected and locks were replaced. Corroded locks were noted and will be replaced.
- September 10, 2014 – Switched out existing ProControl unit with a temporary unit reprogrammed to operate the Armonk plant while wireless software upgrade is installed in existing PLC by EOS Research.
- September 30, 2014 – Upgraded ProControl was installed. System reconfigured for wireless remote monitoring. EW-1 overload relay was reset and pump was back online.
- October 2, 2014 – Flow meters for EW-1 and EW-2 were troubleshot and confirmed not to be functional.
- October 17, 2014 – Further inspection of EW-1 pump was completed by disconnecting the pump line from the pitless adapter. Despite power being received by the pump, no water was being moved. Power to pump was shut off by tech to prevent further damage.
- October 30, 2014 – Replaced EW-1 pump, reportedly with a new model designed for use at contaminated sites, as well as flow meters for EW-1 and EW-2. EW-1 fully operational upon departure.
- December 2, 2014 – Pinhole leak discovered on bag filter housing; the housing was isolated, and all flow diverted through the remaining filter housing.
- December 18, 2014 – Inspected leaking bag filter housing and confirmed necessary replacement.
- January 19, 2015 – Pulled EW-1 pump to inspect failure. The bushing connecting the hose to the pump had corroded away, preventing groundwater extraction from the well. Stainless steel bushing and nipple were used as replacements to avoid further corrosion.
- April 23, 2015 – EW-2 transducer was tested and found to be faulty. Given limited planned pump operation in the near future, transducer replacement has been deferred, with NYSDEC approval, and pump operation will be controlled with an amperage sensor.
- May 6, 2015 – System was down upon arrival following an April 25 power failure. Two bag filter housings imported from another NYSDEC site were installed in place of the one operable and one decommissioned (pin-hole leak) bag filter housings. System remained down at departure and control-panel repairs will be coordinated following NYSDEC approval.
- May 26-28, 2015 – The control-panel layout was optimized for the current system configuration by eliminating unnecessary electrical components and wiring. Proper individual low-amp fuses were installed for each analog sensor to facilitate troubleshooting and allow for more continuous operation. The system was restarted May 28 with all three wells pumping.
- November 10, 2015 – On site to address remote connection issues with the ProControl. The system was operational upon arrival; however, the overload for EW-3N had tripped. After adjusting the threshold and resetting the entire system, communications and operations returned to normal.
- April 15, 2016 - A small leak on one of the bag filter fittings was noted. The bag filter housing was isolated from the system to stop leak, and will be repaired next O&M visit.
- May 13, 2016 - Leaking bag filter fitting was replaced and both bag filters were back on line.
- July 8, 2016 –Collected carbon sample from vessel for disposal classification.
- August 12, 2016 – Collected additional carbon sample from vessel for disposal classification – Aztech decided that last month’s samples were not representative.

2.2 Monitoring Plan Compliance Report

2.2.1 Confirm Compliance with Monitoring Plan

Activity	Required Frequency (X)		Compliance Dates
	Monthly	Biennially	
Influent/Effluent Sampling	X		2013 – 2016
Groundwater Sampling		X	2014, 2015, and 2016

2.2.2 Confirm that Performance Standards are Being Met

2.2.2.1 Volatile Organic Compounds

Groundwater

As discussed previously, the primary COCs listed in the ROD are Halogenated VOCs (PCE, TCE, and DCE) and MTBE. These COCs were detected at concentrations in excess of AWQS and/or GV in several of the monitoring wells during the June 2014, June 2015, and July 2016 sampling events (**Table 2**).

The concentrations of VOCs reported in the samples collected from the Site during this reporting period remain consistent with historical data (January 2002 to October 2011). The results of the most recent sampling event (July 2016) and all other available data indicate that selected remedies established in the March 1990 ROD continue to capture and treat the core of the contaminant plume. The results of the monitoring program also indicate the need for continued groundwater use restrictions for the Site.

The groundwater results indicate that samples collected from monitoring wells in the area north of the Site (e.g., AW-4D, AW-4R, AW-9, and AW-11) continue to report contaminant concentrations less than GWETS influent samples.

Contaminants migrating beyond the Wampus River have been identified, but to date no Site COCs have been reported at a concentration greater than the reporting limit in samples collected from the sentinel wells (AW-204S and AW-204R).

Several monitoring wells appear to be outside the capture zone of the groundwater recovery wells, including monitoring well AW-205RN at the southern end of the Site, off-site monitoring wells AW-6 and AW-8 to the south of the Site, and off-site monitoring wells AW-202S, AW-202I, and AW-203I to the east of the Site. Groundwater samples collected from areas unaffected by the GWETS continue to report COCs greater than AWQS and/or GV, including the results of the current groundwater sampling event.

Influent and Effluent

The effluent limitations for the treatment system are as follows:

Analyte	Effluent Limitation (µg/l)
Vinyl Chloride	10
Trans-1,2-Dichloroethene	10
Methyl tert-butyl ether	50
Cis-1,2-Dichloroethene	10
Trichloroethene	10
Tetrachloroethene	2.5
Zinc	250
Iron	750

Between September 2013 and September 2016, the reported VOC concentrations in effluent samples have not exceeded the permitted limitations established for the system (**Table 7**). Sporadic exceedances of zinc and pH have occurred, the most recent of which was in July 2015 for zinc and February 2014 for pH. Zinc is ubiquitous in groundwater at widely varying concentrations, and dissolved concentrations fluctuate in response to a number of factors including: pH, ORP, alkalinity, and inorganic carbon concentrations.

PCE concentrations make up between 96 and 100% of the total VOC concentrations detected in the combined influent (**Table 3**). Extraction well EW-1 has contributed the highest concentrations of PCE (1,300 µg/l in October 2013), followed by EW-2 (506 µg/l in January 2016) and EW-3N (63.5 µg/l in November 2014).

Analysis of the VOC concentrations measured in the extraction well influent indicates that a sharp decline in concentrations has occurred following the first few years of operation of the GWETS. Since that time, VOC concentrations have remained relatively unchanged (**Figure 17**) with a brief spike at EW-2.

Soil Vapor

The SVE system was reportedly installed at the Site in 1998 to lower the concentrations of contaminants to levels that do not pose a threat to human health. No documentation is available regarding system installation; however, the June 2006 Preliminary Soil Vapor Investigation Summary Report indicates that, in 1998, the SVE was operated until VOC soil gas concentrations diminished. In 2005, air samples were collected from structures determined to be at the highest risk, and the resulting contaminant concentrations were determined to pose no significant risk to the occupants.

No additional soil vapor intrusion (SVI) samples were collected between 2013 and 2016. Refer to the June 2010 PRR for additional information.

Site development in 2012 included the construction of three new buildings on the property. Each building was equipped with a liquid boot membrane and a robust collection of passive PVC vent laterals to reduce the exposure of soil vapors to the occupants. This passive system is not a sub slab depressurization system in the traditional sense (i.e., does not generate any vacuum with an active blower) and does not require a NYS Mitigation System Installation Record to be filed or the production of any NYS Periodic Operations Visit Forms. As a result, this PRR does not cover certification that the system is in place and functioning as designed.

Minimum maintenance, to be performed by the property owner/tenant, will be required to maintain these systems.

2.3 IC / EC Certification

Institutional and Engineering Controls at the Site currently consist of:

- Review of analytical results obtained from monitoring to determine the effectiveness of the remedy.
- Maintaining restricted access to the site remedial components and posting of warning notifications and contact information.
- Restriction on groundwater withdrawal, and well installation through conditions of a deed restriction.
- Operation and maintenance of the GWETS including maintaining necessary discharge permits.

2.3.1 IC / EC Requirements and Compliance

Determination of compliance with the IC/EC at the Site is made based on the following criteria:

- The IC/ EC(s) applied at the Site are in place;
- Nothing has occurred that would impair the ability of such controls to protect the public health and the environment, or constitute a violation or failure to comply with any element of the SMP for such controls.

2.3.2 IC / EC Certification Form

The updated Institutional and Engineering Controls Certification Form for the Site, and the Property Owner Survey are provided as **Appendix A** and **Appendix B**, respectively.

A deed restriction was filed at the Westchester County Clerk's Office in February 2001, prior to the reclassification of the Site in July 2001. The deed restriction preceding the reclassification stated that written approval from "the Relevant Agencies" is required prior to the installation of wells and/or use of groundwater on or from the "Site," as defined in the 1990 ROD, and also requires that access be granted to the Site for continued implementation of the ROD via operation, monitoring, and maintenance of the treatment system. The deed restriction indicates that the covenant shall run with the land and be binding to future owners of the Site. The tax parcel identifications are not listed for all properties within the Site; however, the document identifies three specific tax parcels as "the Property", including Section 2, Block 14, Lots 3, 8, and 9, which include the GWETS. The tax parcels not listed in the deed, but used in addition to "the Property " to define the Site since the reclassification are Section 2, Block 14, Lots 6 and 9A.

A title search performed on any of these three parcels would likely identify the deed restriction as recorded against the parcel; however, whether a title search of the other two parcels within the Site would uncover the document is uncertain. The only conclusive way to determine whether the document is recorded against all Site parcels would be to contract a title search company for a confirmation search outside the "Property."

3.0 Evaluate Costs

3.1 Summary of Costs

Since AECOM's involvement at the Site (May 2005), the system has recovered approximately 340 pounds of VOCs. The estimated mass of contamination removed by the GWETS during this reporting period averaged approximately 23 pounds per year. Operating costs and completion of all required monitoring events for this reporting period (September 2013 to September 2016) were approximately $82,958 per year, which results in a cost of approximately $3,600 per pound of VOC removed. Major cost components are allocated as follows over the three-year period:

O&M Oversight	$52,490
Reporting (Quarterly O&M Reports, SMP Update, and one PRR)	$54,247
Groundwater Monitoring (3 Events)	$23,687
NYSDEC Callout O&M Subcontractor (Aztech)	$106,981
Electric Utility	$11,470
Total Costs	$248,875

These figures include all costs known by AECOM that are associated with GWETS operation and monitoring, including sampling, maintenance, reporting, and lab fees.

4.0 Conclusions and Recommendations

The periodic review process is used for determining if the selected remedy continues to be properly managed (as set forth in the ROD, OM&M Plan, O&M Manual, and SMP), and if the remedy continues to be protective of human health and the environment.

4.1 Conclusions

The following conclusions discuss the effectiveness of the remaining elements of the Site remedy in comparison to the applicable site remedial goals derived from the March 1990 ROD:

Vadose zone:

1. **Removal and off site treatment/disposal of septic tank including associated liquid waste and sludge.**

   In March 1991, a double walled septic tank was excavated and inspected at Country Cleaners dry cleaning on Maple Avenue. The tank contained no liquid and very little sludge. The only contents were pieces of the concrete lid and ¾-inch crushed stone. The outer wall was broken to view surrounding soils, which appeared to not be contaminated. The excavation was backfilled with clean sand per NYSDEC approval and area returned to previous lawn quality. Approximately 16.5 tons of excavated materials and 40 gallons of wash water were disposed of in May 1991.

   Observations documented in the Design Support Testing and Hydrogeologic Testing Report (TAMS, 1995) indicate the tanks at the other two source areas were removed prior to the 1994 investigation. Details of the removals were not available.

2. **Collection of soil gas by vacuum extraction with on-site treatment of extracted gases using carbon adsorption.**

   Soil gas sampling conducted early in the RI/FS reported concentrations of PCE present in the assumed vicinity of septic leach fields at maximum values of: Cleaning by Fredericks 14,400 µg/m^3, Country Cleaners 732 µg/m^3, and Nails Etc. 2,036 µg/m^3. A SVE system was reportedly installed at the Site in 1998 to lower the concentrations of contaminants to levels that will not impair human health. No documentation is available regarding this installation. However, the June 2006 Preliminary Soil Vapor Investigation Summary Report indicates that the system had been installed and was operated until VOC soil gas concentrations diminished.

3. **Long term monitoring of soil gases to verify the effectiveness of the remedy.**

   Temporary soil gas probes were installed in 2005 to determine the extent of vapor phase contaminants present within the investigation area at locations selected by the NYSDEC and in consultation with the NYSDOH.

   Analytical results were compared to the mean outdoor air concentrations from a NYSDOH study of VOCs in air of fuel-heated homes. The results reported lower concentrations of contaminants than those reported during the RI. One exception was AW-4S, which is located in the source area for Cleaning by Fredericks. However, wells either adjacent to the

soil vapor points in this area do not contain contaminant concentrations above groundwater standards and do not indicate groundwater quality degradation. Additionally, each building constructed during redevelopment of the Site was equipped with a liquid boot membrane and a robust collection of passive PVC vent laterals to reduce the exposure of soil vapors to the occupants. Finally, these soil vapor samples were collected in 2005, which may suggest the concentrations declined as a result of natural attenuation.

The resulting contaminant concentrations were determined to pose no significant risk to the occupants.

4. **Application and enforcement of appropriate land use restrictions through the remedial period.**

   A deed restriction filed with the Westchester County Clerk's Office in February 2001 stated that written approval from "the Relevant Agencies" is required prior to the installation of wells and/or use of groundwater on or from the "Site," as defined in the 1990 ROD, and also requires that access be granted to the Site for continued implementation of the ROD via operation, monitoring, and maintenance of the treatment system. The deed restriction indicates that the covenant shall run with the land and be binding to future owners of the Site.

   The document only identifies three specific tax parcels (Section 2, Block 14, Lots 3, 8, and 9) as "the Property" and does not identify all properties within the Site boundaries defined by the ROD, including the two parcels (Section 2, Block 14, Lots 6 and 9A) that combined with "the Property" were used to redefine the Site in the July 2001 NYSDEC reclassification package.

Groundwater:

1. **Installation of a municipal water supply.**

   Construction of the municipal water supply system was completed in 1992 under the direction of the USEPA. Residents and businesses were connected to the system mitigating the potential for consumption of contaminated groundwater supplied from private wells.

2. **Long term monitoring of groundwater to verify the effectiveness of the remedy.**

   According to the SMP, groundwater monitoring, which includes measuring and recording depth-to-groundwater, depth to well bottom, and water quality parameters, should be conducted on a biennial basis for 20 wells associated with the Site (**Figure 3**). However, with permission by the NYSDEC, the number of wells was reduced over the last three years. During the June 2014 and June 2015 groundwater sampling events, the number of wells was reduced to 15, and by the July 2016 event, the number of wells was reduced to 10. During the June 2014 groundwater sampling event, AW-203S was not accessible and was not sampled, for a total of 14 sampled monitoring wells.

3. **Groundwater restoration by on-site pump and treatment using carbon adsorption.**

   Monitoring, maintenance and reporting of the system's performance for compliance with permit requirements, and efficiency of operation have been conducted according to the frequency indicated in Section 3. Operation and maintenance of the system began in April 1998.

The GWETS has run with acceptable intervals of downtime, continuing to remove contaminants and protect the environment.

4. **Discharge of the treated water to the Wampus River.**

   Between September 2013 and September 2016, the reported VOC concentrations in effluent samples from the GWETS have not exceeded the permitted limitations established for the system. Sporadic exceedances of zinc and pH have occurred, the most recent of which was in July 2015 for zinc and February 2014 for pH.

5. **Application and enforcement of appropriate groundwater use and well installation restrictions through the remedial period.**

   The February 2001 deed restriction preceding the reclassification of the Site in July 2001 stated that written approval from "the Relevant Agencies" is required prior to the installation of wells and/or use of groundwater on or from the "Site," as defined in the 1990 ROD, and also requires that access be granted to the Site for continued implementation of the ROD via operation, monitoring, and maintenance of the treatment system.

   The Site was redefined in the July 2001 NYSDEC reclassification package to include only the following tax parcels: Section 2, Block 14, Lots 3, 6, 8, 9, and 9A.

The remedial measures in place continue to be generally effective in protecting human health and the environment. However, the GWETS is not adequately capturing constituents of concern within the contaminant plume (e.g., AW-6; **Figures 7 – 8**) and therefore, not reaching the remedial goals established in the ROD.

Contaminant concentrations potentially entering the Wampus River were detected during an initial series of sediment and sewer discharge samples, and contaminants migrating below the Wampus River have been detected in samples collected from sentinel wells AW-204R and AW-204S. However, no Site COCs in excess of reporting limits have been reported in these wells.

GWETS modification or augmentation should be considered after measures outlined below are implemented and results evaluated. OM&M of the system should continue until such time as the goal of removing the COCs to the extent possible has been achieved.

4.2 Recommendations

AECOM recommends the following for the Armonk Private Wells Site:

- Repair AW-10 and AW-203S, both of which have damaged casings/covers.

- Attempt to locate, expose, and sample paved over monitoring wells AW-1R and AW-RS. These wells reported exceedances of groundwater standards for chlorinated VOCs when last sampled (October 2011).

- Development of a remedial strategy for reducing the levels of VOCs in the vicinity of the recovery wells, especially near EW-1, where concentrations averaged above 800 µg/l during this reporting period. Given the contamination resides in fractured bedrock and mass removal has remained steady, an in situ remedy should be evaluated that will work in conjunction with the present pump and treat system. Since the contamination is chlorinated ethenes, the most common remedy in this application would be chemical oxidation using

sodium/potassium permanganate. Use of permanganate will directly oxidize the dissolved phase chlorinated ethenes into carbon dioxide, water and chloride, but may not significantly reduce sorbed contamination. Two other potential in situ remedies would include the use of a substrate to promote the biodegradation of the contamination, though complete oxidation may not occur as the process may stall at the intermediate cis-1,2-DCE. A more innovative treatment technology would involve the injection of modified sodium permanganate solution that would not only oxidize the dissolved-phase contaminants, but prevent the sorbed mass from dissolving through a process termed in situ biogeochemical stabilization (ISGS). Each of these methods would involve injection of chemicals into the groundwater either through existing or new wells. The groundwater pump and treatment system would continue operation to capture any of the injected compounds. A full evaluation of appropriate technologies could be performed as part of a Remedial System Optimization (RSO) study.

TABLES

Table 1
Groundwater Monitoring Well Details
Armonk Private Wells
Armonk, New York
Site No. 3-60-005

Well Identification	Location	Well Diameter & Construction	Surface Completion	Screened Material	Surface Elevation (ft. amsl)	TOC Elevation (ft. amsl)	Depth-to-Well Bottom (ft. bgs)	Screened Interval (ft. bgs)		Open-Hole/Screened Elevation (ft. amsl)		Depth-to-Groundwater (ft. bgs 2014)	Groundwater Elevation (ft. amsl 2014)	Depth-to-Groundwater (ft. bgs 2015)	Groundwater Elevation (ft. amsl 2015)	Depth-to-Groundwater (ft. bgs 2016)	Groundwater Elevation (ft. amsl 2016)
								Top	Bottom	Top	Bottom						
AW-1R	On-site	**Paved Over**	Flush-mount	Bedrock	381.13	381.19	57.7	51.5	56.5	329.63	324.63	-	-	-	-	-	-
AW-4D	Off-site	2" PVC Riser/2" Stainless Steel Screen	Flush-mount	Overburden	383.64	383.64	65	60.5	65.5	323.14	318.14	12.93	370.71	15.23	368.41	15.84	367.8
AW-4S	Off-site	2" Stainless Steel Riser and Screen	Flush-mount	Overburden	383.98	383.98	37.6	32.5	37.5	351.48	346.98	12.77	371.21	14.43	369.55	15.1	368.88
AW-4R	Off-site	2" PVC Riser/2" Stainless Steel Screen	Flush-mount	Bedrock	383.67	383.67	80.6	78.5	83.5	305.17	300.17	14.15	369.52	14.87	368.80	14.49	369.18
AW-6/AW-4W	On-site	2" Stainless Steel Riser and Screen	Flush-mount	Overburden	NA	376.88	33.35	28	33	349.38	344.38	8.59	368.29	7.90	368.98	8.07	368.81
AW-8	Off-site	2" Stainless Steel Riser and Screen	Standpipe	Overburden	378.86	381.52	31.3	18	29	360.86	349.86	11.03	370.49	10.89	370.63	11.46	370.06
AW-9	Off-site	2" PVC Riser/2" Stainless Steel Screen	Standpipe	Overburden	388.7	391.00	24.6	17.5	22.5	371.2	366.2	19.19	371.81	19.33	371.67	20.30	370.7
AW-10	Off-site	2" PVC Riser/2" Stainless Steel Screen	Standpipe	Overburden	369.95	371.86	108	98	108	271.95	261.45	1.48	370.38	1.38	370.48	2.94	368.92
AW-11	Off-site	2" PVC Riser/2" Stainless Steel Screen	Standpipe	Overburden	374.62	374.62	54	49	54	325.62	320.62	3.37	371.25	3.29	371.33	3.92	370.7
AW-202I	On-site	6" PVC Riser and Screen	Flush-mount	Overburden	375.53	375.53	117	15	122	360.53	253.53	5.12	370.41	5.04	370.49	5.52	370.01
AW-202S	On-site	2" Stainless Steel Riser and Screen	Flush-mount	Overburden	375.26	375.25	50.3	30.3	50.3	344.96	324.96	4.82	370.43	4.75	370.50	5.00	370.25
AW-203I	On-site	2" Stainless Steel Riser and Screen	Flush-mount	Overburden	373.77	373.79	125	95	125	278.77	248.77	4.38	369.41	12.28	361.51	4.82	368.97
AW-203S	On-site	2" Stainless Steel Riser and Screen	Flush-mount	Overburden	373.42	373.45	50.4	30.3	50.3	343.12	323.12	3.23	370.22	3.23	370.22	3.57	369.88
AW-204R	Off-site	6" Stainless Steel Overburden Casing	Flush-mount	Bedrock	372.52	372.58	165	135	165	237.52	207.52	3.52	369.06	3.04	369.54	3.70	368.88
AW-204S	Off-site	2" Stainless Steel Riser and Screen	Flush-mount	Overburden	371.5	371.57	50.6	30.3	50.3	341.2	321.2	1.24	370.33	1.17	370.40	1.68	369.89
AW-205R	On-site	**Lost**	Flush-mount	Bedrock	±381	±381	128	118	128	263	253	-	-	-	-	-	-
AW-205RN	On-site	2" PVC Riser and Screen	Flush-mount	rburden/Bed	-	-	80.0	40.0	80.0	-	-	8.51	-	8.47	-	3.05	-
AW-206R	On-site	**Abandoned**	Flush-mount	Bedrock	±378	±378	79.4	77.2	102.8	300.8	198	-	-	-	-	-	369.38
AW-RS	On-site	**Paved Over**	Flush-mount	-	-	-	135	-	-	-	-	-	-	-	-	-	-
EW-1	On-site	8" PVC Riser and Screen	Flush-mount	Bedrock	381	-	90.5	13	90.5	368.00	290.50	-	-	-	-	-	-
EW-2	On-site	6" Stainless Steel Overburden Casing	Flush-mount	Bedrock	380.66	-	174	51	174	329.60	206.66	-	-	-	-	-	-
EW-3	On-site	**Abandoned**	Flush-mount	Bedrock	-	-	138	80	138	80 bgs	138 bgs	-	-	-	-	-	-
EW-3N	On-site	6" PVC Riser and Screen	Flush-mount	Bedrock	-	-	125	35	125	35 bgs	125 bgs	-	-	-	-	-	-

Notes:
On-site - Defined by tax parcels provided by the New York State Department of Environmental Conservation.
PVC - Polyvinyl Chloride
ft. - feet
amsl - above mean sea level
TOC - Top of Casing
bgs - below ground surface
AW-205R cannot be located; AW-206R was often mistaken to be AW-205R.
AW-206R/AW-205R was abandoned in 2012.
EW-3 was abandoned on May 4, 2012.

Table 2
Groundwater Analytical Results - Volatile Organic Compounds
Armonk Private Wells Site
Armonk, New York
Site No. 3-60-005
January 2002 - July 2016

Well ID		AW-1R/RW-1R												AW-4S											
Date		Jan-02	Jun-02	Sep-02	Dec-02	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16	Jan-02	Jun-02	Sep-02	Dec-02	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16
Analyte	Class GA AWQS*																								
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND
tert-Butyl Alcohol	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND	NS	NS	NS	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND
Iodomethane	5 (GV)	NA	NA	NA	NA	NA	NA	ND	NA	ND	NS	NS	NS	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND
Methyl tert-buytl Ether	10 (GV)	NA	ND	NA	5	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	**0.6 J**	ND	**2.6 J**	**1 J**	ND	ND	ND	ND	ND
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	**4.5 J**	ND	ND	ND
Vinyl Acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND
1,2-Dichloroethane	0.6	NA	NA	NA	NA	ND	ND	ND	ND	ND	NS	NS	NS	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	5	NA	ND	NA	**2**	**20**	**7.8**	**1.3**	**5.8**	**0.85 J**	NS	NS	NS	**3 J**	**1**	**2**	**2**	ND	ND	**1.1**	**0.97 J**	ND	**10**	**2.3 J**	**3.6 J**
trans-1,2-Dichloroethene	5	NA	NA	NA	NA	ND	**4.4**	ND	**7.4**	ND	NS	NS	NS	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5	NA	NA	NA	NA	NA	NA	NA	NA	ND	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND
Carbon Disulfide	60 (GV)	NA	NA	NA	NA	ND	ND	ND	ND	ND	NS	NS	NS	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	7	NA	NA	NA	NA	ND	ND	ND	ND	ND	NS	NS	NS	NA	NA	NA	NA	ND	ND	**0.3 J**	ND	ND	ND	ND	ND
Tetrachloroethene	5	NA	**110 D**	NA	**990 E**	**2800 D**	**310 D**	**170 D**	**130**	**180 D**	NS	NS	NS	**29**	**16**	**22**	**17**	**4.6 J**	ND	**8.2**	**5.7**	**10**	**25**	**16**	**18**
1,2,3-Trichloropropane	0.04	NA	NA	NA	NA	NA	NA	ND	NA	ND	NS	NS	NS	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND
Trichloroethene	5	NA	**10**	NA	**25 E**	ND	**86**	**14**	**15**	**6.2**	NS	NS	NS	**2 J**	**0.9 J**	**2**	**2**	ND	ND	**1.2**	ND	**0.9 J**	**2.6 J**	**1.2 J**	**2.1 J**
Methylene Chloride	5	NA	NA	NA	NA	ND	ND	**0.4 JB**	ND	ND	NS	NS	NS	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	10 (GV)	NA	NA	NA	NA	NA	NA	ND	NA	ND	NS	NS	NS	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND
1,1-Dichloroethane	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	NS	NS	NS	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
Total VOCs	NA	NA	120	NA	1022	2820	408	186	158.2	187.1	NS	NS	NS	34	17.9	26	21.6	4.6	2.6	11.8	6.67	15.4	37.6	19.5	23.7

Notes:

All data presented in micrograms per Liter (µg/L).

* New York State Ambient Water Quality Standards (TOGs 1.1.1).

GV - guidance value.

ND - Analyte concentration less than the instrument detection limit (IDL).

J - Estimated concentration exceeding the IDL, but less than the reporting limit

D - Results from a subsequent dilution

B - Analyte detected in associated method blank

E- Results exceed the instrument calibration limit

NA indicates 1) no standard or guidance value exists, or 2) sample was not analyzed for specified compound

BOLD font indicates results within the IDL, **BOLD** font in shaded cell indicates exceedances of AWQS+GV.

Table 2
Groundwater Analytical Results - Volatile Organic Compounds
Armonk Private Wells Site
Armonk, New York
Site No. 3-60-005
January 2002 - July 2016

Well ID		AW-4W/**AW-6**												**AW-5**											
Date		Jan-02	Jun-02	Sep-02	Dec-02	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16	Jan-02	Jun-02	Sep-02	Dec-02	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16
Analyte	**Class GA AWQS***																								
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	NS
tert-Butyl Alcohol	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	**7.1**	ND	ND	NA	NA	NS	NS	NS
Iodomethane	5 (GV)	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	NA	NA	NS	NS	NS
Methyl tert-buytl Ether	10 (GV)	**5 J**	**11**	**12**	**10**	**5.6**	**4.7 J**	**1**	**23**	**24**	**29**	ND	**45.0**	ND	ND	ND	ND	**0.2 D**	ND	ND	NA	NA	NS	NS	NS
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	NS
Vinyl Acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	NS
1,2-Dichloroethane	0.6	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	NA	NA	NS	NS	NS
cis-1,2-Dichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NS	NS	NS
trans-1,2-Dichloroethene	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	NA	NA	NS	NS	NS
Toluene	5	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	NS
Carbon Disulfide	60 (GV)	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	NA	NA	NS	NS	NS
Chloroform	7	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	NA	NA	NS	NS	NS
Tetrachloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.5 J**	NA	NA	NS	NS	NS
1,2,3-Trichloropropane	0.04	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	NA	NA	NS	NS	NS
Trichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.7**	**1.1**	**0.4 J**	NA	NA	NS	NS	NS
Methylene Chloride	5	NA	NA	NA	NA	ND	ND	**0.7 JB**	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	**0.4 J**	**0.5 JB**	NA	NA	NS	NS	NS
Naphthalene	10 (GV)	NA	NA	NA	NA	NA	NA	ND	NA	ND	**2.9 J**	ND	ND	NA	NA	NA	NA	ND	ND	ND	NA	NA	NS	NS	NS
1,1-Dichloroethane	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	NA	NA	NS	NS	NS
Total VOCs	NA	5	11.0	12.0	10	5.6	4.7	1.7	23.0	24.0	31.9	ND	45.0	ND	ND	ND	ND	8	1.5	1.4	NA	NA	NS	NS	NS

Notes:

All data presented in micrograms per Liter (µg/L).

* New York State Ambient Water Quality Standards (TOGs 1.1.1).

GV - guidance value.

ND - Analyte concentration less than the instrument detection limit (IDL).

J - Estimated concentration exceeding the IDL, but less than the reporting limit

D - Results from a subsequent dilution

B - Analyte detected in associated method blank

E- Results exceed the instrument calibration limit

NA indicates 1) no standard or guidance value exists, or 2) sample was not analyzed for specified compound

BOLD font indicates results within the IDL, **BOLD** font in shaded cell indicates exceedances of AWQS+GV.

Table 2
Groundwater Analytical Results - Volatile Organic Compounds
Armonk Private Wells Site
Armonk, New York
Site No. 3-60-005
January 2002 - July 2016

Well ID		AW-10												AW-11											
Date		Jan-02	Jun-02	Sep-02	Dec-02	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16	Jan-02	Jun-02	Sep-02	Dec-02	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16
Analyte	**Class GA AWQS***																								
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND
tert-Butyl Alcohol	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	**7.2 J**	ND	ND	NA	ND	ND	ND	ND
Iodomethane	5 (GV)	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	NA	ND	ND	ND	ND
Methyl tert-buytl Ether	10 (GV)	ND	**0.5 J**	NA	NA	ND	**1.3 J**	**0.5 J**	**0.75 J**	ND	ND	ND	ND	NA	**2**	**2**	**2**	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND
Vinyl Acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND
1,2-Dichloroethane	0.6	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	5	ND	**10**	NA	NA	**13**	**5.1**	**1.4**	ND	**3.6 J**	**4.2 J**	**4.7 J**	**4.3 J**	NA	ND	ND	**0.6 J**	ND	**0.3 J**	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND
Carbon Disulfide	60 (GV)	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	7	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	**0.4 J**	**0.4 J**	ND	ND	ND	ND	ND
Tetrachloroethene	5	ND	**6**	NA	NA	**14**	**4.4 J**	**3.5**	ND	**5.6**	**4.6 J**	**5.6**	**5.0**	NA	ND	ND	**0.5 J**	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	0.04	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	NA	ND	ND	ND	ND
Trichloroethene	5	ND	**1**	NA	NA	ND	ND	**0.3 J**	ND	**0.59 J**	ND	**0.9 J**	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	5	NA	NA	NA	NA	ND	ND	**0.8 JB**	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	**0.6 J**	**0.8 JB**	ND	ND	ND	ND	ND
Naphthalene	10 (GV)	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	NA	ND	ND	ND	ND
1,1-Dichloroethane	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
Total VOCs	NA	ND	17.5	NA	NA	27	10.8	6.5	0.75	9.79	8.8	11.2	9.3	NA	2	2	3.1	7.2	1.3	1.2	ND	ND	ND	ND	ND

Notes:

All data presented in micrograms per Liter (µg/L).

* New York State Ambient Water Quality Standards (TOGs 1.1.1).

GV - guidance value.

ND - Analyte concentration less than the instrument detection limit (IDL).

J - Estimated concentration exceeding the IDL, but less than the reporting limit

D - Results from a subsequent dilution

B - Analyte detected in associated method blank

E- Results exceed the instrument calibration limit

NA indicates 1) no standard or guidance value exists, or 2) sample was not analyzed for specified compound

BOLD font indicates results within the IDL, **BOLD** font in shaded cell indicates exceedances of AWQS+GV.

Table 2
Groundwater Analytical Results - Volatile Organic Compounds
Armonk Private Wells Site
Armonk, New York
Site No. 3-60-005
January 2002 - July 2016

Well ID		AW-203S												AW-203I											
Date		Jan-02	Jun-02	Sep-02	Dec-02	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16	Jan-02	Jun-02	Sep-02	Dec-02	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16
Analyte	Class GA AWQS*																								
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND
tert-Butyl Alcohol	NA	NA	NA	NA	NA	**8.7 J**	ND	ND	NA	ND	ND	NS	NS	NA	NA	NA	NA	**9.3 J**	NA	ND	NA	ND	ND	ND	ND
Iodomethane	5 (GV)	NA	NA	NA	NA	ND	ND	ND	NA	ND	ND	NS	NS	NA	NA	NA	NA	**0.8 J**	NA	ND	NA	ND	ND	ND	ND
Methyl tert-buytl Ether	10 (GV)	ND	ND	ND	ND	ND	ND	**4.6**	ND	ND	ND	NS	NS	ND	ND	ND	**0.7 J**	ND	**1.5 J**	**0.8 J**	**2.9**	**3.4 J**	**5.6**	**4.6 J**	**11.0**
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND
Vinyl Acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND
1,2-Dichloroethane	0.6	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	NS	NS	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	NS	NS	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	**1.3 J**	ND	ND	ND
Carbon Disulfide	60 (GV)	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	NS	NS	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	7	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	NS	NS	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	0.04	NA	NA	NA	NA	**0.2 J**	ND	ND	NA	ND	ND	NS	NS	NA	NA	NA	NA	ND	NA	ND	NA	ND	ND	ND	ND
Trichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	5	NA	NA	NA	NA	ND	ND	**0.5 JB**	ND	ND	ND	NS	NS	NA	NA	NA	NA	ND	ND	**0.5 JB**	ND	ND	ND	ND	ND
Naphthalene	10 (GV)	NA	NA	NA	NA	ND	ND	ND	NA	ND	ND	NS	NS	NA	NA	NA	NA	**0.3 J**	NA	ND	NA	ND	ND	ND	ND
1,1-Dichloroethane	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	NS	NS	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
Total VOCs	NA	ND	ND	ND	ND	8.9	ND	5.1	ND	ND	ND	NS	NS	ND	ND	ND	0.7	10.4	1.5	1.3	2.9	4.7	5.6	4.6	11.0

Notes:

All data presented in micrograms per Liter (µg/L).

* New York State Ambient Water Quality Standards (TOGs 1.1.1).

GV - guidance value.

ND - Analyte concentration less than the instrument detection limit (IDL).

J - Estimated concentration exceeding the IDL, but less than the reporting limit

D - Results from a subsequent dilution

B - Analyte detected in associated method blank

E- Results exceed the instrument calibration limit

NA indicates 1) no standard or guidance value exists, or 2) sample was not analyzed for specified compound

BOLD font indicates results within the IDL, **BOLD** font in shaded cell indicates exceedances of AWQS+GV.

Table 2
Groundwater Analytical Results - Volatile Organic Compounds
Armonk Private Wells Site
Armonk, New York
Site No. 3-60-005
January 2002 - July 2016

Well ID		AW-205R/**AW-206R**									**AW-205RN**			**AW-RS**							
Date		Jan-02	Jun-02	Sep-02	Dec-02	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16
Analyte	**Class GA AWQS***																				
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND	NS	NS	NS
tert-Butyl Alcohol	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND	**16**	ND	ND	NA	NA	ND	NA	ND	NS	NS	NS
Iodomethane	5 (GV)	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND	NA	NA	ND	NA	ND	NS	NS	NS
Methyl tert-buytl Ether	10 (GV)	NA	NA	**1 J**	ND	ND	ND	**0.6 J**	**12**	**12**	**55.0**	ND	**68.0**	**7.7**	**14**	**4.8**	**2**	**0.82 J**	NS	NS	NS
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND	NS	NS	NS
Vinyl Acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND	NS	NS	NS
1,2-Dichloroethane	0.6	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS
cis-1,2-Dichloroethene	5	NA	NA	ND	ND	ND	ND	ND	**1.9**	**2.6 J**	ND	ND	ND	ND	**2.7 J**	**4.6**	**5.7**	**6.6**	NS	NS	NS
trans-1,2-Dichloroethene	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS
Toluene	5	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND	NS	NS	NS
Carbon Disulfide	60 (GV)	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS
Chloroform	7	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS
Tetrachloroethene	5	NA	NA	**6**	**8**	ND	ND	**0.4 J**	**26**	**29**	ND	ND	ND	**9.2**	**92**	**83 D**	**66**	**61**	NS	NS	NS
1,2,3-Trichloropropane	0.04	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND	NA	NA	ND	NA	ND	NS	NS	NS
Trichloroethene	5	NA	NA	**0.5 J**	**0.9 J**	ND	ND	**0.4 J**	**5.1**	**6**	ND	ND	ND	ND	**14**	**16**	**9.9**	**11**	NS	NS	NS
Methylene Chloride	5	NA	NA	NA	NA	ND	ND	**0.9 JB**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS
Naphthalene	10 (GV)	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND	NA	NA	ND	NA	ND	NS	NS	NS
1,1-Dichloroethane	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS
Total VOCs	NA	NA	NA	7.5	8.9	ND	ND	2.3	45.0	49.6	71.0	ND	68.0	16.9	123	108	83.6	79.4	NS	NS	NS

Notes:

All data presented in micrograms per Liter (µg/L).

* New York State Ambient Water Quality Standards (TOGs 1.1.1).

GV - guidance value.

ND - Analyte concentration less than the instrument detection limit (IDL).

J - Estimated concentration exceeding the IDL, but less than the reporting limit

D - Results from a subsequent dilution

B - Analyte detected in associated method blank

E- Results exceed the instrument calibration limit

NA indicates 1) no standard or guidance value exists, or 2) sample was not analyzed for specified compound

BOLD font indicates results within the IDL, **BOLD** font in shaded cell indicates exceedances of AWQS+GV.

Table 2
Groundwater Analytical Results - Volatile Organic Compounds
Armonk Private Wells Site
Armonk, New York
Site No. 3-60-005
January 2002 - July 2016

Well ID		AW-4D												AW-4R											
Date		Jan-02	Jun-02	Sep-02	Dec-02	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16	Jan-02	Jun-02	Sep-02	Dec-02	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16
Analyte	**Class GA AWQS***																								
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NS	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NS
tert-Butyl Alcohol	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	NS	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	NS
Iodomethane	5 (GV)	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	NS	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	NS
Methyl tert-buytl Ether	10 (GV)	ND	**1**	**1**	**1**	ND	**2.1 J**	**0.9 J**	**0.63 J**	ND	ND	ND	NS	ND	**0.6 J**	ND	ND	ND	ND	**0.4 J**	**0.95 J**	ND	ND	ND	NS
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NS	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NS
Vinyl Acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NS	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NS
1,2-Dichloroethane	0.6	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS
cis-1,2-Dichloroethene	5	ND	ND	ND	**0.4 J**	ND	ND	**0.6 J**	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	**2.8 J**	ND	ND	ND	ND	ND	NS
trans-1,2-Dichloroethene	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS
Toluene	5	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NS	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NS
Carbon Disulfide	60 (GV)	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS
Chloroform	7	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS
Tetrachloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	**11**	ND	ND	ND	ND	ND	NS
1,2,3-Trichloropropane	0.04	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	NS	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	NS
Trichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Methylene Chloride	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS
Naphthalene	10 (GV)	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	NS	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	NS
1,1-Dichloroethane	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS
Total VOCs	NA	ND	1	1	1.4	ND	2.1	1.5	0.63	ND	ND	ND	NS	ND	0.6	ND	ND	ND	13.8	0.4	0.95	ND	ND	ND	NS

Notes:

All data presented in micrograms per Liter (µg/L).

* New York State Ambient Water Quality Standards (TOGs 1.1.1).

GV - guidance value.

ND - Analyte concentration less than the instrument detection limit (IDL).

J - Estimated concentration exceeding the IDL, but less than the reporting limit

D - Results from a subsequent dilution

B - Analyte detected in associated method blank

E- Results exceed the instrument calibration limit

NA indicates 1) no standard or guidance value exists, or 2) sample was not analyzed for specified compound

BOLD font indicates results within the IDL, **BOLD** font in shaded cell indicates exceedances of AWQS+GV.

Table 2
Groundwater Analytical Results - Volatile Organic Compounds
Armonk Private Wells Site
Armonk, New York
Site No. 3-60-005
January 2002 - July 2016

Well ID		AW-8												AW-9											
Date		Jan-02	Jun-02	Sep-02	Dec-02	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16	Jan-02	Jun-02	Sep-02	Dec-02	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16
Analyte	**Class GA AWQS***																								
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NS
tert-Butyl Alcohol	NA	NA	NA	NA	NA	NA	NA	ND	NA	**4.8 J**	ND	ND	ND	NA	NA	NA	NA	**9.4 J**	ND	ND	NA	ND	ND	ND	NS
Iodomethane	5 (GV)	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	NA	ND	ND	ND	NS
Methyl tert-buytl Ether	10 (GV)	**390 D**	ND	**320 D**	**320 D**	**210 D**	**290 D**	**120 D**	**50.0**	**20.0**	**19.0**	**7.7**	**7.1**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NS
Vinyl Acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1 J**	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NS
1,2-Dichloroethane	0.6	NA	NA	NA	NA	**5.6**	**5.7**	**3.4**	**3.8**	**2.8 J**	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS
cis-1,2-Dichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
trans-1,2-Dichloroethene	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS
Toluene	5	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NS
Carbon Disulfide	60 (GV)	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS
Chloroform	7	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS
Tetrachloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
1,2,3-Trichloropropane	0.04	NA	NA	NA	NA	NA	NA	ND	NA	**24**	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	NA	ND	ND	ND	NS
Trichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Methylene Chloride	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS
Naphthalene	10 (GV)	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	NA	ND	ND	ND	NS
1,1-Dichloroethane	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS
Total VOCs	NA	390	ND	320	320	216	296	123	53.8	52.6	19.0	7.7	7.1	ND	ND	ND	ND	9.4	ND	ND	ND	ND	ND	ND	NS

Notes:

All data presented in micrograms per Liter (µg/L).

* New York State Ambient Water Quality Standards (TOGs 1.1.1).

GV - guidance value.

ND - Analyte concentration less than the instrument detection limit (IDL).

J - Estimated concentration exceeding the IDL, but less than the reporting limit

D - Results from a subsequent dilution

B - Analyte detected in associated method blank

E- Results exceed the instrument calibration limit

NA indicates 1) no standard or guidance value exists, or 2) sample was not analyzed for specified compound

BOLD font indicates results within the IDL, **BOLD** font in shaded cell indicates exceedances of AWQS+GV.

Table 2
Groundwater Analytical Results - Volatile Organic Compounds
Armonk Private Wells Site
Armonk, New York
Site No. 3-60-005
January 2002 - July 2016

Well ID		AW-201I/**AW-202I**												**AW-202S**											
Date		Jan-02	Jun-02	Sep-02	Dec-02	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16	Jan-02	Jun-02	Sep-02	Dec-02	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16
Analyte	**Class GA AWQS***																								
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	**0.53 J**	ND	ND	ND
tert-Butyl Alcohol	NA	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND
Iodomethane	5 (GV)	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND
Methyl tert-buytl Ether	10 (GV)	NA	**20**	**16**	**19**	**25**	**26**	**7.4**	**2.2**	**1.6 J**	**2.1 J**	**2.1 J**	**3.1 J**	NA	NA	**11**	**8**	ND	**4.5 J**	**3.2**	**1.6**	ND	ND	**0.58 J**	ND
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND
Vinyl Acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND
1,2-Dichloroethane	0.6	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	5	NA	ND	ND	ND	ND	ND	**1.5**	**2.3**	**0.83 J**	**1.4 J**	**1.9 J**	**5.1**	NA	NA	ND	ND	ND	ND	**1.7**	ND	**1.5 J**	**5.1**	**7.6**	**12.0**
trans-1,2-Dichloroethene	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	**0.7 J**	ND	ND	ND
Carbon Disulfide	60 (GV)	NA	NA	NA	NA	ND	**1.4 J**	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	7	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5	NA	**0.5 J**	**2**	**0.9 J**	ND	**2.3 J**	**17**	**14**	**1.5 J**	**1.1 J**	ND	**1.0 J**	NA	NA	**2**	**0.6 J**	ND	**2 J**	**23 D**	**1.5**	**1.2 J**	**1.0 J**	**1.3 J**	**1.1 J**
1,2,3-Trichloropropane	0.04	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND
Trichloroethene	5	NA	ND	ND	ND	ND	ND	**1.7**	**1.8**	**3 J**	**3.5 J**	**5.2**	**8.2**	NA	NA	**0.4 J**	ND	ND	ND	**1.2**	ND	**1.3 J**	**5.0**	**8.2**	**13.0**
Methylene Chloride	5	NA	NA	NA	NA	ND	ND	**0.4 JB**	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	**0.5 JB**	ND	ND	ND	ND	ND
Naphthalene	10 (GV)	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	ND	NA	ND	ND	ND	ND
1,1-Dichloroethane	5	NA	NA	NA	NA	ND	ND	ND	**1.4**	**1.5 J**	**0.94 J**	**0.77 J**	**1.0 J**	NA	NA	NA	NA	ND	ND	ND	**2.1**	**2.4 J**	**1.6 J**	**1.6 J**	**1.2 J**
Total VOCs	NA	NA	20.5	18	19.9	25	29.7	28	21.7	8.43	9.0	10.0	18.4	NA	NA	13.4	8.6	ND	6.5	29.6	5.2	7.63	12.7	19.3	27.3

Notes:

All data presented in micrograms per Liter (µg/L).

* New York State Ambient Water Quality Standards (TOGs 1.1.1).

GV - guidance value.

ND - Analyte concentration less than the instrument detection limit (IDL).

J - Estimated concentration exceeding the IDL, but less than the reporting limit

D - Results from a subsequent dilution

B - Analyte detected in associated method blank

E- Results exceed the instrument calibration limit

NA indicates 1) no standard or guidance value exists, or 2) sample was not analyzed for specified compound

BOLD font indicates results within the IDL, **BOLD** font in shaded cell indicates exceedances of AWQS+GV.

Table 2
Groundwater Analytical Results - Volatile Organic Compounds
Armonk Private Wells Site
Armonk, New York
Site No. 3-60-005
January 2002 - July 2016

Well ID		AW-204S												AW-204R											
Date		Jan-02	Jun-02	Sep-02	Dec-02	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16	Jan-02	Jun-02	Sep-02	Dec-02	May-05	Oct-05	Aug-07	Oct-09	Oct-11	Jun-14	Jun-15	Jul-16
Analyte	Class GA AWQS*																								
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NS
tert-Butyl Alcohol	NA	NA	NA	NA	NA	**6.6 J**	ND	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	**5.7 J**	ND	ND	NA	ND	ND	ND	NS
Iodomethane	5 (GV)	NA	NA	NA	NA	ND	ND	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	NA	ND	ND	ND	NS
Methyl tert-buytl Ether	10 (GV)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NS
Vinyl Acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NS
1,2-Dichloroethane	0.6	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS
cis-1,2-Dichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
trans-1,2-Dichloroethene	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS
Toluene	5	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NS
Carbon Disulfide	60 (GV)	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS
Chloroform	7	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS
Tetrachloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.99 J**	ND	ND	NS
1,2,3-Trichloropropane	0.04	NA	NA	NA	NA	ND	ND	ND	NA	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	NA	ND	ND	ND	NS
Trichloroethene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Methylene Chloride	5	NA	NA	NA	NA	ND	ND	**0.4 JB**	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	**0.6 J**	ND	ND	ND	ND	ND	NS
Naphthalene	10 (GV)	NA	NA	NA	NA	ND	ND	ND	NA	ND	**3.6 J**	ND	ND	NA	NA	NA	NA	ND	ND	ND	NA	ND	ND	ND	NS
1,1-Dichloroethane	5	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NS
Total VOCs	NA	ND	ND	ND	ND	6.6	ND	0.4	ND	ND	3.6	ND	ND	ND	ND	ND	ND	5.7	0.6	ND	ND	0.99	ND	ND	NS

Notes:

All data presented in micrograms per Liter (µg/L).

* New York State Ambient Water Quality Standards (TOGs 1.1.1).

GV - guidance value.

ND - Analyte concentration less than the instrument detection limit (IDL).

J - Estimated concentration exceeding the IDL, but less than the reporting limit

D - Results from a subsequent dilution

B - Analyte detected in associated method blank

E- Results exceed the instrument calibration limit

NA indicates 1) no standard or guidance value exists, or 2) sample was not analyzed for specified compound

BOLD font indicates results within the IDL, **BOLD** font in shaded cell indicates exceedances of AWQS+GV.

Table 3
COMBINED INFLUENT RESULTS
ARMONK PRIVATE WELLS
ARMONK, NEW YORK
SITE No. 3-60-005
2013 - 2016

Analytes - VOCs	**9/12/13**	**10/10/13**	**11/15/13**	**12/11/13**	**12/31/13**	**2/18/14**	**3/12/14**	**4/9/14**	**5/7/14**	**6/4/14**	**7/9/14**	**8/6/14**	**9/3/14**	**10/2/14**	**11/7/14**	**12/2/14**
Chloromethane	<10	<5	<5	<5	<5	<5	<5	<5	<5	<2	<2	<2	<5	<1	<5	<5
Vinyl Chloride	<10	<5	<5	<5	<5	<5	<5	<5	<5	<2	<2	<2	<5	<1	<5	<5
t-1,2-Dichloroethene	<10	<5	<5	<5	<5	<5	<5	<5	<5	<2	<2	<2	<5	<1	<5	<5
c-1,2-Dichloroethene	<10	**7.4**	**5.6**	<5	**5.4**	**9.1**	**12**	**22**	<5	**4.4**	**2.6**	**5.7**	<5	<1	<5	<5
Trichloroethene	<10	**6.6**	**5.2**	<5	<5	<5	**5.6**	**6.6**	<5	**4.8**	**6.4**	**4.0**	<5	<1	**10**	**5.4**
Tetrachloroethene	**800**	**670**	**580**	**220**	**500**	**500**	**620**	**670**	**230**	**350**	**330**	**480 H**	**120**	**31**	**480**	**480**
Analytes - Metals																
Iron	<50	<50	**51**	<50	<50	<50	**148**	<50	**82**	<50	<50	<50	<50	<50	<50	<50
Zinc	**15**	**20**	**21**	**24**	**40**	**17**	**435**	**19**	**27**	**18**	**21**	**25**	**38**	**18**	**24**	**76**

NOTES:

Results reported in micrograms per liter (µg/l).

Data are shown only for reported analytes. Detected concentrations appear in **bold font**.

Analysis by Environmental Protection Agency (EPA) Method 8260 for volatile organic compounds (VOCs).

Analysis by Environmental Protection Agency (EPA) Method 200.7 for Metals.

NS - Not sampled.

H - Hold time exceeded

February, March, August, and September 2015 samples did not include recovery well EW-2.

Samples analyzed by Adirondack Environmental Services (E601 for purgeable halocarbons).

January 2014 sample was collected December 31, 2013.

January 2016 sample did not include recovery well EW-2.

System down: 4/25/15 - 5/28/15

Table 3
COMBINED INFLUENT RESULTS
ARMONK PRIVATE WELLS
ARMONK, NEW YORK
SITE No. 3-60-005
2013 - 2016

Analytes - VOCs	1/8/15	2/5/15	3/2/15	4/9/15	5/1/15	6/3/15	7/9/15	8/11/15	9/2/15	10/13/15	11/3/15	12/2/15
Chloromethane	<5	<5	<5	<1	NS	<5	<2	<2	<2	**6.4**	**6.2**	**5.0**
Vinyl Chloride	<5	<5	<5	<1	NS	<5	<2	<2	<2	<5	<5	<5
t-1,2-Dichloroethene	<5	<5	<5	<1	NS	<5	<2	<2	<2	<5	<5	<5
c-1,2-Dichloroethene	<5	<5	<5	<1	NS	<5	**3.5**	<2	<2	<5	<5	<5
Trichloroethene	<5	**5.7**	**6.4**	<1	NS	<5	**5.5**	**3.2**	**7.2**	<5	**9.1**	**8.6**
Tetrachloroethene	**320**	**460**	**910**	**16**	NS	**340**	**400**	**390**	**400**	**380**	**520**	**440**
Analytes - Metals												
Iron	<50	<50	<50	**210**	NS	**56**	**1720**	<50	**366**	<50	<50	**161**
Zinc	**49**	**27**	**49**	**17**	NS	**46**	**72**	**25**	**45**	**22**	**31**	**28**

NOTES:

Results reported in micrograms per liter (µg/l).

Data are shown only for reported analytes. Detected concentrations appear in **bold font**.

Analysis by Environmental Protection Agency (EPA) Method 8260 for volatile organic compounds (VOCs).

Analysis by Environmental Protection Agency (EPA) Method 200.7 for Metals.

NS - Not sampled.

H - Hold time exceeded

February, March, August, and September 2015 samples did not include recovery well EW-2.

Samples analyzed by Adirondack Environmental Services (E601 for purgeable halocarbons).

January 2014 sample was collected December 31, 2013.

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System down: 4/25/15 - 5/28/15

Table 3
COMBINED INFLUENT RESULTS
ARMONK PRIVATE WELLS
ARMONK, NEW YORK
SITE No. 3-60-005
2013 - 2016

Analytes - VOCs	**1/6/16**	**2/3/16**	**3/8/16**	**4/15/16**	**5/13/16**	**6/7/16**	**7/8/16**	**8/12/16***	**9/7/16**
Chloromethane	<5	<5	<5	<5	NS	NS	NS	<5	NS
Vinyl Chloride	<5	<5	<5	<5	NS	NS	NS	<5	NS
t-1,2-Dichloroethene	<5	<5	<5	<5	NS	NS	NS	<5	NS
c-1,2-Dichloroethene	<5	<5	<5	<5	NS	NS	NS	<5	NS
Trichloroethene	**5.1**	<5	**6.0**	<5	NS	NS	NS	<5	NS
Tetrachloroethene	**470**	**370**	**390**	**360**	NS	NS	NS	**250**	NS
Analytes - Metals									
Iron	<50	<50	**142**	**192**	NA	NA	NA	**433**	NA
Zinc	**15**	**22**	**10**	**27**	NA	NA	NA	**22**	NA

NOTES:

Results reported in micrograms per liter (µg/l).

Data are shown only for reported analytes. Detected concentrations appear in **bold font**.

Analysis by Environmental Protection Agency (EPA) Method 8260 for volatile organic compounds (VOCs).

Analysis by Environmental Protection Agency (EPA) Method 200.7 for Metals.

NS - Not sampled.

H - Hold time exceeded

February, March, August, and September 2015 samples did not include recovery well EW-2.

Samples analyzed by Adirondack Environmental Services (E601 for purgeable halocarbons).

January 2014 sample was collected December 31, 2013.

January 2016 sample did not include recovery well EW-2.

System down: 4/25/15 - 5/28/15

Table 4
EXTRACTION WELL EW-1 INFLUENT RESULTS
ARMONK PRIVATE WELLS
ARMONK, NEW YORK
SITE No. 3-60-005
2013-2016

Analytes - VOCs	**9/12/13**	**10/10/13**	**11/15/13**	**12/11/13**	**12/31/13**	**2/18/14**	**3/12/14**	**4/9/14**	**5/7/14**	**6/4/14**	**7/9/14**	**8/6/14**	**9/3/14**	**10/2/14**	**11/7/14**	**12/2/14**
Chloromethane	<10	<10	<10	<10	<10	<5	<10	<10	<10	<10	<10	**17**	**41**	<2	**22**	**58**
Vinyl Chloride	<10	<10	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<2	<10	<10
Bromomethane	<10	<10	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<2	<10	<10
trans-1,2-Dichloroethene	<10	<10	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<2	<10	<10
cis-1,2-Dichloroethene	<10	**11**	<10	<10	**11**	**17**	**17**	**29**	<10	**11**	<10	<10	<10	<2	<10	<10
Trichloroethene	**10**	<10	<10	<10	<10	**8.8**	**10**	<10	<10	**18**	**13**	<10	<10	<2	**22**	<10
1,1,2-Trichloroethane	<10	<10	<10	<10	<10	<5	<10	<10	<10	<10	<10	<10	<10	<2	<10	<10
Tetrachloroethene	**1,300**	**1,300**	**960**	**940**	**520**	**990**	**810**	**840**	**640**	**1,100**	**920**	**990**	**960**	**120**	**1,200**	**880**
Analytes - Metals																
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTES:
Results reported in micrograms per liter (µg/l).
Data are shown only for reported analytes. Detected concentrations appear in **bold font**.
Analysis by Environmental Protection Agency (EPA) Method 8260 for volatile organic compounds (VOCs).
Analysis by Environmental Protection Agency (EPA) Method 200.7 for Metals.
NS - Not sampled.
Samples analyzed by Adirondack Environmental Services (E601 for purgeable halocarbons).
January 2014 sample was collected December 31, 2013.
System down: 4/25/15 - 5/28/15

Table 4
EXTRACTION WELL EW-1 INFLUENT RESULTS
ARMONK PRIVATE WELLS
ARMONK, NEW YORK
SITE No. 3-60-005
2013-2016

Analytes - VOCs	**1/8/15**	**2/5/15**	**3/2/15**	**4/9/15**	**5/1/15**	**6/3/15**	**7/9/15**	**8/11/15**	**9/2/15**	**10/13/15**	**11/3/15**	**12/2/15**
Chloromethane	**41**	<10	<10	<10	NS	<10	<10	**14**	<10	**20**	**29**	**12**
Vinyl Chloride	<10	<10	<10	<10	NS	<10	<10	<10	<10	<10	<10	<10
Bromomethane	**24**	<10	<10	<10	NS	<10	<10	**17**	<10	<10	**12**	<10
trans-1,2-Dichloroethene	<10	<10	<10	<10	NS	<10	<10	<10	<10	<10	<10	<10
cis-1,2-Dichloroethene	**11**	<10	<10	**10**	NS	<10	<10	<10	<10	<10	<10	<10
Trichloroethene	**15**	**10**	<10	<10	NS	<10	<10	<10	<10	**16**	<10	<10
1,1,2-Trichloroethane	<10	<10	<10	<10	NS	<10	<10	<10	<10	<10	<10	<10
Tetrachloroethene	**840**	**970**	**940**	**920**	NS	**1,100**	**700**	**730**	**750**	**800**	**810**	**740**
Analytes - Metals												
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTES:
Results reported in micrograms per liter (µg/l).
Data are shown only for reported analytes. Detected concentrations appear in **bold font**.
Analysis by Environmental Protection Agency (EPA) Method 8260 for volatile organic compounds (VOCs).
Analysis by Environmental Protection Agency (EPA) Method 200.7 for Metals.
NS - Not sampled.
Samples analyzed by Adirondack Environmental Services (E601 for purgeable halocarbons).
January 2014 sample was collected December 31, 2013.
System down: 4/25/15 - 5/28/15

Table 4
EXTRACTION WELL EW-1 INFLUENT RESULTS
ARMONK PRIVATE WELLS
ARMONK, NEW YORK
SITE No. 3-60-005
2013-2016

Analytes - VOCs	**1/6/16**	**2/3/16**	**3/8/16**	**4/15/16**	**5/13/16**	**6/7/16**	**7/8/16**	**8/12/16**	**9/7/16**
Chloromethane	**10**	<10	<10	<10	<10	**20**	<10	<10	<10
Vinyl Chloride	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	<10	<10	<10	<10	<10	<10	<10	<10	<10
trans-1,2-Dichloroethene	<10	<10	<10	<10	<10	<10	<10	<10	<10
cis-1,2-Dichloroethene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Trichloroethene	<10	<10	<10	<10	<10	<10	<10	<10	**12**
1,1,2-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10
Tetrachloroethene	**710**	**720**	**930**	**710**	**810**	**840**	**950**	**620**	**720**
Analytes - Metals									
Iron	NA	NA	NA	NA	**834**	**116**	NA	NA	<50
Zinc	NA	NA	NA	NA	**272**	**24**	NA	NA	<10

NOTES:
Results reported in micrograms per liter (µg/l).
Data are shown only for reported analytes. Detected concentrations appear in **bold font**.
Analysis by Environmental Protection Agency (EPA) Method 8260 for volatile organic compounds (VOC
Analysis by Environmental Protection Agency (EPA) Method 200.7 for Metals.
NS - Not sampled.
Samples analyzed by Adirondack Environmental Services (E601 for purgeable halocarbons).
January 2014 sample was collected December 31, 2013.
System down: 4/25/15 - 5/28/15

Table 5
EXTRACTION WELL EW-2 INFLUENT RESULTS
ARMONK PRIVATE WELLS
ARMONK, NEW YORK
SITE No. 3-60-005
2013 - 2016

Analytes - VOCs	**9/12/13**	**10/10/13**	**11/15/13**	**12/11/13**	**12/31/13**	**2/18/14**	**3/12/14**	**4/9/14**	**5/7/14**	**6/4/14**	**7/9/14**	**8/6/14**	**9/3/14**	**10/2/14**	**11/7/14**	**12/2/14**
Vinyl Chloride	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
t-1,2-Dichloroethene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
c-1,2-Dichloroethene	**1**	<1	<1	<1	<1	<1	<1	<1	<1	**1.1**	<1	<1	<1	<1	<1	<1
Trichloroethene	**1.4**	**1.4**	<1	**1.2**	**1.0**	**1.2**	**1.3**	<1	<1	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.3**
Tetrachloroethene	**14**	**16**	**11**	**12**	**11**	**13**	**12**	**10**	**10**	**13**	**13**	**13**	**11**	**10**	**12**	**12**
Analytes - Metals																
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTES:

Results reported in micrograms per liter (µg/l).

Data are shown only for reported analytes. Detected concentrations appear in **bold font**.

Analysis by Environmental Protection Agency (EPA) Method 8260 for volatile organic compounds (VOCs).

Analysis by Environmental Protection Agency (EPA) Method 200.7 for Metals.

NS - Not sampled.

Samples analyzed by Adirondack Environmental Services (E601 for purgeable halocarbons).

January 2014 sample was collected December 31, 2013.

* well intentionally offline

Downtime: 1/8/15 - 5/28/15, 6/23/15-1/19/16, and 5/2/16

System down: 4/25/15 - 5/28/15

Table 5
EXTRACTION WELL EW-2 INFLUENT RESULTS
ARMONK PRIVATE WELLS
ARMONK, NEW YORK
SITE No. 3-60-005
2013 - 2016

Analytes - VOCs	1/8/15	2/5/15	3/2/15	4/9/15	5/1/15	6/3/15	7/9/15	8/11/15	9/2/15	10/13/15	11/3/15	12/2/15
Vinyl Chloride	<1	NS*	NS*	<1	NS	<1	<1	NS*	NS*	<2	NS*	NS*
t-1,2-Dichloroethene	<1	NS*	NS*	<1	NS	<1	<1	NS*	NS*	<2	NS*	NS*
c-1,2-Dichloroethene	<1	NS*	NS*	<1	NS	<1	**1.8**	NS*	NS*	<2	NS*	NS*
Trichloroethene	**1.5**	NS*	NS*	<1	NS	**1.7**	**3.2**	NS*	NS*	**3.8**	NS*	NS*
Tetrachloroethene	**12**	NS*	NS*	**11**	NS	**17**	**170**	NS*	NS*	**290**	NS*	NS*
Analytes - Metals												
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTES:

Results reported in micrograms per liter (µg/l).

Data are shown only for reported analytes. Detected concentrations appear in **bold font**.

Analysis by Environmental Protection Agency (EPA) Method 8260 for volatile organic compounds (VOCs).

Analysis by Environmental Protection Agency (EPA) Method 200.7 for Metals.

NS - Not sampled.

Samples analyzed by Adirondack Environmental Services (E601 for purgeable halocarbons).

January 2014 sample was collected December 31, 2013.

* well intentionally offline

Downtime: 1/8/15 - 5/28/15, 6/23/15-1/19/16, and 5/2/16

System down: 4/25/15 - 5/28/15

Table 5
EXTRACTION WELL EW-2 INFLUENT RESULTS
ARMONK PRIVATE WELLS
ARMONK, NEW YORK
SITE No. 3-60-005
2013 - 2016

Analytes - VOCs	1/6/16	2/3/16	3/8/16	4/15/16	5/13/16	6/7/16	7/8/16	8/12/16	9/7/16
Vinyl Chloride	<5	<5	<5	<2	NS*	NS*	NS*	<2	NS*
t-1,2-Dichloroethene	<5	<5	<5	<2	NS*	NS*	NS*	<2	NS*
c-1,2-Dichloroethene	<5	<5	<5	<2	NS*	NS*	NS*	<2	NS*
Trichloroethene	**5.8**	<5	<5	<2	NS*	NS*	NS*	<2	NS*
Tetrachloroethene	**500**	**72**	**67**	**22**	NS*	NS*	NS*	**25**	NS*
Analytes - Metals									
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTES:

Results reported in micrograms per liter (µg/l).

Data are shown only for reported analytes. Detected concentrations appear in **bold font**.

Analysis by Environmental Protection Agency (EPA) Method 8260 for volatile organic compounds (VOCs).

Analysis by Environmental Protection Agency (EPA) Method 200.7 for Metals.

NS - Not sampled.

Samples analyzed by Adirondack Environmental Services (E601 for purgeable halocarbons).

January 2014 sample was collected December 31, 2013.

* well intentionally offline

Downtime: 1/8/15 - 5/28/15, 6/23/15-1/19/16, and 5/2/16

System down: 4/25/15 - 5/28/15

Table 6
EXTRACTION WELL EW-3N INFLUENT RESULTS
ARMONK PRIVATE WELLS
ARMONK, NEW YORK
SITE No. 3-60-005
2013 - 2016

Analytes - VOCs	**9/12/13**	**10/10/13**	**11/15/13**	**12/11/13**	**12/31/13**	**2/18/14**	**3/12/14**	**4/9/14**	**5/7/14**	**6/4/14**	**7/9/14**	**8/6/14**	**9/3/14**	**10/2/14**	**11/7/14**	**12/2/14**
Chloromethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Vinyl Chloride	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
t-1,2-Dichloroethene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
c-1,2-Dichloroethene	<1	<1	<1	<1	<1	<1	<1	<1	<1	**1.5**	<1	<1	**1.1**	<1	**1.2**	<1
Trichloroethene	<1	<1	<1	<1	**1.3**	<1	<1	<1	<1	**2.4**	<1	<1	**1.5**	**1.5**	**2.3**	<1
Tetrachloroethene	**25**	**22**	**17**	**16**	**14**	**21**	**34**	**62**	**32**	**33**	**23**	**20**	**15**	**24**	**60**	**48**
Analytes - Metals																
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTES:

Results reported in micrograms per liter (µg/l).

Data are shown only for reported analytes. Detected concentrations appear in **bold font**.

Analysis by Environmental Protection Agency (EPA) Method 8260 for volatile organic compounds (VOCs).

Analysis by Environmental Protection Agency (EPA) Method 200.7 for Metals.

NS - Not sampled.

Samples analyzed by Adirondack Environmental Services (E601 for purgeable halocarbons).

January 2014 sample was collected December 31, 2013.

* well intentionally offline

Downtime: 5/2/16
System down: 4/25/15 - 5/28/15

Table 6
EXTRACTION WELL EW-3N INFLUENT RESULTS
ARMONK PRIVATE WELLS
ARMONK, NEW YORK
SITE No. 3-60-005
2013 - 2016

Analytes - VOCs	**1/8/15**	**2/5/15**	**3/2/15**	**4/9/15**	**5/1/15**	**6/3/15**	**7/9/15**	**8/11/15**	**9/2/15**	**10/13/15**	**11/3/15**	**12/2/15**
Chloromethane	<1	<1	<1	<1	NS	<1	<1	<1	<1	<1	<1	**1.5**
Vinyl Chloride	<1	<1	<1	<1	NS	<1	<1	<1	<1	<1	<1	<1
t-1,2-Dichloroethene	<1	<1	<1	<1	NS	<1	<1	<1	<1	<1	<1	<1
c-1,2-Dichloroethene	**1.2**	**1.1**	<1	<1	NS	<1	<1	**1.2**	**1.3**	<1	<1	<1
Trichloroethene	**2.5**	**2.5**	**1.2**	<1	NS	<1	<1	**3.2**	**3.3**	<1	**1.2**	**1.3**
Tetrachloroethene	**25**	**25**	**27**	**27**	NS	**50**	**24**	**23**	**24**	**24**	**28**	**24**
Analytes - Metals												
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTES:

Results reported in micrograms per liter (µg/l).

Data are shown only for reported analytes. Detected concentrations appear in **bold font**.

Analysis by Environmental Protection Agency (EPA) Method 8260 for volatile organic compounds (VOCs).

Analysis by Environmental Protection Agency (EPA) Method 200.7 for Metals.

NS - Not sampled.

Samples analyzed by Adirondack Environmental Services (E601 for purgeable halocarbons).

January 2014 sample was collected December 31, 2013.

* well intentionally offline

Downtime: 5/2/16
System down: 4/25/15 - 5/28/15

Table 6
EXTRACTION WELL EW-3N INFLUENT RESULTS
ARMONK PRIVATE WELLS
ARMONK, NEW YORK
SITE No. 3-60-005
2013 - 2016

Analytes - VOCs	**1/6/16**	**2/3/16**	**3/8/16**	**4/15/16**	**5/13/16**	**6/7/16**	**7/8/16**	**8/12/16**	**9/7/16**
Chloromethane	<1	<1	<1	<1	NS*	NS*	NS*	<1	NS*
Vinyl Chloride	<1	<1	<1	<1	NS*	NS*	NS*	<1	NS*
t-1,2-Dichloroethene	<1	<1	<1	<1	NS*	NS*	NS*	<1	NS*
c-1,2-Dichloroethene	<1	<1	<1	<1	NS*	NS*	NS*	<1	NS*
Trichloroethene	**1.4**	**1.4**	**1.2**	**1.2**	NS*	NS*	NS*	<1	NS*
Tetrachloroethene	**27**	**26**	**22**	**20**	NS*	NS*	NS*	**17**	NS*
Analytes - Metals									
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTES:

Results reported in micrograms per liter (µg/l).

Data are shown only for reported analytes. Detected concentrations appear in **bold font**.

Analysis by Environmental Protection Agency (EPA) Method 8260 for volatile organic compounds (VOCs).

Analysis by Environmental Protection Agency (EPA) Method 200.7 for Metals.

NS - Not sampled.

Samples analyzed by Adirondack Environmental Services (E601 for purgeable halocarbons).

January 2014 sample was collected December 31, 2013.

* well intentionally offline

Downtime: 5/2/16
System down: 4/25/15 - 5/28/15

Table 7
EFFLUENT RESULTS
ARMONK PRIVATE WELLS
ARMONK, NEW YORK
SITE No. 3-60-005
2013 - 2016

Analyte / Effluent Limitations	**9/12/13**	**10/10/13**	**11/15/13**	**12/11/13**	**12/31/13**	**2/18/14**	**3/12/14**	**4/9/14**	**5/7/14**	**6/4/14**	**7/9/14**	**8/6/14**	**9/3/14**	**10/2/14**	**11/7/14**	**12/2/14**
Vinyl Chloride / 10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
t-1,2-Dichloroethene / 10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
c-1,2-Dichloroethene / 10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene / 10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene / 2.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Analytes - Metals / Effluent Limitations																
Iron / 750	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Zinc / 250	**10**	**17**	**26**	**42**	**15**	**32**	**157**	**78**	**13**	**11**	**36**	**16**	**26**	**28**	**118**	**121**
pH / 6.5 - 8.5	**6.0**	**6.0**	6.7	7.2	7.3	**9.3**	7.3	7.4	7.2	7.2	7.6	7.0	7.0	7.8	7.0	7.1

NOTES:
Data are shown for all analytes for which monitoring requirements have been established.
Results reported in micrograms per liter (µg/l).
Data are shown only for reported analytes. Detected concentrations appear in **bold font**.
Concentrations exceeding effluent limitations are shown in bold font in a shaded cell.
Analysis by Environmental Protection Agency (EPA) Method 8260 for volatile organic compounds (VOCs).
Analysis by Environmental Protection Agency (EPA) Method 200.7 for Metals.
NS - Not sampled.
* pH meter failed to calibrate
Samples analyzed by Adirondack Environmental Services (E601 for purgeable halocarbons).
January 2014 sample was collected December 31, 2013.
Downtime: 4/25/15 - 5/28/15

Table 7
EFFLUENT RESULTS
ARMONK PRIVATE WELLS
ARMONK, NEW YORK
SITE No. 3-60-005
2013 - 2016

Analyte / Effluent Limitations	**1/8/15**	**2/5/15**	**3/2/15**	**4/9/15**	**5/1/15**	**6/3/15**	**7/9/15**	**8/11/15**	**9/2/15**	**10/13/15**	**11/3/15**	**12/2/15**	**1/6/16**	**2/3/16**	**3/8/16**	**4/15/16**	**5/13/16**	**6/7/16**	**7/8/16**	**8/12/16**	**9/7/16**
Vinyl Chloride / 10	<1	<1	<1	<1	NS	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
t-1,2-Dichloroethene / 10	<1	<1	<1	<1	NS	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
c-1,2-Dichloroethene / 10	<1	<1	<1	<1	NS	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene / 10	<1	<1	<1	<1	NS	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene / 2.5	<1	<1	<1	<1	NS	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Analytes - Metals / Effluent Limitations																					
Iron / 750	<50	<50	<50	<50	NS	<50	<50	**78**	<50	<50	**57**	<50	<50	<50	**275**	<50	<50	<50	<50	<50	<50
Zinc / 250	**38**	**34**	**110**	**14**	NS	**287**	**273**	**190**	**33**	**120**	**159**	**29**	**12**	**33**	**33**	**13**	**145**	**53**	**37**	**10**	**25**
pH / 6.5 - 8.5	7.0	7.1	NA*	6.6	NS	6.5	6.6	6.6	6.7	6.9	7.0	6.8	6.8	6.7	7.1	7.3	7.1	7.1	6.8	6.8	7.0

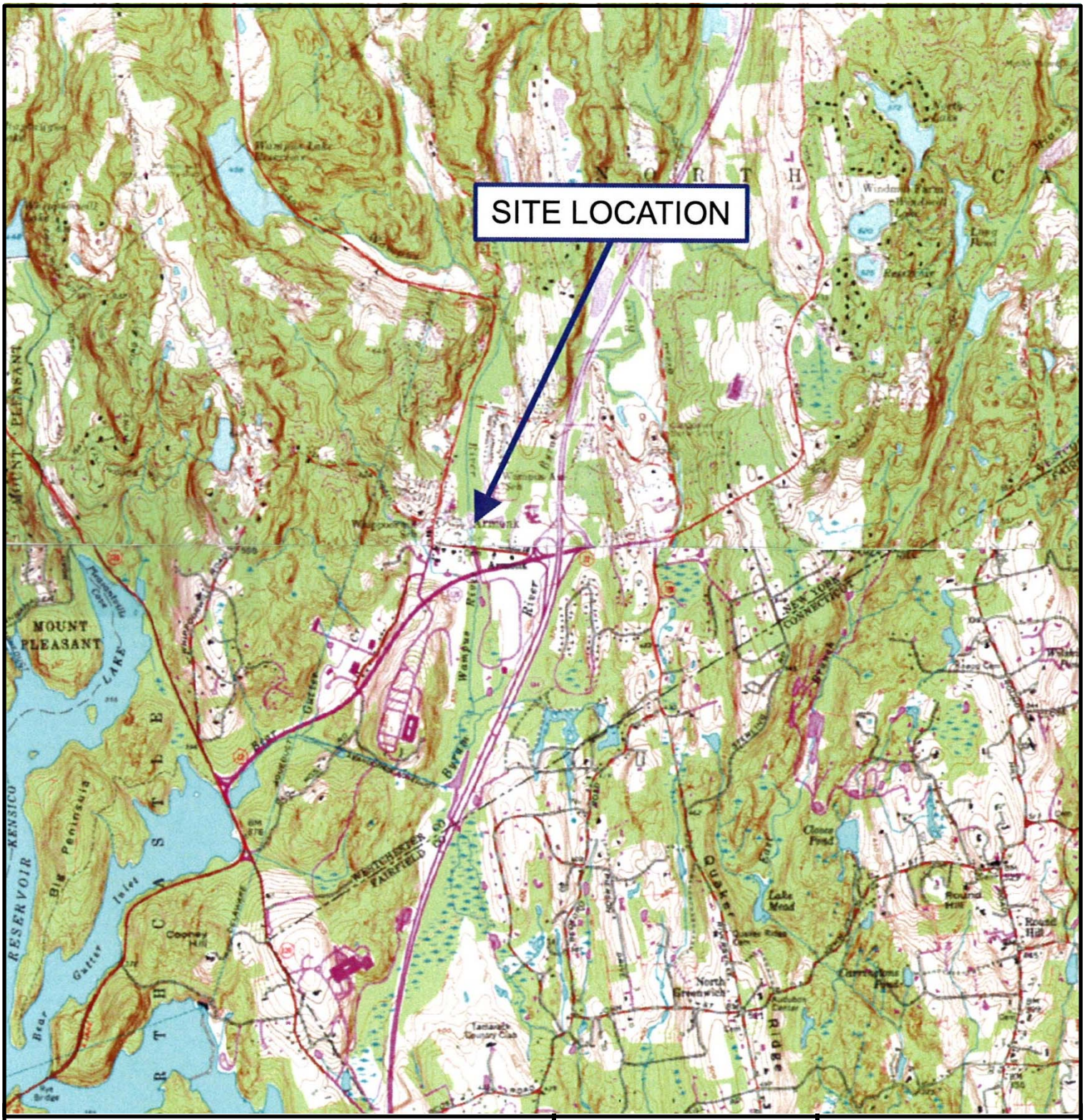
NOTES:
Data are shown for all analytes for which monitoring requirements have been established.
Results reported in micrograms per liter (µg/l).
Data are shown only for reported analytes. Detected concentrations appear in **bold font**.
Concentrations exceeding effluent limitations are shown in bold font in a shaded cell.
Analysis by Environmental Protection Agency (EPA) Method 8260 for volatile organic compounds (VOCs).
Analysis by Environmental Protection Agency (EPA) Method 200.7 for Metals.
NS - Not sampled.
* pH meter failed to calibrate
Samples analyzed by Adirondack Environmental Services (E601 for purgeable halocarbons).
January 2014 sample was collected December 31, 2013.
Downtime: 4/25/15 - 5/28/15

Table 8
CUMULATIVE VOLUME REMOVED BY EXTRACTION WELLS
ARMONK PRIVATE WELLS
ARMONK, NEW YORK
SITE No. 3-60-005
2013 - 2016

Date	EW-1	EW-2	EW-3	EW-3N
9/30/2013	15,737,996	31,412,148	Abandoned	1,266,394
12/31/2013	16,104,845	32,392,783	Abandoned	1,552,177
3/31/2014	16,469,898	33,379,501	Abandoned	1,734,408
6/30/2014	17,137,732	34,296,373	Abandoned	1,880,959
9/30/2014	17,707,715	35,228,066	Abandoned	2,013,998
12/31/2014	18,155,052	35,850,261	Abandoned	2,138,139
3/31/2015	18,808,060	35,912,641	Abandoned	2,250,246
6/30/2015	19,264,690	36,174,489	Abandoned	2,311,889
9/30/2015	19,831,183	36,184,288	Abandoned	2,393,254
12/31/2015	20,420,388	36,184,997	Abandoned	2,463,924
3/31/2016	21,098,205	36,952,454	Abandoned	2,538,639
6/30/2016	21,698,497	37,286,802	Abandoned	2,563,929
9/30/2016	22,228,886	37,287,574	Abandoned	2,564,323

NOTES:
- EW-3N was installed on December 19, 2012.

FIGURES



Source: NYSGIS Clearinghouse

AECOM

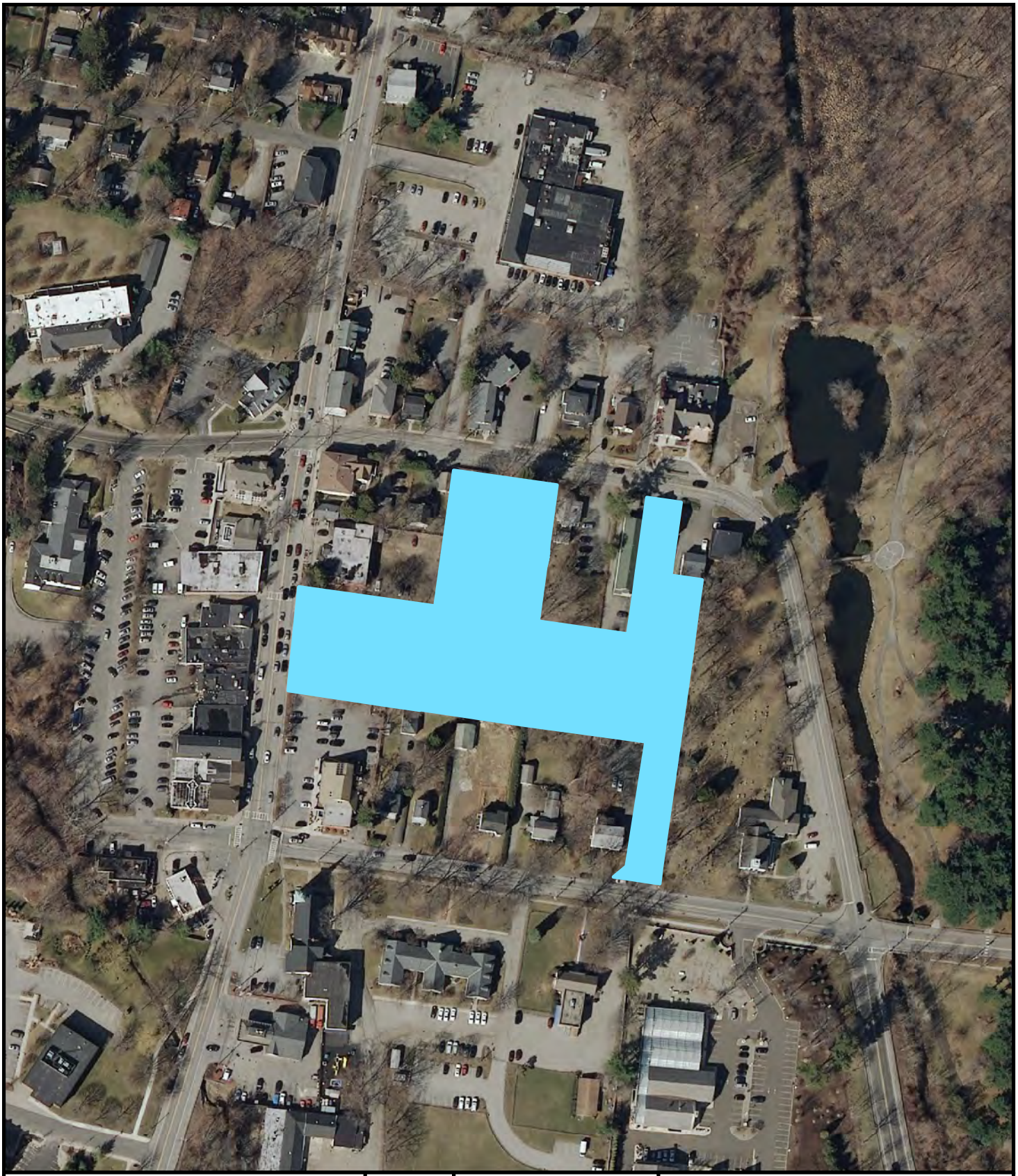
40 British American Blvd.
Latham, NY 12110
T: (518) 951-2200
F: (518) 951-2300

FIGURE 1
SITE LOCATION

ARMONK PRIVATE WELLS
MAPLE AVENUE
ARMONK, NEW YORK

DECEMBER 2016

60282094



Source: NYS GIS Clearinghouse

Feet
0 55 110 220 330 440

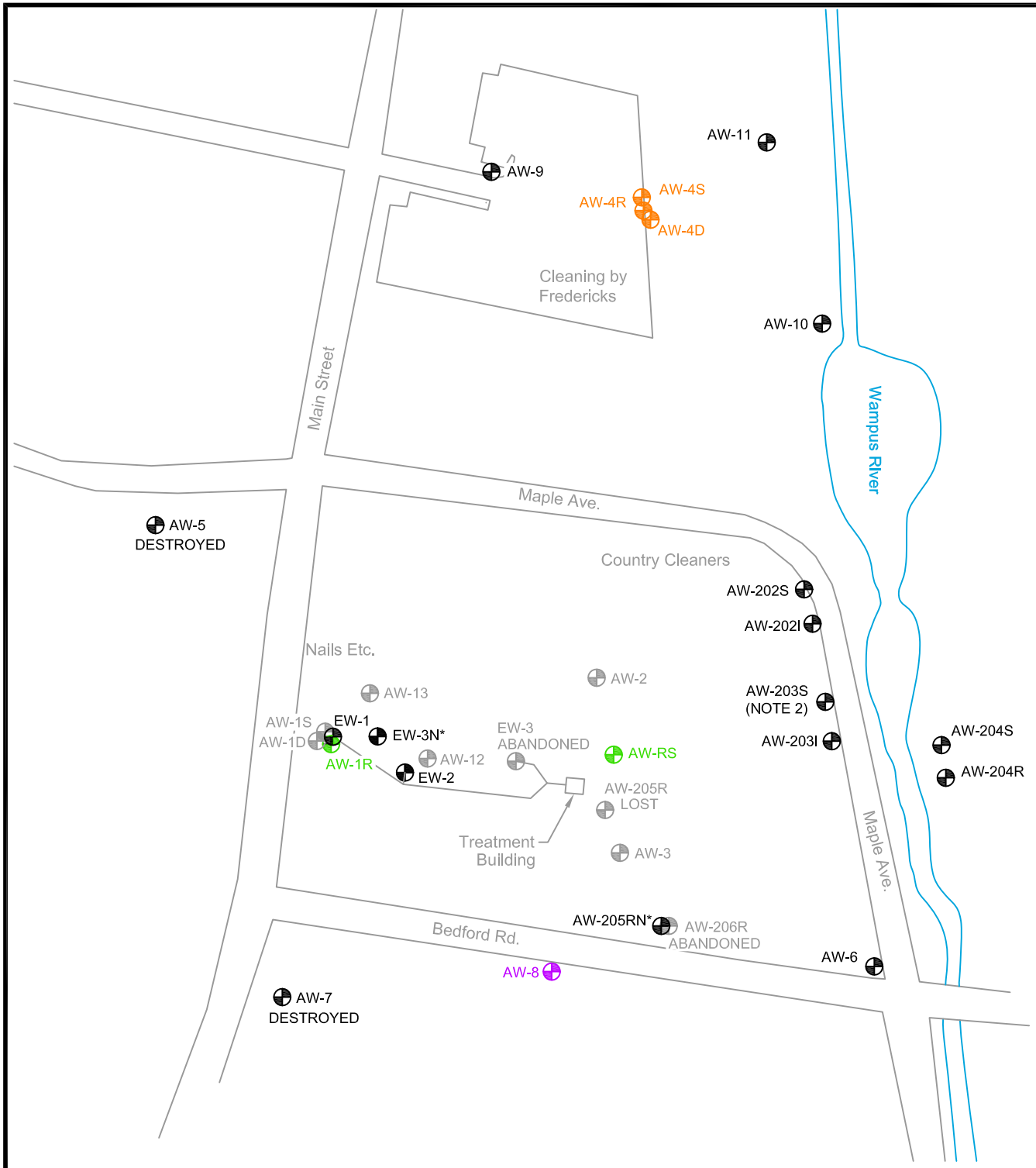
SCALE

N

AECOM

FIGURE 2
SITE BOUNDARY
ARMONK PRIVATE WELLS
MAPLE AVENUE
ARMONK, NEW YORK

JANUARY 2017 **60282094**



LEGEND

AW-10	MONITORING WELL
EW-2	EXTRACTION WELL
AW-12	DECOMMISSIONED WELL
AW-4R	BURIED WELL; SAMPLEABLE
AW-1R	PAVED OVER WELL
AW-8	DAMAGED WELL; SAMPLEABLE

N

* WELL LOCATIONS ARE APPROXIMATE

NOTE

1. AW-206R AND EW-3 WERE ABANDONED IN JULY 2012.
2. AW-203S IS MISSING A WELL COVER.

0' 100' 200' 400'

APPROX. SCALE

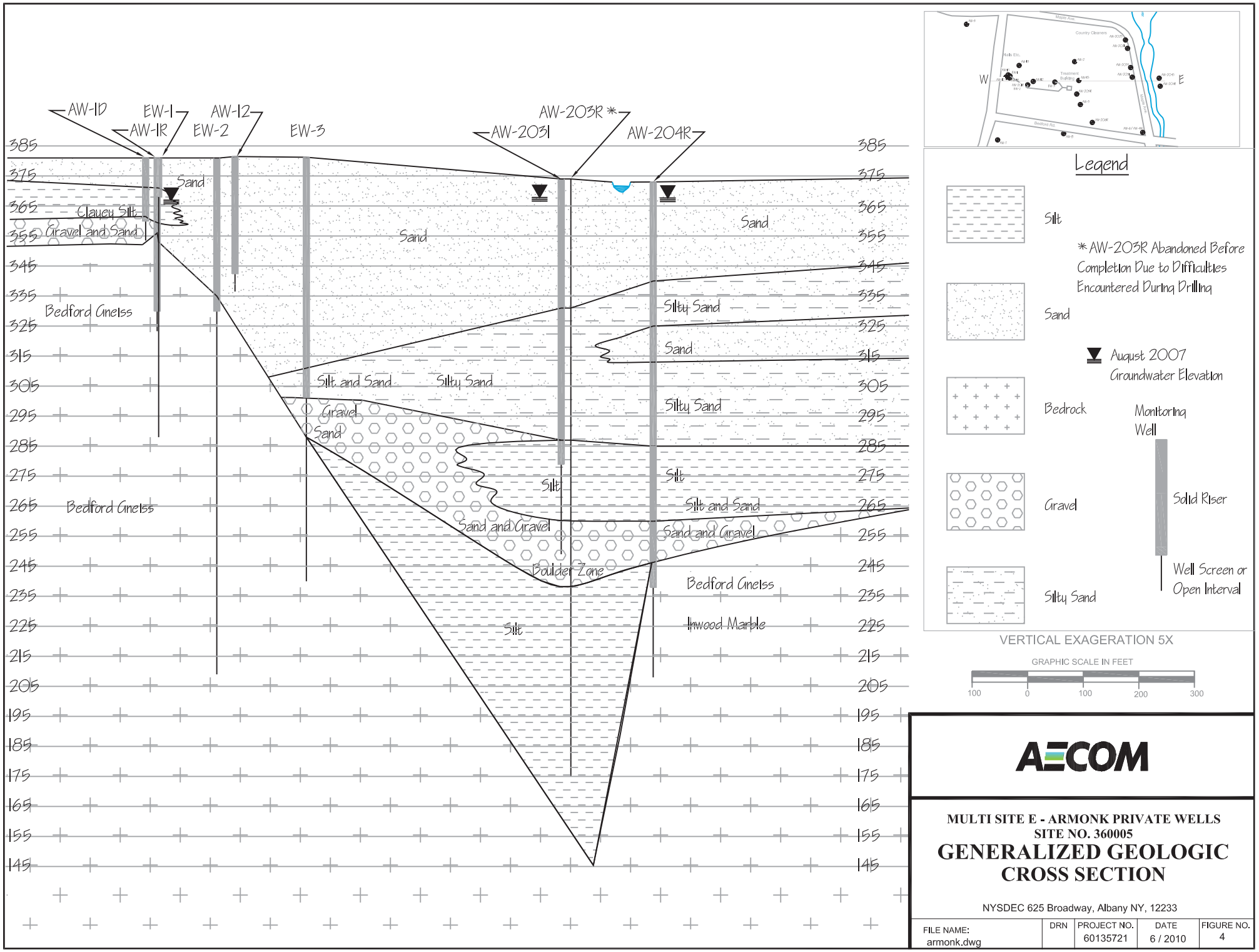
AECOM

MULTI SITE E - ARMONK PRIVATE WELLS
SITE NO. 3-60-005

SITE FEATURES MAP

NYSDEC 625 Broadway, Albany NY, 12233

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
armonkNov2016.dwg		60282094	11 / 2016	3



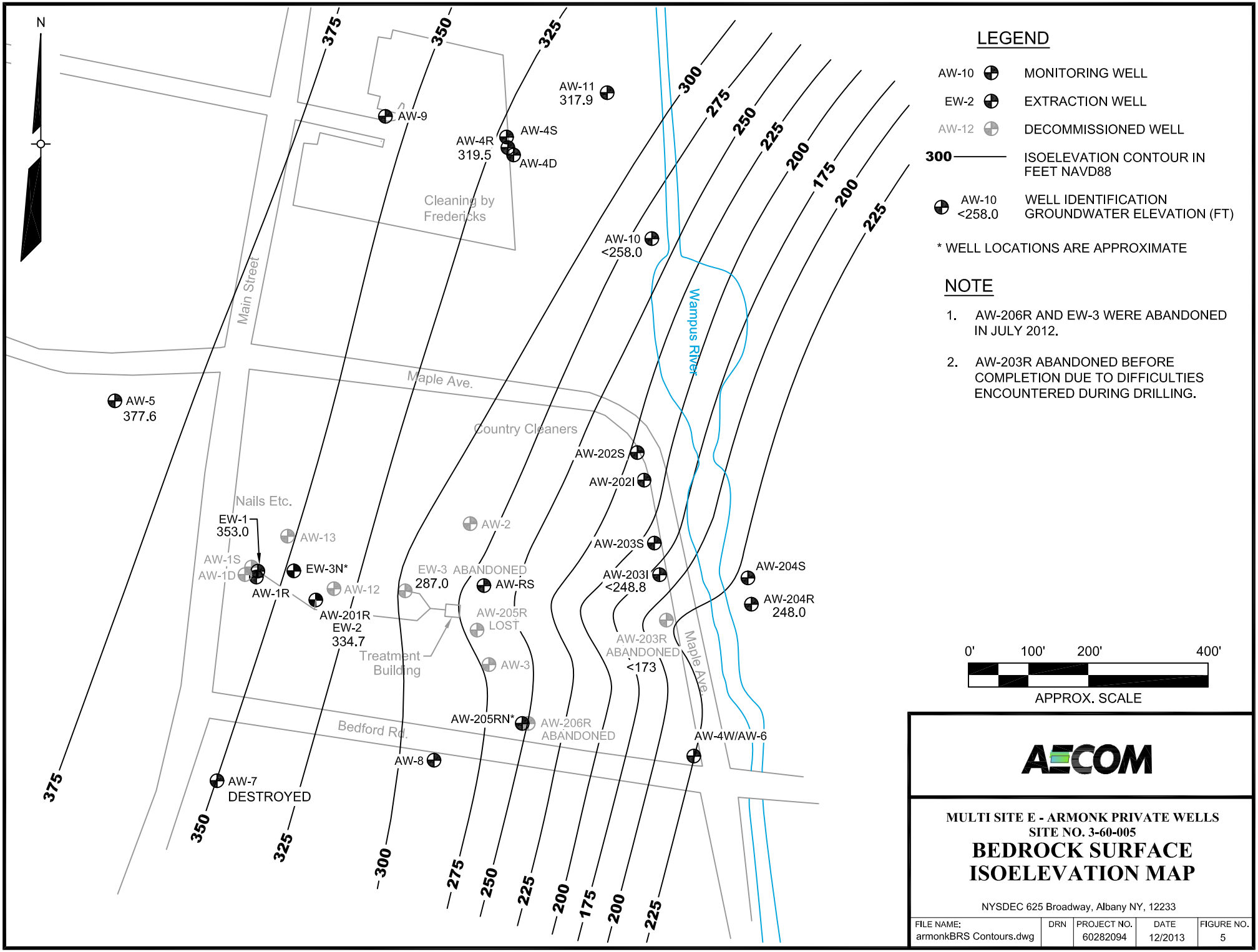
AECOM

MULTI SITE E - ARMONK PRIVATE WELLS
SITE NO. 360005

GENERALIZED GEOLOGIC CROSS SECTION

NYSDEC 625 Broadway, Albany NY, 12233

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
armonk.dwg		60135721	6 / 2010	4



LEGEND

- AW-10 — MONITORING WELL
- EW-2 — EXTRACTION WELL
- AW-12 — DECOMMISSIONED WELL
- 300 — ISOELEVATION CONTOUR IN FEET NAVD88
- AW-10 <258.0 — WELL IDENTIFICATION GROUNDWATER ELEVATION (FT)

* WELL LOCATIONS ARE APPROXIMATE

NOTE

1. AW-206R AND EW-3 WERE ABANDONED IN JULY 2012.
2. AW-203R ABANDONED BEFORE COMPLETION DUE TO DIFFICULTIES ENCOUNTERED DURING DRILLING.

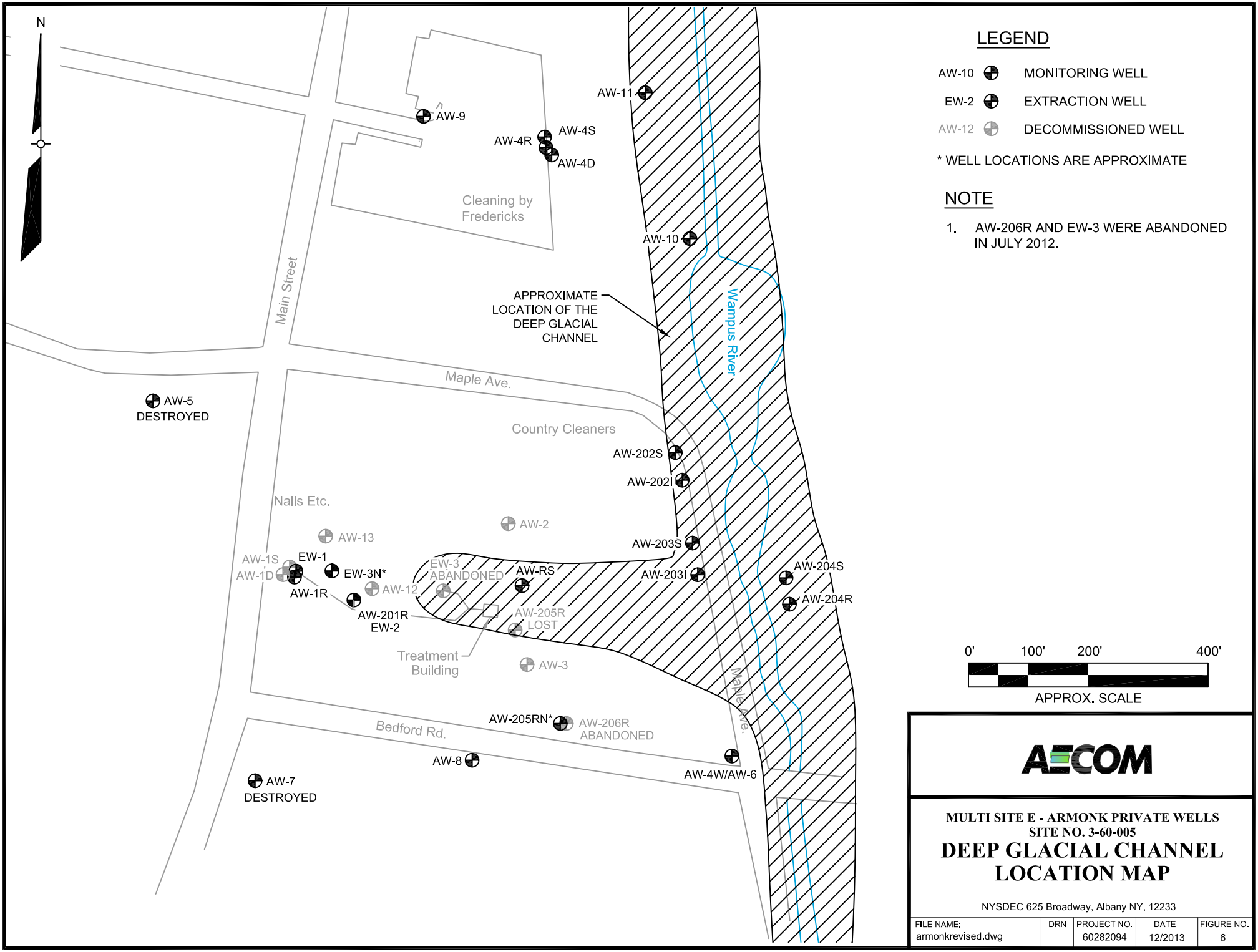
AECOM

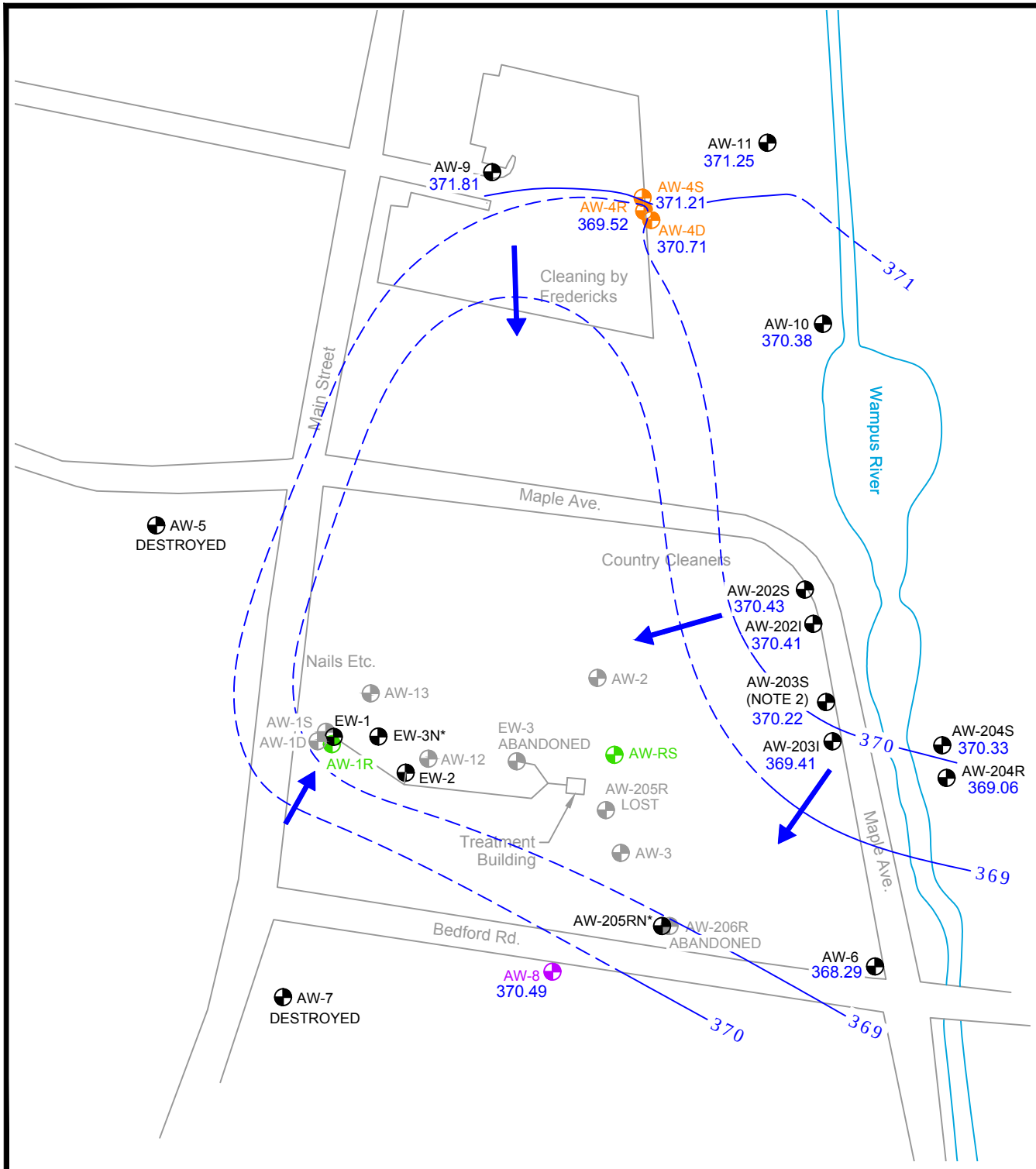
MULTI SITE E - ARMONK PRIVATE WELLS
SITE NO. 3-60-005

BEDROCK SURFACE ISOELEVATION MAP

NYSDEC 625 Broadway, Albany NY, 12233

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
armonkBRS Contours.dwg		60282094	12/2013	5


N
AW-9
AW-4R
AW-4S
AW-4D
AW-11
Cleaning by Fredericks
AW-10
Main Street
APPROXIMATE LOCATION OF THE DEEP GLACIAL CHANNEL
Wampus River
Maple Ave.
AW-5 DESTROYED
Country Cleaners
AW-202S
AW-202I
Nails Etc.
AW-2
AW-13
AW-203S
AW-1S
AW-1D
EW-1
EW-3N*
AW-1R
AW-12
EW-3 ABANDONED
AW-RS
AW-203I
AW-204S
AW-204R
AW-201R
EW-2
AW-205R LOST
Treatment Building
AW-3
Maple Ave.
AW-205RN*
AW-206R ABANDONED
Bedford Rd.
AW-8
AW-4W/AW-6
AW-7 DESTROYED
LEGEND
AW-10 MONITORING WELL
EW-2 EXTRACTION WELL
AW-12 DECOMMISSIONED WELL
* WELL LOCATIONS ARE APPROXIMATE
NOTE
1. AW-206R AND EW-3 WERE ABANDONED IN JULY 2012.
0' 100' 200' 400'
APPROX. SCALE
AECOM
MULTI SITE E - ARMONK PRIVATE WELLS
SITE NO. 3-60-005
DEEP GLACIAL CHANNEL LOCATION MAP
NYSDEC 625 Broadway, Albany NY, 12233
FILE NAME: armonkrevised.dwg
DRN
PROJECT NO. 60282094
DATE 12/2013
FIGURE NO. 6



LEGEND

AW-10	MONITORING WELL
EW-2	EXTRACTION WELL
AW-12	DECOMMISSIONED WELL
AW-4R	BURIED WELL; SAMPLEABLE
AW-1R	PAVED OVER WELL
AW-8	DAMAGED WELL; SAMPLEABLE
369	ISOELEVATION CONTOUR IN FEET NAVD88 (DASHED WHERE INFERRED)
	INFERRED GROUNDWATER FLOW DIRECTION
AW-10 370.38	WELL IDENTIFICATION GROUNDWATER ELEVATION (FT)

* WELL LOCATIONS ARE APPROXIMATE

N

NOTE

1. AW-206R AND EW-3 WERE ABANDONED IN JULY 2012.
2. AW-203S IS MISSING A WELL COVER.

0' 100' 200' 400'

APPROX. SCALE

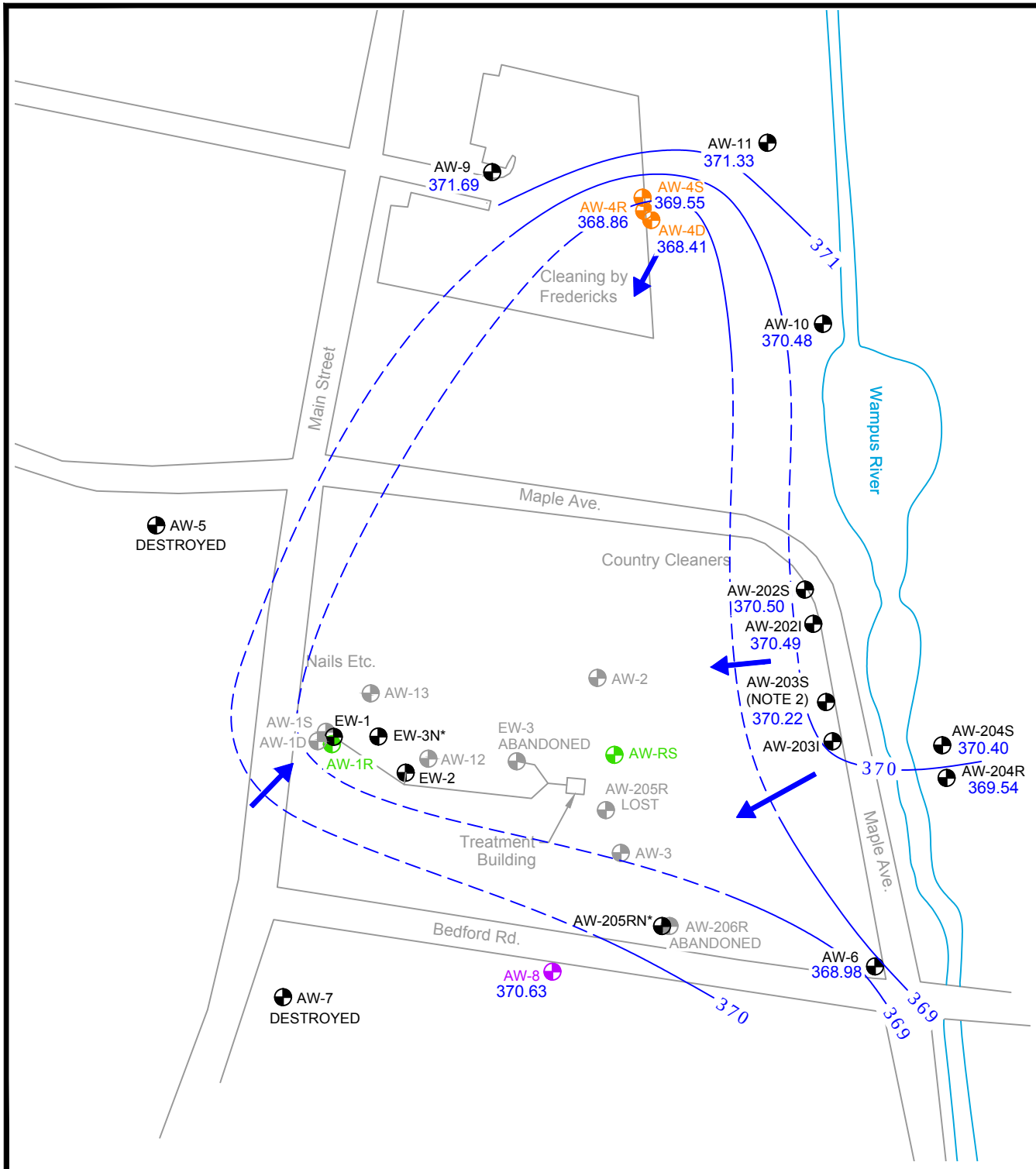
AECOM

MULTI SITE E - ARMONK PRIVATE WELLS
SITE NO. 3-60-005

GROUNDWATER ISOELEVATION MAP

June 2014 Results
NYSDEC 625 Broadway, Albany NY, 12233

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
armonkDec2016.dwg		60282094	12 / 2016	7



LEGEND

AW-10	MONITORING WELL
EW-2	EXTRACTION WELL
AW-12	DECOMMISSIONED WELL
AW-4R	BURIED WELL; SAMPLEABLE
AW-1R	PAVED OVER WELL
AW-8	DAMAGED WELL; SAMPLEABLE
369	ISOELEVATION CONTOUR IN FEET NAVD88 (DASHED WHERE INFERRED)
	INFERRED GROUNDWATER FLOW DIRECTION
AW-10 370.48	WELL IDENTIFICATION GROUNDWATER ELEVATION (FT)

* WELL LOCATIONS ARE APPROXIMATE

N

NOTE

1. AW-206R AND EW-3 WERE ABANDONED IN JULY 2012.
2. AW-203S IS MISSING A WELL COVER.
3. AW-203I WAS NOT USED FOR CONTOURING PURPOSES.

0' 100' 200' 400'

APPROX. SCALE

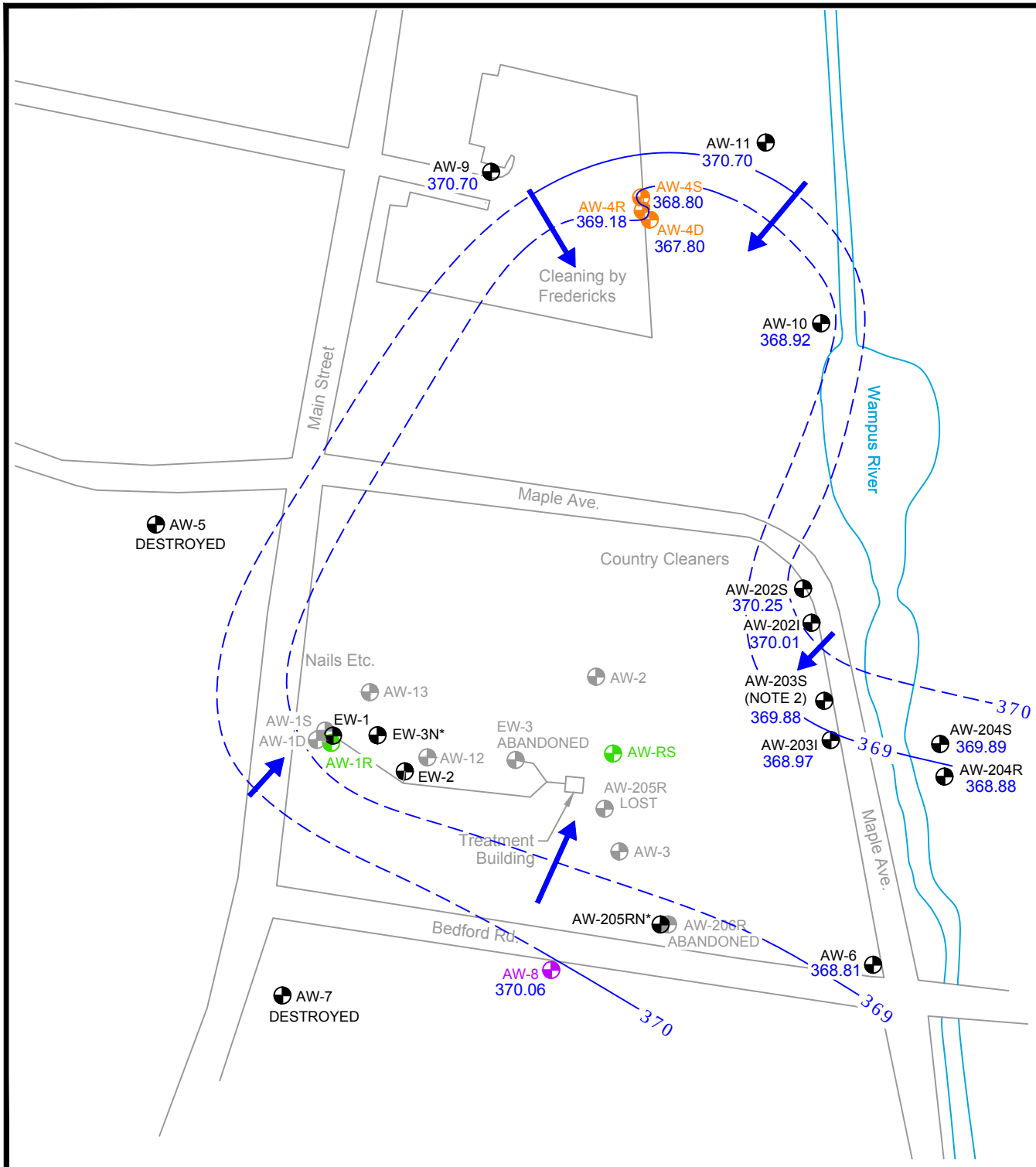
AECOM

MULTI SITE E - ARMONK PRIVATE WELLS
SITE NO. 3-60-005

GROUNDWATER ISOELEVATION MAP

June 2015 Results
NYSDEC 625 Broadway, Albany NY, 12233

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
armonkDec2016.dwg		60282094	12 / 2016	8



LEGEND

AW-10	MONITORING WELL
EW-2	EXTRACTION WELL
AW-12	DECOMMISSIONED WELL
AW-4R	BURIED WELL; SAMPLEABLE
AW-1R	PAVED OVER WELL
AW-8	DAMAGED WELL; SAMPLEABLE
369	ISOELEVATION CONTOUR IN FEET NAVD88 (DASHED WHERE INFERRED)
	INFERRED GROUNDWATER FLOW DIRECTION
AW-10 368.92	WELL IDENTIFICATION GROUNDWATER ELEVATION (FT)

* WELL LOCATIONS ARE APPROXIMATE

N

NOTE

1. AW-206R AND EW-3 WERE ABANDONED IN JULY 2012.
2. AW-203S IS MISSING A WELL COVER.

0' 100' 200' 400'

APPROX. SCALE

AECOM

MULTI SITE E - ARMONK PRIVATE WELLS
SITE NO. 3-60-005

GROUNDWATER ISOELEVATION MAP

July 2016 Results
NYSDEC 625 Broadway, Albany NY, 12233

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
armonkDec2016.dwg		60282094	12 / 2016	9

Well ID		AW-4S
Date		Jun-14
Analyte	Class GA AWQS*	
cis-1,2-Dichloroethene	5	**10.0**
Tetrachloroethene	5	**25.0**
Trichloroethene	5	**2.6** J
Total VOCs	NA	37.6

Well ID		AW-10
Date		Jun-14
Analyte	Class GA AWQS*	
cis-1,2-Dichloroethene	5	**4.2** J
Tetrachloroethene	5	**4.6** J
Total VOCs	NA	8.8

Well ID		AW-202S
Date		Jun-14
Analyte	Class GA AWQS*	
cis-1,2-Dichloroethene	5	**5.1**
Tetrachloroethene	5	**1.0** J
Trichloroethene	5	**5.0**
1,1-Dichloroethane	5	**1.6** J
Total VOCs	NA	12.7

Well ID		AW-202I
Date		Jun-14
Analyte	Class GA AWQS*	
Methyl tert-buytl Ether	10	**2.1** J
cis-1,2-Dichloroethene	5	**1.4** J
Tetrachloroethene	5	**1.1** J
Trichloroethene	5	**3.5** J
1,1-Dichloroethane	5	**0.94** J
Total VOCs	NA	9.0

Well ID		AW-204S
Date		Jun-14
Analyte	Class GA AWQS*	
Naphthalene	10	**3.6** J
Total VOCs	NA	3.6

Well ID		AW-203I
Date		Jun-14
Analyte	Class GA AWQS*	
Methyl tert-buytl Ether	10	**5.6**
Total VOCs	NA	5.6

Well ID		AW-6
Date		Jun-14
Analyte	Class GA AWQS*	
Methyl tert-buytl Ether	10	**29.0**
Naphthalene	10	**2.9** J
Total VOCs	NA	31.9

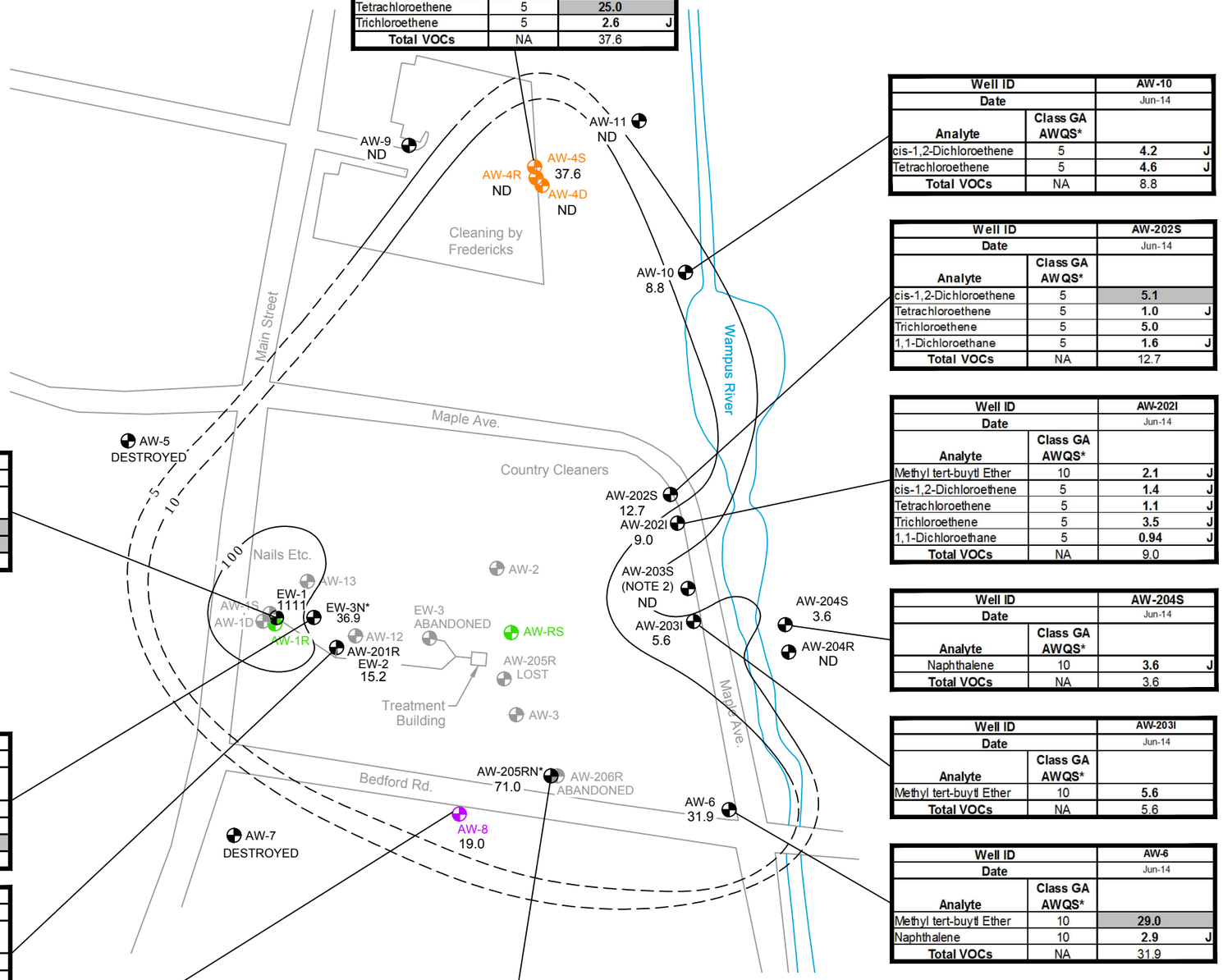
Well ID		EW-1
Date		Jun-14
Analyte	Class GA AWQS*	
cis-1,2-Dichloroethene	5	**11.0**
Tetrachloroethene	5	**1100**
Total VOCs	NA	1111

Well ID		EW-3N
Date		Jun-14
Analyte	Class GA AWQS*	
cis-1,2-Dichloroethene	5	**1.5**
Trichloroethene	5	**2.4**
Tetrachloroethene	5	**33.0**
Total VOCs	NA	36.9

Well ID		EW-2
Date		Jun-14
Analyte	Class GA AWQS*	
cis-1,2-Dichloroethene	5	**1.1**
Trichloroethene	5	**1.1**
Tetrachloroethene	5	**13.0**
Total VOCs	NA	15.2

Well ID		AW-8
Date		Jun-14
Analyte	Class GA AWQS*	
Methyl tert-buytl Ether	10	**19.0**
Total VOCs	NA	19.0

Well ID		AW-205RN
Date		Jun-14
Analyte	Class GA AWQS*	
Methyl tert-buytl Ether	10	**55.0**
tert-Butyl Alcohol	NA	**16.0**
Total VOCs	NA	71.0



N

LEGEND

AW-10	MONITORING WELL
EW-2	EXTRACTION WELL
AW-12	DECOMMISSIONED WELL
AW-4R	BURIED WELL; SAMPLEABLE
AW-1R	PAVED OVER WELL
AW-8	DAMAGED WELL; SAMPLEABLE
10	ISOCONCENTRATION CONTOUR IN MICROGRAMS PER LITER (µg/L) (DASHED WHERE INFERRED)
NS	NOT SAMPLED
J	ESTIMATED CONCENTRATION EXCEEDING THE INSTRUMENT DETECTION LIMIT, BUT LESS THAN THE REPORTING LIMIT
ND	"NON DETECT"; CONCENTRATION LESS THAN INSTRUMENT DETECTION LIMIT

* WELL LOCATIONS ARE APPROXIMATE

NOTE

1. AW-206R AND EW-3 WERE ABANDONED IN JULY 2012.
2. AW-203S IS MISSING A WELL COVER.
3. MONITORING WELL SAMPLES WERE COLLECTED ON JUNE 24, 2014.
4. SHADED CELLS INDICATE AN EXCEEDANCE OF GROUNDWATER STANDARDS.

0' 100' 200' 400'

APPROX. SCALE

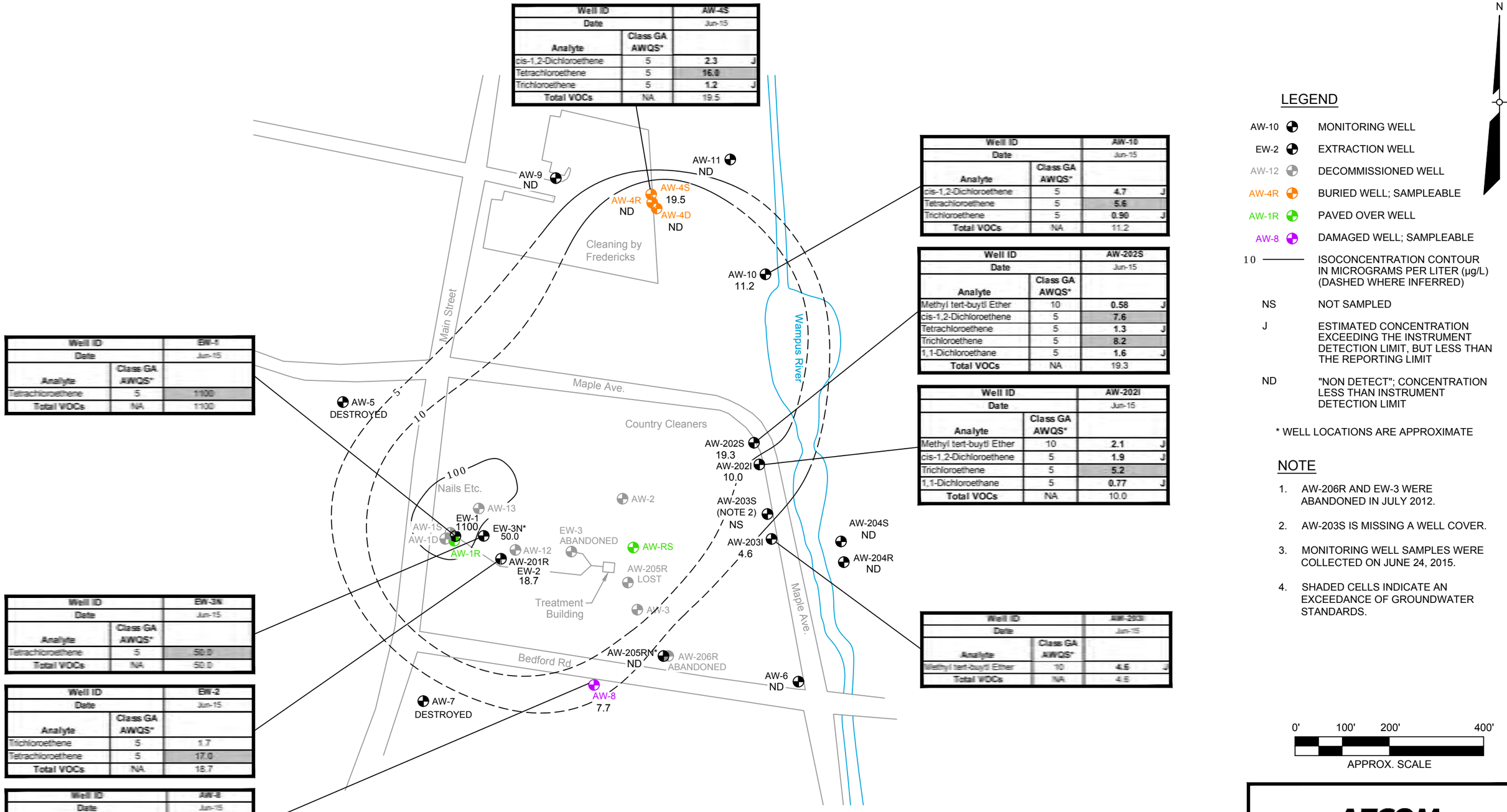
AECOM

MULTI SITE E - ARMONK PRIVATE WELLS
SITE NO. 3-60-005

GROUNDWATER VOC DETECTIONS AND VOC ISOCONCENTRATION MAP

June 2014 Results
NYSDEC 625 Broadway, Albany NY, 12233

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
armonkDec2016.dwg		60282094	12 / 2016	10



Well ID		AW-4S	
Date		Jun-15	
Analyte	Class GA AWQS*		
cis-1,2-Dichloroethene	5	2.3	J
Tetrachloroethene	5	16.0	
Trichloroethene	5	1.2	J
Total VOCs	NA	19.5	

Well ID		AW-10	
Date		Jun-15	
Analyte	Class GA AWQS*		
cis-1,2-Dichloroethene	5	4.7	J
Tetrachloroethene	5	5.6	
Trichloroethene	5	0.90	J
Total VOCs	NA	11.2	

Well ID		AW-202S	
Date		Jun-15	
Analyte	Class GA AWQS*		
Methyl tert-butyl Ether	10	0.58	J
cis-1,2-Dichloroethene	5	7.6	
Tetrachloroethene	5	1.3	J
Trichloroethene	5	8.2	
1,1-Dichloroethane	5	1.6	J
Total VOCs	NA	19.3	

Well ID		AW-202I	
Date		Jun-15	
Analyte	Class GA AWQS*		
Methyl tert-butyl Ether	10	2.1	J
cis-1,2-Dichloroethene	5	1.9	J
Trichloroethene	5	5.2	
1,1-Dichloroethane	5	0.77	J
Total VOCs	NA	10.0	

Well ID		EW-1	
Date		Jun-15	
Analyte	Class GA AWQS*		
Tetrachloroethene	5	1100	
Total VOCs	NA	1100	

Well ID		EW-3N	
Date		Jun-15	
Analyte	Class GA AWQS*		
Tetrachloroethene	5	50.0	
Total VOCs	NA	50.0	

Well ID		EW-2	
Date		Jun-15	
Analyte	Class GA AWQS*		
Trichloroethene	5	1.7	
Tetrachloroethene	5	17.0	
Total VOCs	NA	18.7	

Well ID		AW-8	
Date		Jun-15	
Analyte	Class GA AWQS*		
Methyl tert-butyl Ether	10	7.7	
Total VOCs	NA	7.7	

Well ID		AW-203S	
Date		Jun-15	
Analyte	Class GA AWQS*		
Methyl tert-butyl Ether	10	4.5	J
Total VOCs	NA	4.5	

LEGEND

AW-10	MONITORING WELL
EW-2	EXTRACTION WELL
AW-12	DECOMMISSIONED WELL
AW-4R	BURIED WELL; SAMPLEABLE
AW-1R	PAVED OVER WELL
AW-8	DAMAGED WELL; SAMPLEABLE
10	ISOCONCENTRATION CONTOUR IN MICROGRAMS PER LITER (µg/L) (DASHED WHERE INFERRED)
NS	NOT SAMPLED
J	ESTIMATED CONCENTRATION EXCEEDING THE INSTRUMENT DETECTION LIMIT, BUT LESS THAN THE REPORTING LIMIT
ND	"NON DETECT"; CONCENTRATION LESS THAN INSTRUMENT DETECTION LIMIT

* WELL LOCATIONS ARE APPROXIMATE

NOTE

1. AW-206R AND EW-3 WERE ABANDONED IN JULY 2012.
2. AW-203S IS MISSING A WELL COVER.
3. MONITORING WELL SAMPLES WERE COLLECTED ON JUNE 24, 2015.
4. SHADED CELLS INDICATE AN EXCEEDANCE OF GROUNDWATER STANDARDS.

0' 100' 200' 400'

APPROX. SCALE

AECOM

MULTI SITE E - ARMONK PRIVATE WELLS
SITE NO. 3-60-005

GROUNDWATER VOC DETECTIONS AND VOC ISOCONCENTRATION MAP

June 2015 Results
NYSDEC 625 Broadway, Albany NY, 12233

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
armonkDec2016.dwg		60282094	12 / 2016	11

Well ID		AW-4S	
Date		Jul-16	
Analyte	Class GA AWQS*		
cis-1,2-Dichloroethene	5	3.6	J
Tetrachloroethene	5	**18.0**	
Trichloroethene	5	2.1	J
Total VOCs	NA	23.7	

Well ID		AW-10	
Date		Jul-16	
Analyte	Class GA AWQS*		
cis-1,2-Dichloroethene	5	4.3	J
Tetrachloroethene	5	**5.0**	
Total VOCs	NA	9.3	

Well ID		AW-202S	
Date		Jul-16	
Analyte	Class GA AWQS*		
cis-1,2-Dichloroethene	5	**12.0**	
Tetrachloroethene	5	1.1	J
Trichloroethene	5	**13.0**	
1,1-Dichloroethane	5	1.2	J
Total VOCs	NA	27.3	

Well ID		AW-202I	
Date		Jul-16	
Analyte	Class GA AWQS*		
Methyl tert-buytl Ether	10	3.1	J
cis-1,2-Dichloroethene	5	**5.1**	
Tetrachloroethene	5	1.0	J
Trichloroethene	5	**8.2**	
1,1-Dichloroethane	5	1.0	J
Total VOCs	NA	18.4	

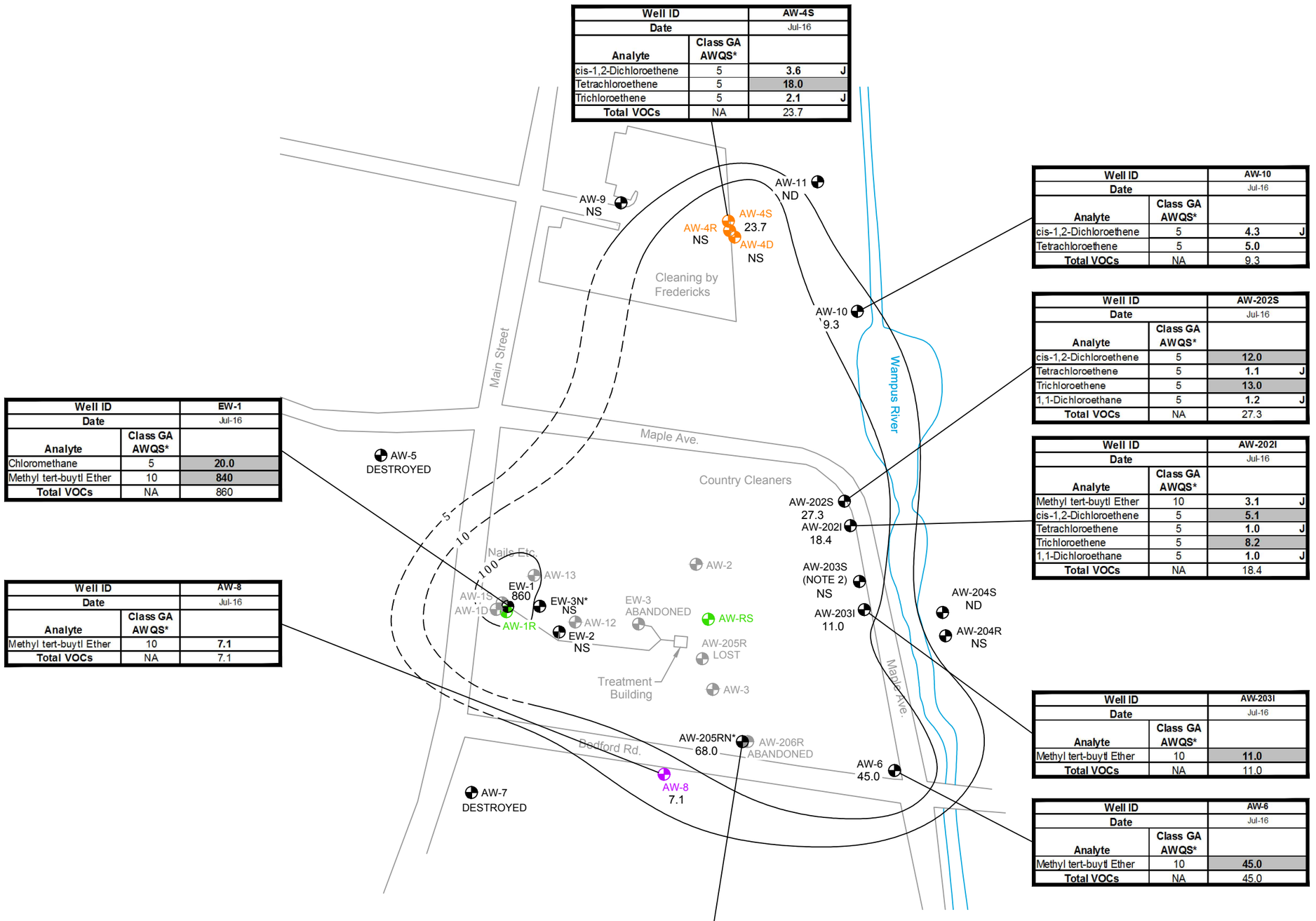
Well ID		EW-1
Date		Jul-16
Analyte	Class GA AWQS*	
Chloromethane	5	**20.0**
Methyl tert-buytl Ether	10	**840**
Total VOCs	NA	860

Well ID		AW-8
Date		Jul-16
Analyte	Class GA AWQS*	
Methyl tert-buytl Ether	10	**7.1**
Total VOCs	NA	7.1

Well ID		AW-203I
Date		Jul-16
Analyte	Class GA AWQS*	
Methyl tert-buytl Ether	10	**11.0**
Total VOCs	NA	11.0

Well ID		AW-6
Date		Jul-16
Analyte	Class GA AWQS*	
Methyl tert-buytl Ether	10	**45.0**
Total VOCs	NA	45.0

Well ID		AW-205RN
Date		Jul-16
Analyte	Class GA AWQS*	
Methyl tert-buytl Ether	10	**68.0**
Total VOCs	NA	68.0



N

LEGEND

AW-10	MONITORING WELL
EW-2	EXTRACTION WELL
AW-12	DECOMMISSIONED WELL
AW-4R	BURIED WELL; SAMPLEABLE
AW-1R	PAVED OVER WELL
AW-8	DAMAGED WELL; SAMPLEABLE
10	ISOCONCENTRATION CONTOUR IN MICROGRAMS PER LITER (µg/L) (DASHED WHERE INFERRED)
NS	NOT SAMPLED
J	ESTIMATED CONCENTRATION EXCEEDING THE INSTRUMENT DETECTION LIMIT, BUT LESS THAN THE REPORTING LIMIT
ND	"NON DETECT"; CONCENTRATION LESS THAN INSTRUMENT DETECTION LIMIT

* WELL LOCATIONS ARE APPROXIMATE

NOTE

1. AW-206R AND EW-3 WERE ABANDONED IN JULY 2012.
2. AW-203S IS MISSING A WELL COVER.
3. MONITORING WELL SAMPLES WERE COLLECTED ON JULY 6, 2016.
4. SHADED CELLS INDICATE AN EXCEEDANCE OF GROUNDWATER STANDARDS.

0' 100' 200' 400'

APPROX. SCALE

AECOM

MULTI SITE E - ARMONK PRIVATE WELLS
SITE NO. 3-60-005

GROUNDWATER VOC DETECTIONS AND VOC ISOCONCENTRATION MAP

July 2016 Results
NYSDEC 625 Broadway, Albany NY, 12233

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
armonkDec2016.dwg		60282094	12 / 2016	12

Figure 13
Well Data with Maximum Total Concentrations <27 µg/l
Armonk Private Wells
Maple Avenue
Armonk, New York

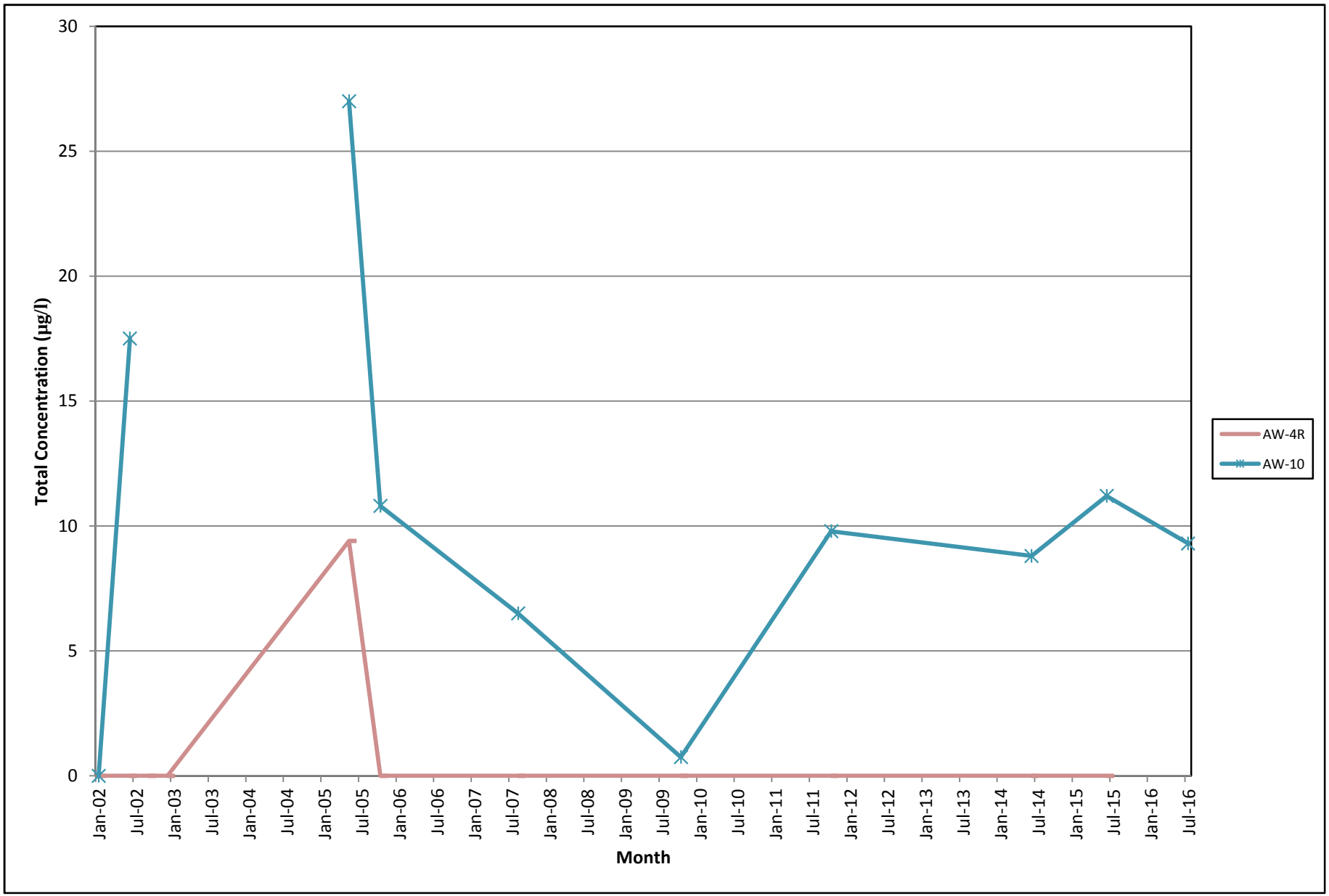


Figure 14
Well Data with Maximum Total Concentrations >27 µg/l
Armonk Private Wells
Maple Avenue
Armonk, New York

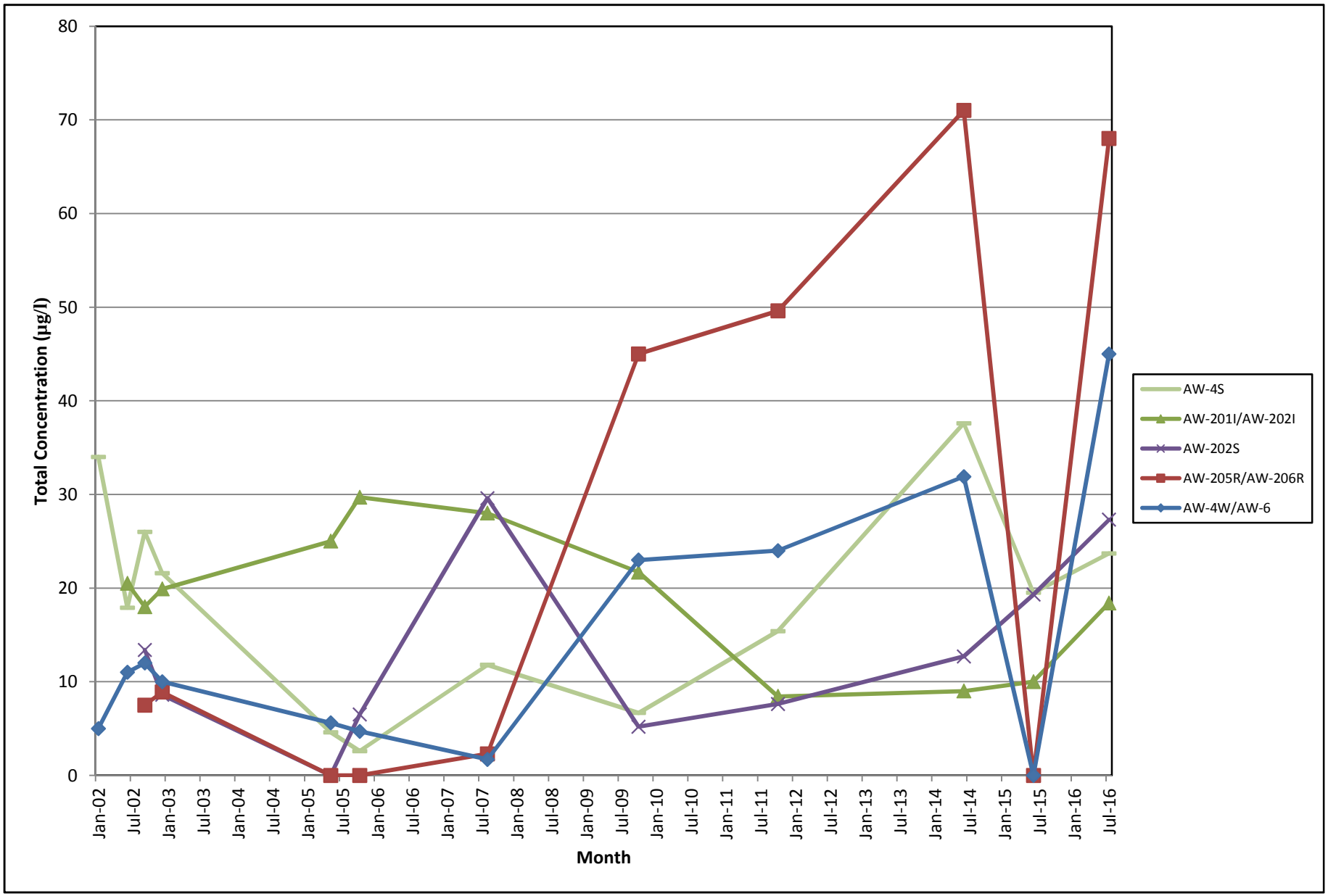


Figure 15
Well Data with Highest Total Concentrations
Armonk Private Wells
Maple Avenue
Armonk, New York

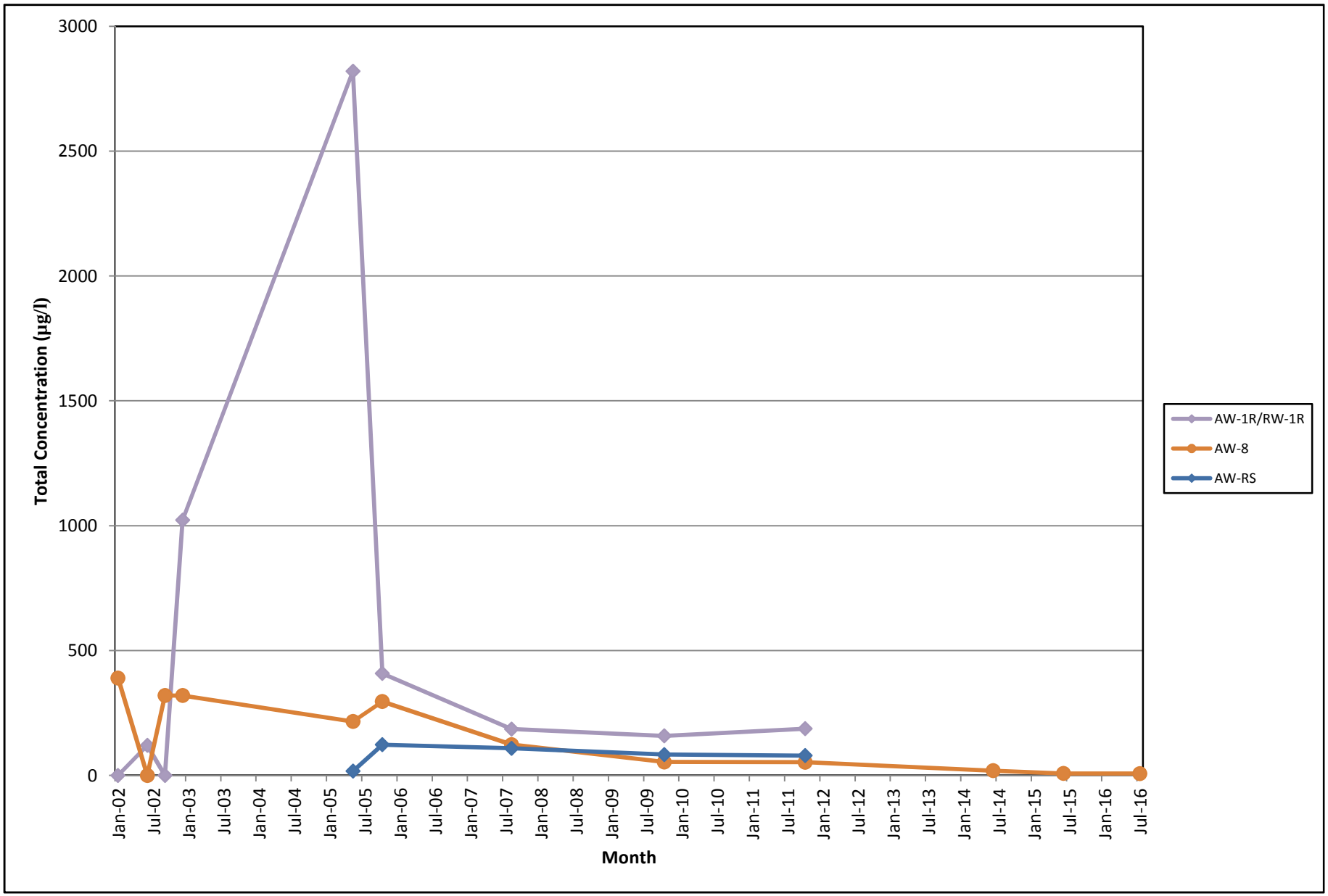


Figure 16
Annual and Cumulative Total VOC Removal From Groundwater (2005-2016)
Armonk Private Wells
Maple Avenue
Armonk, New York

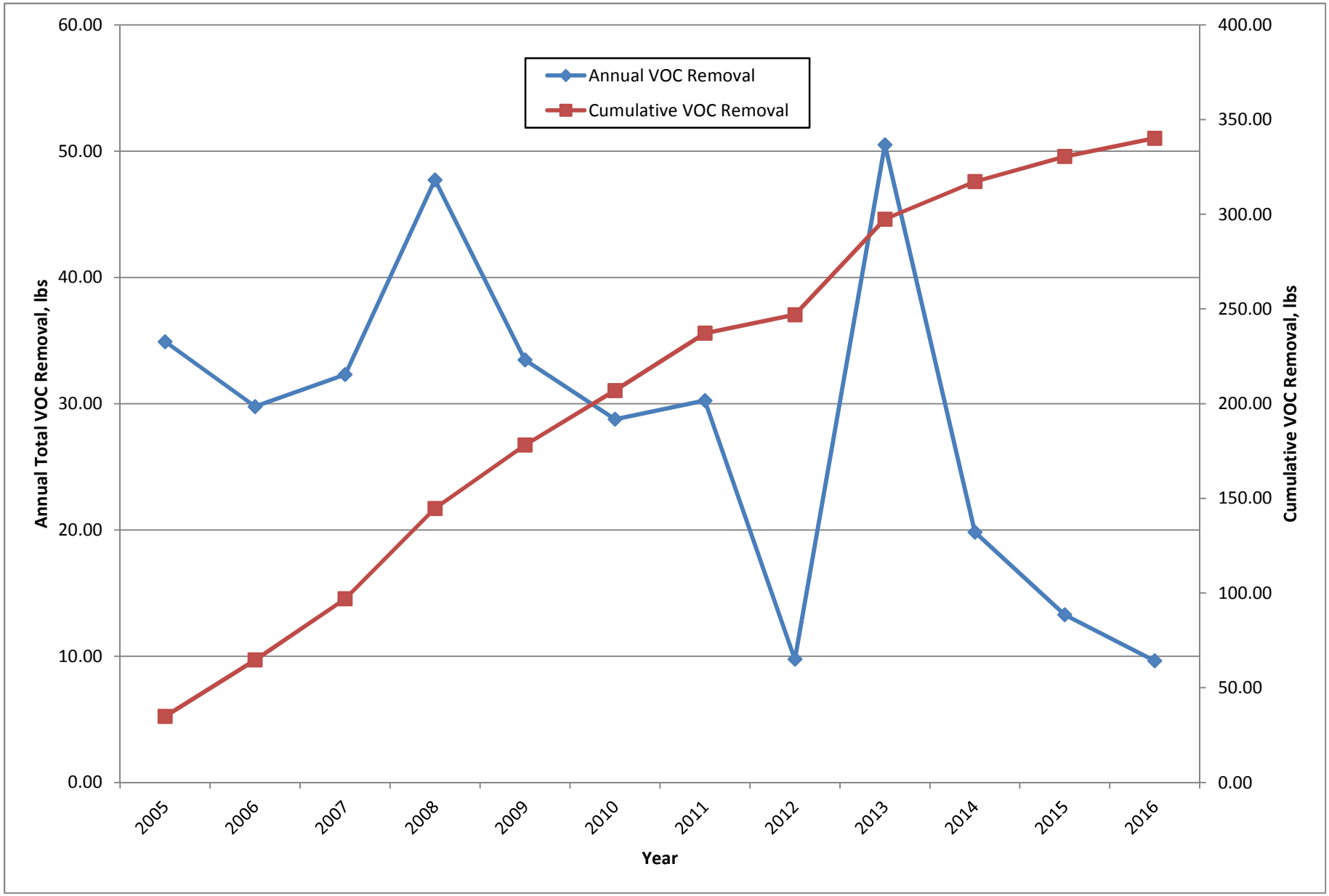
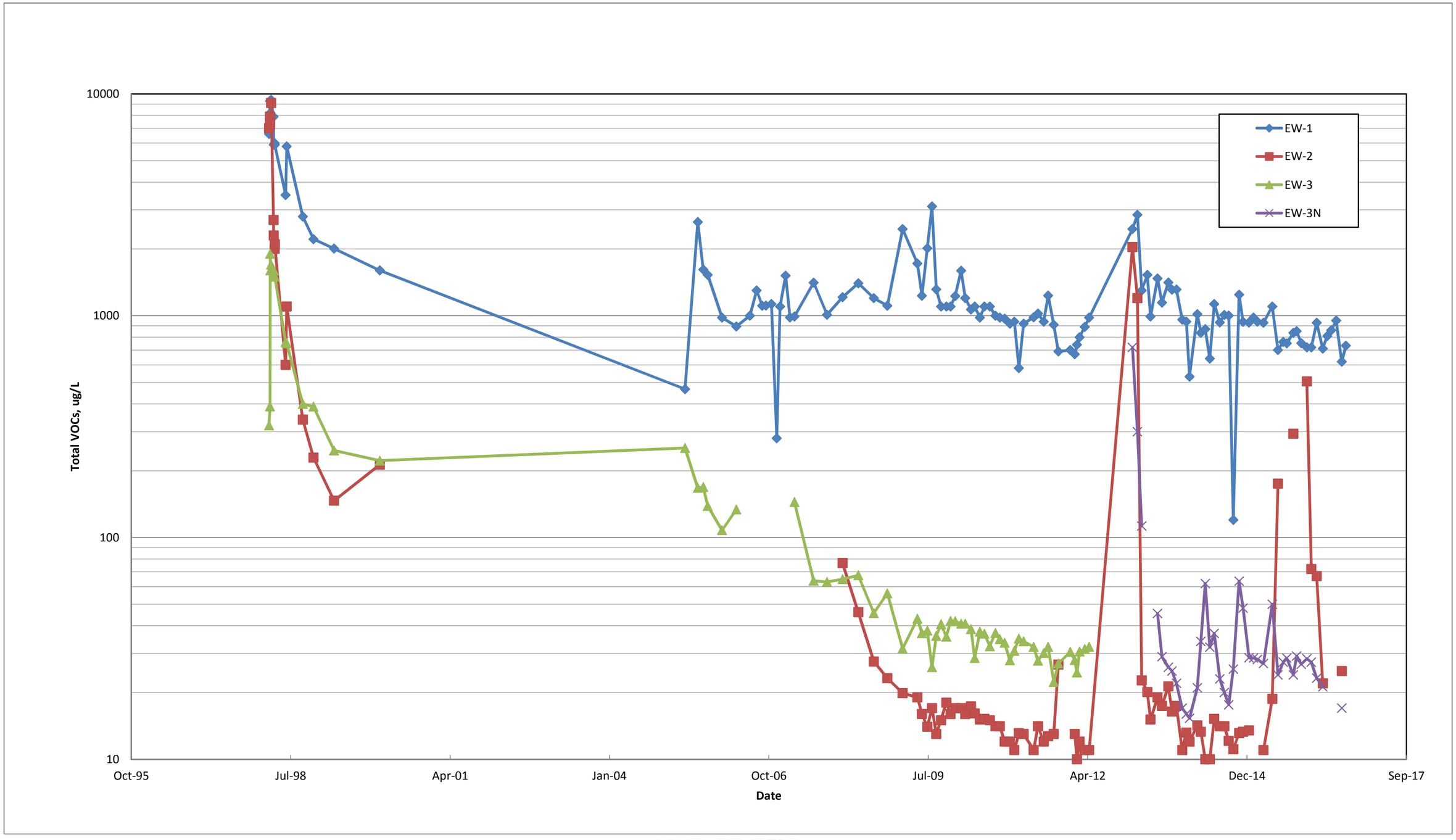


Figure 17
Total VOC Concentration per Extraction Well
Armonk Private Wells
Maple Avenue
Armonk, New York



APPENDIX A

IC/EC Certification Forms

Enclosure 1
Engineering Controls - Standby Consultant/Contractor Certification Form

Site Details **Box 1**

Site No. 360005

Site Name Armonk Private Wells

Site Address: Vicinity of Maple Ave. Main St. & Bedford Rd. Zip Code: 10504
City/Town: North Castle
County: Westchester
Site Acreage: 3.2

Reporting Period: September 30, 2013 to September 30, 2016

	YES	NO
1. Is the information above correct?	X	☐
If NO, include handwritten above or on a separate sheet.		
2. To your knowledge has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment during this Reporting Period?	☐	X
3. To your knowledge has there been any change of use at the site during this Reporting Period (see 6NYCRR 375-1.11(d))?	☐	X
4. To your knowledge have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property during this Reporting Period?	☐	X
If you answered YES to questions 2 thru 4, include documentation or evidence that documentation has been previously submitted with this certification form.		
5. To your knowledge is the site currently undergoing development?	☐	X

Box 2

	YES	NO
6. Is the current site use consistent with the use(s) listed below? Commercial and Industrial	X	☐
7. Are all ICs/ECs in place and functioning as designed?	X	☐

IF THE ANSWER TO EITHER QUESTION 6 OR 7 IS NO, sign and date below and contact the DEC PM regarding the development of a Corrective Measures Work Plan to address these issues.

Signature of Standby Consultant/Contractor Date

SITE NO. 360005 **Box 3**

Description of Institutional Controls

Parcel	Owner	Institutional Control
108.01-6-33	41 Maple Ave LLC	Ground Water Use Restriction Monitoring Plan O&M Plan

Deed restriction includes restriction on groundwater use and requires access be given to the State to perform remedial work.

108.01-6-34	TORLISH THOMAS & DUANE	Ground Water Use Restriction

Deed Restriction requires access be given to the State to perform remedial work and restricts the use of groundwater.

108.01-6-41	ASQ LLC	Ground Water Use Restriction Monitoring Plan O&M Plan

Deed Restriction requires access be given to the State to perform remedial work and restricts use of groundwater.

Box 4

Description of Engineering Controls

Parcel	Engineering Control
108.01-6-41	Groundwater Treatment System Vapor Mitigation

Note: There are currently no active vapor mitigation systems operating on site; however, there are three buildings constructed in 2012 with passive vapor controls. The installation of these passive systems did not require installation records; therefore, this certification does not address these controls.

Box 5

Periodic Review Report (PRR) Certification Statements

1. I certify by checking "YES" below that:

   a) the Periodic Review report and all attachments were prepared under the direction of, and reviewed by, the party making the certification, including data and material prepared by previous contractors for the current certifying period, if any;

   b) to the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and the information presented is accurate and compete.

YES	NO
☒	☐

2. If this site has an IC/EC Plan (or equivalent as required in the Decision Document), for each Institutional or Engineering control listed in Boxes 3 and/or 4, I certify by checking "YES" below that all of the following statements are true:

   (a) the Institutional Control and/or Engineering Control(s) employed at this site is unchanged since the date that the Control was put in-place, or was last approved by the Department;

   (b) nothing has occurred that would impair the ability of such Control, to protect public health and the environment;

   (c) nothing has occurred that would constitute a failure to comply with the Site Management Plan, or equivalent if no Site Management Plan exists.

YES	NO
☒	☐

IF THE ANSWER TO QUESTION 2 IS NO, sign and date below and contact the DEC PM regarding the development of a Corrective Measures Work Plan to address these issues.

Signature of Standby Consultant/Contractor

Date

Box 6

IC/EC CERTIFICATIONS

Professional Engineer Signature

I certify that all information in Boxes 2 through 5 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I Daniel Servetas at AECOM
print name

40 British American Blvd

Latham, New York 12110
(print business address)

am certifying as a Professional Engineer.

11/3/2017

Signature of Professional Engineer — Stamp (Required for PE) — Date

APPENDIX B

Property Owner Survey

(718) 822-1020

60 MORROW AVENUE
SCARSDALE, NEW YORK 10583
REAL ESTATE • PROPERTY MANAGEMENT

(914) 793-5610
FAX (914) 793-4137

October 17, 2016

Carl Hoffman, Project Manager
NYS Dept. of Environmental Conservation
Div. of Environmental Remediation. BURE
625 Broadway
Albany, NY 12233-7017

RE: Property Owner Survey: Site Management Periodic Review
Parcel: 108.01-6-41
Site Name: Armonk Private Wells
Site No.: 360005
Site Address: Vicinity of Maple Ave, Main St., & Bedford Road.
North Castle, NY 10504

Dear Mr. Hoffman:

Pursuant to the letter we received dated October 4th, 2016 from the NYS Dept. of Environmental Conservation, enclosed please find Survey filled out and signed.

If you require anything further, do not hesitate to contact our office.

Yours very truly,

Alan Zaretsky
ASQ, LLC

kk
Enc.
Via Certified Mail

Enclosure 1
Institutional and Engineering Controls - Property Owner Survey

Site Details **Box 1**

Site No. 360005

Site Name Armonk Private Wells

Site Address: Vicinity of Maple Ave. Main St. & Bedford Rd. Zip Code: 10504
City/Town: North Castle
County: Westchester
Site Acreage: 3.2

Reporting Period: September 30, 2013 to September 30, 2016

	YES	NO
1. Is the information above correct?	X	☐
If NO, include handwritten above or on a separate sheet.		
2. Has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment during this Reporting Period?	☐	X
3. Has there been any change of use at the site during this Reporting Period (see 6NYCRR 375-1.11(d))?	☐	X
4. Have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property during this Reporting Period?	☐	X
If you answered YES to questions 2, 3 or 4, include documentation with this form.		
5. Is the site currently undergoing development?	☐	X

Box 2

	YES	NO
6. Is the current site use consistent with the use(s) listed below? Commercial and ~~Industrial~~	X	☐
7. Are all Institutional Controls (ICs) in place and functioning as designed?	X	☐

Signature of Property Owner

10/17/16
Date

SITE NO. 360005

Box 3

Description of Institutional Controls

Parcel	Owner	Institutional Control
108.01-6-41	ASQ LLC	Ground Water Use Restriction Monitoring Plan O&M Plan

Deed Restriction requires access be given to the State to perform remedial work and restricts use of groundwater.

Box 4

Description of Engineering Controls

Parcel	Engineering Control
108.01-6-41	Groundwater Treatment System Vapor Mitigation

Three new buildings constructed onsite include passive soil vapor systems. A pump and treatment remedial system using GAC operated by State Superfund is on this parcel too.

Box 5

Periodic Review Report (PRR) Survey Statements

For each Institutional or Engineering control listed in Boxes 3 and/or 4, by checking "YES" below I believe all of the following statements to be true:

(a) the Institutional Control(s) and/or Engineering Control(s) employed at this site remain unchanged since the date that the Control was put in-place, or was last approved by the Department;

(b) nothing has occurred that would impair the ability of such Control, to protect public health and the environment;

(c) access to the site will continue to be provided to the Department, to evaluate the remedy, including access to evaluate the continued maintenance of this Control; and

(d) if a Site Management Plan (SMP) exists, nothing has occurred that would constitute a violation or failure to comply with the SMP for this Control.

YES	NO
☒	☐

Signature of Property Owner

10/17/16
Date