February 2012
Remedial Action Workplan

American Cleaners – Middletown, NY

NYSDEC Site Number V-00461

February 22, 2012

Prepared for:

American Cleaners
Former Caldor/Lloyds Mall
Middletown, New York

Prepared by:

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I Robert Zimmer certify that I am currently a NYS registered professional engineer and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Robert Zimmer, P.E.
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1.0 Introduction and Purpose.

Geovation, in collaboration with Mid-Hudson Geosciences, have collected, reviewed and interpreted environmental data to develop an understanding of the nature and extent of impacted soil at the American Cleaners facility located at the former Caldor/Lloyd's Mall in Middletown, New York (Figure 1-1). Comparison of the data collected to the New York State Department of Environmental Conservation (NYSDEC) soil clean up objectives (SCOs) indicates that contaminants are present in site soil at concentrations above the SCOs and need to be removed and/or reduced. The purpose of this Remedial Action Workplan (RAW) is to summarize the data collected describing the nature and extent of soil impacts to and set forth a strategy to remediate soil contamination consistent with the contemplated use of the property and to a level that is protective of the public health and the environment.

a) Site Description. American Cleaners of Middletown is located in the Town of Wallkill, about 0.4 miles east of the Middletown City Boundary at 360 Route 211E at the Caldor-Lloyds Mall (Figure 1-1). The Section Block and Lot (SBL) number designated for the Caldor Mall property is Section 50, Block 2, Lot 2. The American Cleaners building is located on the Caldor-Lloyds Mall in the northwest corner of the Mall property and is approximately one acre in size. The property is improved with a single story building, which is approximately 5,000 square feet with an attached storage shed. The Caldor-Lloyds Mall lies on land with a slope to the north toward Route 211. Neighboring properties include MHV Credit Union to the northeast within the Caldor Mall and Cheeseburger Paradise, and a former Video Store, (now vacant) located toward the northwest. The layout of the property and building are provided on Figure 2.

The building was constructed in 1982 and was designed for use as a commercial dry cleaner. The design for dry-cleaning services was planned with a customer counter across the front of the store and five 4-foot by 4-foot wide trenches running from the front of the store to the rear. Cleaning, washing, drying, steaming and pressing equipment is placed around the perimeter of the store. The trenches are designed to provide maximum hanging capacity on three tiers of clothes rods running from front to back. The clothes-hanger rods can be reached by the employees to store and retrieve customers' garments.

A single heating oil underground storage tank (UST) is present at this site. In 1999 the UST which is located at the back of the building was replaced with a new tank closer to the north end of the building. A site investigation and post-excavation sampling indicated the presence of petroleum contamination, resulting in a spill reported to NYSDEC Region 3 (Spill No. 9912516).

b) Site History. In 1982, the property owner, Mr Halevh designed and constructed this one-story building, specifically for operation of a dry-cleaning establishment (Figures 1-1 and 2). From 1982 to date, the building has been in continuous operation for dry-cleaning, customer drop-off, and customer pick-up.

The chemical of concern, Tetrachloroethylene (also known as tetrachloroethene, perchlorethylene, "perc" or "PCE"), has been used at the site since 1982. Unintentional and unregulated releases of PCE began in 1982 when PCE-saturated filters were placed in the dumpster outside the back of the building for disposal with trash and garbage. The dry-cleaning processing equipment was updated periodically on the following schedule:

1982-1992 First Generation Equipment
1992-1997 Third Generation Equipment
1997-Present Fourth Generation Equipment

In 1982, the PCE used in dry-cleaning operations was delivered in 55-gallon drums. The PCE was pumped from the drums into the "washers." Sometime in the 1980s, delivery of PCE changed to delivery by truck with a hose transferring PCE from the truck to the dry-cleaning machines. Truck delivery of PCE is similar to that of fuel oil and the driver sets up the hose and monitors the operation from the truck. On one delivery occasion, the hose nozzle broke and an unknown quantity of PCE was spilled on the asphalt near the back door of the building. The spilled PCE flowed downslope on the parking lot and pooled at the northern curb of the parking lot about 35 feet away from and parallel to the north wall of the building.

The use of PCE was approximately 75 to 100 gallons per week from 1982 until 1997. Since 1997, American Cleaners at Middletown has used less than 200 gallons of PCE per year because "fourth-generation" technology has greatly reduced the use. At some time, the PCE delivery method changed from tank trucks back to 55-gallon drums, likely coincident with the installation of "fourth-generation" equipment in 1997.

c) Previous Investigations. Initial investigations in 1999 were conducted at the site by HRP while replacing the heating oil UST. The presence of PCE was reported in site groundwater, and shortly after the tank replacement, Anson Environmental conducted a study of the extent of PCE contamination. The names and dates of the HRP, Anson Environmental and subsequent Berninger reports are listed in chronological order below:

- Phase I Environmental Site Assessment for Caldor Shopping Center, by HRP Associates (October 1999, 3 monitoring wells during UST removal)
- Phase II Environmental Investigation Report by Anson Environmental (April 18, 2001, 9 soil borings and 4 monitoring wells)
- Environmental Investigation, American Cleaners, Caldor/Lloyd Mall Plaza, Route 211, Middletown, NY (Anson Environmental Ltd, April 18, 2001)
- Site-Specific Health and Safety Plan (Berninger, September 2002)
- Voluntary Investigation Work Plan (Berninger, March 2003)
- Voluntary Cleanup Program Interim Report (Berninger, Nov 2003)
- Voluntary Cleanup Program Report (Berninger, April 2006)
- Supplemental Investigation Work Plan (Berninger, May 2008)
- Proposed Supplemental Investigation Work Plan (Berninger, Sep. 2008)
- Remedial Investigation Report (Mid-Hudson Geosciences, Feb. 2010)
- Remedial Action Selection Report (Mid-Hudson Geosciences, June 2010)

To date, the investigative work has consisted of collection of soil samples, groundwater samples and soil gas samples around the American Cleaners building and in the parking lots between American Cleaners and the Cheeseburger Paradise Restaurant and between American Cleaners and the MHV Credit Union Building. Ambient air samples and sub-slab gas sample were collected at the HMV Credit Union Bank, the Cheeseburger Paradise Restaurant and the vacant Video Store Building.

d) Summary of Environmental Conditions. Soil impacted with PCE at concentrations above the NYSDEC Soil Clean-Up Objectives (SCOs) was reported in five of the 29 soil samples collected at this property. A summary table of the historic soil sampling results is provided as Table 1. Other volatile organic compounds tested for were not reported present above their SCOs at this site and do not require remediation. A diagram which shows the approximate location of the soil which requires remediation is provided as Figure 2.

The concentration of contaminants in soil gas was also measured at numerous locations at this site (Table 2). As previously discussed, PCE is the only contaminant measured in soil at concentrations above the SCOs. As an aid to identifying the presence of soil impacted with PCE, a summary diagram of the PCE concentration in soil gas is provided as Figure 3.

Subsurface investigations of the hillside location of American Cleaners shows that the land surface and water table both slope to the north; however, the slope of the water table is greater than that of the land surface creating a wedge of unsaturated overburden increasing in thickness on the downhill side of the building (Figures 4-1 and 4-2). The water table on the south side of the building is unconfined while on the north side it exhibits some confined characteristics.

Near surface ponding of water has been observed immediately under the black top within numerous borings installed at the site. During rain storms and post storm conditions, the upper one to two feet of soil beneath the black top has been observed to be saturated near MW21, MW30, MW26, and MW28. Careful review of Figure 4-2 and study of boring logs provides the following information:

Layers Identified in Monitoring Well Boring	MW21	MW26
Saturated Surface Infiltration Layer	0-2.5 feet	0-1 feet
Surface to top transmissive zone	0-4 feet	0-7 feet
Dry Silt (with clay layers)	(clay not observed)	1-7 feet
Dry Clay	2.5-4 feet	3-4.5 feet

The overburden sediments observed in Geoprobe cores taken around the building are predominantly silt with relatively low permeability shown in yellow (dry) and orange (wet) on Figures 4-1 and 4-2. Clay layers are also observed within the vadose zone in MW21 and MW 26 as listed above and in MW25 (1-6 feet below ground surface) as shown in pink. Such clay layers do not readily conduct fluids (air and water), but their discontinuous nature does not prevent the migration of soil gas.

It is not unusual, and often necessary, to apply different remedial techniques to soil located above and below the water table. This RAW addresses impacted soil above the water table. Impacted soil below the water table will be addressed in the future under a different remedial action. The depth to the water table varies across the property. A contour diagram which shows the depth to groundwater is provided as Figure 5. The location of impacted soil and concentration of contaminants(Figure 2; Table 1), along with the depth to groundwater and presence of ponded water and impermeable lenses (Figures 4.2, 4.4 & 5) are the principle information used to evaluate remedial options and select a remedial technology.

e) Summary of Remedy. The selected remedy consists of a two phase approach to the installation and operation of a Soil Vapor Extraction (SVE) system to treat impacted soil positioned above the water table. The system design is based on the site conditions summarized in section 1(d). above. Phase I will consist of preliminary installation, testing and operation of SVE equipment in the northern portion of the site, while Phase II will include the expansion of the SVE system to other areas impacted above the soil SCOs and treatment of soil beneath the existing building structure. A two phased approach is proposed to first allow for the collection of critical SVE design information during Phase I and then subsequently using that data to complete an efficient and cost effective design to expand the SVE system to include all areas where soil remediation is required.

Prior to implementation of Phase II a mass balance will be conducted to estimate the amount of contaminants which will be addressed by this remedial plan and to prepare a estimate of the time that will be required to complete the site remedy. The mass balance estimate will be used in the future to evaluate, the performance of the remedial system and if remediation will be completed within the estimated time frame.

Once remediation of site soils is completed to below the SCOs, the NYSDEC has required that sub-slab depressurization be maintained at this facility. The Phase II design will either include a method to convert the sub-slab, SVE system into a sub-slab depressurization system (SSDS), or will state that a separate SSDS system will be installed prior to shutting off the SVE equipment.

Prior to any construction activities, a Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) will be prepared for implementation during both Phase I and Phase II construction activities.

f) Contemplated Use. The building was originally built for a dry cleaning establishment with special features such as a utility trench around the interior of the exterior wall and the 4 foot by 4-foot long trenches in the floor of the building, constructed to maximize space for clothing on hangers.

The current intent of the owner, is to continue in the dry cleaning business with adjustments for customer preference and needs. An example of potential change would be to make the commercial laundry section larger and reduce the dry cleaning section given that less people are wearing woolen clothes. That is just an example of potential change and does not reflect the current plan of American Cleaners at Middletown at this time.

The lot for American Cleaners was subdivided from the larger Caldor Plaza lot in 2010, limiting area for expansion of the American Cleaner facilities without further acquisition of parking lot area.

2.0 Remedial Action Selection.

Based on the presence of contaminants in the shallow unsaturated soils both beneath the building and beneath exterior portions of the building, SVE was selected as a remedial technology applicable to this site. Excavation beneath the building is not considered practical at this active facility. Other forms of In-situ chemical or biological treatment were also not considered applicable as these technologies required that saturated soil conditions be maintained, which would likely result in flooding interior (trench) portions of the building. SVE has a long and successful track record of being applied to unsaturated soil impacted with PCE, and may be installed in both interior and exterior locations.

3.0 Project Plans and Specifications.

Details regarding the Phase I and Phase II portions of this Remedial Action Workplan are provided below:

3.1 Phase I.

a. Phase I – Preliminary Layout of SVE Wells. The area targeted for the preliminary installation and testing of SVE equipment is shown on Figure 6. The preliminary system design includes the installation of four vertical SVE wells and one twenty foot section of horizontal SVE piping. The vertical SVE wells will be installed in the portion of the site were a relatively deeper groundwater table exists and the opportunity exists to evaluate the influence of exterior SVE wells beneath the building. The horizontal SVE piping will also be installed near the building as shown on Figure 6. In addition to the four SVE extraction wells and 20 ft. length of SVE extraction piping, SVE monitoring points will be installed to evaluate the effectiveness of each of these two types of SVE installations and to provide performance data to prepare the design of the Phase II expansion of the SVE system. The proposed locations for SVE monitoring points are also shown on Figure 6.

The layout of the treatment wells is based on the assumption that an effective Radius of Influence (ROI) of 10 feet will be achieved in each of the SVE wells. This conservative assumption is based on the soil type observed at the site and Geovation's experience testing the negative pressure fields developed by SVE systems. Start-up testing will evaluate the validity of this assumption using the monitoring points installed for this purpose.

It should be noted that in the interest of expediency, Phase I of this project is being conducted without the benefit of a SVE pilot test; therefor, each of the phases of this SVE Workplan, as described, are subject to modification in the field based on subsurface conditions encountered and the data collected during preceding portions of this project.

b. SVE System Specifications. The Phase I SVE system design elements are shown on Figure 6. The preliminary design employs four vertical vapor extraction points, configured in a diamond shape and plumbed to two parallel 2 inch PVC headers with each header accepting soil gas from two SVE wells. The SVE wells will be spaced approximately 15 feet apart and will be screened from 1.5 feet below grade to the median depth of the groundwater table (approximately 7 feet below grade). Each SVE well will be constructed using two inch inside diameter schedule 40 PVC pipe with 0.020 inch slotted screen. The annular space between the borehole and the well screen will be filled with No. 2 silica sand from the bottom of the boring to above the the top of the screened PVC, then sealed with 0.5-foot of wetted benonite. If the annular space collapses during well construction, native material will be allowed to fill the annular space for the length of the collapse and the use of well sand will then continue above the collapse. A diagram showing the SVE extraction well design is provided as Figure 7.

The surface expression of each SVE well will be housed within a 12-inch curb box and inside the curb box a “tee” will be attached to the top of the well casing to allow connection to the 2” manifold and access down the well from above. The top of the well will terminate in a threaded fitting and plug which will provide a location to attach a pressure gauge and air flow port, to monitor and regulate soil vapor flow. Prior to connection to the header, a ball valve will be installed to allow the negative pressure to be shut off from any well. The area where the SVE wells and piping will be installed is currently paved. The paved surface provides a more impervious surface than dirt and/or vegetation which both optimizes the recovery of soil-gas vapors and allows for vehicles to continue to drive through the area.

The pair of two inch Schedule 40 PVC headers will run parallel, in a common trench, to connect the SVE wells to the blower. The headers will be utilized to transport extracted soil vapors from the SVE wells to the treatment shed (Figure 6). All connection piping will be installed to a depth of twelve inches below grade and placed in a bed of sand or pea-gravel with a minimum thickness of 3 inches. A diagram showing the proposed trench construction details is provided as Figure 8.

The location of the horizontal SVE well is also shown on Figure 6. The horizontal SVE well is designed to be 20 feet in length and buried approximately three to four feet below the ground surface. The SVE well will be constructed using two inch inside diameter schedule 40 PVC pipe with 0.020 inch slotted screen. The horizontal SVE well will be bedded and covered in a minimum of six (6) inches of #2 silica sand and covered with a geotextile. The trench will then be backfilled using native excavated material to within approximately one foot of the ground surface. The trench will be sealed with three inches of wetted benonite and the paving repaired above the trench. A diagram showing the proposed construction specifications of the horizontal SVE well is provided as Figure 9. Similar to the vertical SVE wells, where the horizontal SVE well attaches to the connection piping, it will have a ball valve and threaded fitting to attach a pressure gauge and air flow meter. Connection piping to the treatment shed will be similar to the connection piping of the vertical SVE wells shown on Figure 8.

As previously discussed, SVE monitoring points will be installed to evaluate the radius of influence achieved by the vertical SVE wells and horizontal SVE piping. The monitoring points will be constructed in a similar manner as the recovery points, however they will be constructed of 1 inch PVC and protected at the ground surface with 6 inch flush mount covers rather than twelve inch covers. The proposed locations for the four SVE monitoring points are shown on Figure 6. Construction specifications for the monitoring points are shown on Figure 7.

c. Recovery System Mechanical Components and Treatment Shed. Based on the soil types observed at the site, the system design shown on Figure 6, and assumptions previously discussed, a 5 hp regenerative blower, or equivalent, has been selected to be installed for Phase I of this remedial action. A 40-gal moisture separator, or equivalent, with a emergency high sump switch, manway, sight glass, and manual drain will provide vapor stream moisture removal. An in-line filter will provide vapor stream particulate matter removal and a silencer will be used to minimize noise emissions.

Treatment of all off-gas will be completed by passing the discharge of the system through two stages of granular activated carbon (GAC). The two stages will be arranged in series with a monitoring port between the stages, such that when breakthrough is detected from the first set of carbon, off-gas will still be treated by the second set. Once breakthrough is reported, the second stage GAC unit will be rotated up to the primary position and the second stage GAC will be replaced. It is proposed that the two GAC units will be approximately 140-lb in size. It is anticipated that the carbon canisters will have to be replaced frequently during the early operation of the SVE system and that the frequency that the GAC needs replacing will decline as contaminants are removed from the subsurface.

Treated effluent, will be discharged to the atmosphere. The vent line will extend to above the roof-line of the nearby building and will be constructed of two inch Schedule 40 CPVC. The vent line will be attached to the treatment shed and stabilized with guide wires. Pressure gauges, air flow monitoring, and sampling ports will be provided to monitor system operating conditions and to allow system optimization. Emergency shut-off switches will be provided to deactivate the system in the event of pressure, or moisture build-up.

All equipment and gauges will be housed in an weather tight treatment shed. The treatment shed will be constructed of wood or metal with sound proofing, insulated walls and a wood floor.

d. Electrical Power Supply. A 50 amp electrical power supply with individual circuit breaker capabilities will be provided to power the treatment shed. An emergency shut-off will be supplied to remotely deactivate the system in the event of an emergency.

e. Discharge of Ponded Water During Construction. Shallow ponded water has been observed to be present immediately below the paved surface at most locations across the site in quantities enough to fill small test holes. It may be assumed that this near surface water will also enter bore holes and trenches which will be required to implement the remedy. The volume of water which may be stored in this near surface source is currently unknown and it is uncertain if the volume encountered will pose a difficulty to constructing the VES wells or associated trenching. To address the possibility of encountering a significant volume of near surface water, Geovation and/or Mid-Hudson Geosciences will either obtain a SPDES permit to discharge treated or untreated water to the stormwater system, or a permit will be obtained from the locally operated POTW to discharge the ponded water to the sanitary sewer system.

f. System Start Up. Upon completion of the installation of the Phase I preliminary SVE equipment, Geovation and Mid-Hudson Geosciences will initiate start-up and optimization activities. This will include monitoring and adjusting the negative pressure attained at each of the SVE extraction wells, and monitoring of air flow rates, and vapor recovery rates. Individual SVE well recovery rates, cumulative recovery rates, and air stream contaminants will be measured and recorded to evaluate if the effluent air contaminant concentrations are below NYSDEC guidelines. Samples collected for submission to a analytical laboratory will be collected into stainless steel summa-canisters and submitted for TO-15 analysis. It is anticipated that a total of three laboratory samples will be collected during system start up. One sample will be collected at each of the following time periods; 2 hours after system start up, 1 day after system start up and one week after system start up. The number of samples and sampling methodology for this testing are provided on the Quality Assurance Project Plan (QUAPP) summary table, Table 3. Air sampling will include concurrent laboratory air samples and PID screening tool measurements to establish a correlation between these measurement methods such that subsequent sampling and reporting can be conducted with a PID only.

The design goal for the preliminary system is establishing a vacuum of 0.01 inches of water at a distance of 10 feet from the SVE wells; however, system start up testing will include applying multiple strength vacuums to the system and measuring the negative pressure field established at the monitoring points and other relevant locations. Review of this data will provide the information required to optimize the blower selection during the Phase II system expansion.

g. System Operation & Maintenance. Initially system Operation and Maintenance (O&M) will be performed on a weekly basis for the first four weeks and then will be transitioned to a monthly basis. During each O&M site visit, the system will be checked that it is operational, a PID screening device will be used to screen system effluent at the pre-GAC, mid-GAC, and post-GAC to evaluate conformance with air emission standards and monitor GAC performance to determine if GAC replacement is required. In addition, on a quarterly basis, or more frequently, pressure and airflow readings will be collected from each SVE extraction point and the system re-balanced to optimize contaminant removal. Field logs of the vacuum readings and air flow measurements and PID readings will be maintained. Liquid may accumulate in the SVE moisture separator. If small amounts of liquid, less than a 2 gallons per day, is generated by the SVE system, and contaminants are not present in the liquid in concentrations above applicable standards, the liquid will be evaporated and discharged to the atmosphere. If larger amounts of liquids are generated than can be reliably evaporated each day, the liquid generated will be discharged to either the storm water or sanitary sewer system under either a SPDES permit or POTW permit.

3.2 Phase II.

Within three months of Phase I system start up, the Phase II final design will be completed and implementation of Phase II will begin. Based on the data collected during the implementation of

Phase I of this project, information will be available to assess (i) working in the area where shallow ponded water is present, (ii) calculation of the radius of influence of the vertical and horizontal SVE wells, (iii) final design of the layout of SVE wells to include additional impacted areas, (iv) calculation of design flow rates and system head loss on the final design layout, (v) final selection of blower for the full-scale system, and (vi) final design of off-gas treatment.

In addition to the items listed above, prior to implementation of Phase II system start up, a mass balance will be calculated to estimate the mass of contaminants being remediated by the SVE system and an estimate will be made of the time required to complete soil remediation.

a. Final System Layout. The location of on-site soil which requires remediation is shown on Figure 2. It has been assumed for this portion of the RAW that Phase I testing shows that vertical SVEs are capable of effectively treating a 15 foot ROI from each well. Based on this assumption, a potential final SVE system layout design is provided as Figure 10. This final design includes eight exterior SVE wells and four interior SVE wells, connected with horizontal piping to the treatment system shed.

b. System Specifications. It is anticipated that the Phase II final system design will use the same system design specifications as used in Phase I. Design specifications for the vertical SVE wells are shown on Figure 7. Design specifications for the horizontal piping to connect the SVE wells to the treatment shed is shown on Figure 8.

c. Mechanical Components. Treatment Shed and Power Supply. It is anticipated that the same treatment shed, electrical power supply and off-gas treatment equipment used in Phase I will be suitable for Phase II. A enlarged inset detail of the treatment shed is included on Figure 6. It is expected that when the Phase II SVE treatment wells are initially operated that the GAC off-gas treatment material will need to be changed more frequently.

d. Discharge of ponded water during construction. It is expected that ponded water will be handled in Phase II in the same manner as it was during Phase I. See section 3.1(e). above. Ponded water in excavations and bore holes, if encountered, will be discharged to either the stormwater system or the sanitary sewer system under the appropriate permit.

e. System Start Up. System start up for Phase II will follow the same procedure as Phase I system start up. Start up will include monitoring and adjusting the negative pressure attained at each SVE extraction point and monitoring treated off-gas. Reduced laboratory testing will be required as a relationship between the hand held screening device and laboratory results will have already been established. A summary of the analytical testing and proposed screening is included on the QUAPP summary table, Table 3.

f. System Operation and Maintenance. The operation and maintenance of the Phase II SVE system will follow the outline described in Phase I above. Each O&M site visit will include the following: (i)confirm system is operational, (ii)record volume of liquid in moisture separator, (iii)screen and record data on effluent air stream – before, midway, and post GAC, (iv) record airflow rate of post GAC air stream.

Once Phase II start up is complete, a site management plan (SMP) will be developed which further describes long term O&M practices. The SMP will: a) require that any soil excavated during future activities will be tested and properly handled in a manner acceptable to the Department to protect the health and safety of workers, the local population and the nearby community; b) provide for the continued proper operation and maintenance of the components of the Vapor Extraction System; and c) completion of a periodic certification of institutional and engineering controls, to be submitted to the Department. A draft SMP will be prepared upon completion of construction of the Vapor Extraction System.

4.0 Institutional Controls

Until remediation is completed, institutional controls will be put in place at the site. The deed restriction will require: a) compliance with an approved site management plan; b) restricting access and handling of site soil and c) completion of a periodic certification of institutional and engineering controls, submitted to the Department.

The property owner and/or responsible party will provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable to the Department, until the Department notifies the property owner in writing that this certification is no longer needed. This submission will: a) contain certification that the institutional controls and engineering controls constituting the remedy remain effectively in place and are either unchanged from the previous certification or are compliant with Department-approved modifications; b) allow the Department access to the site; and c) state that nothing has occurred that would impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

5.0 Health and Safety Plan

A Health and Safety Plan (HASP) will be generated prior to conducting Phase I construction activities. It is anticipated that all field work can be completed in Level D personal protective equipment. All field personnel will be informed of the location of the nearest hospital and be provided with a copy of the emergency contact list. Field Supervisory personnel will be familiar with the route to the hospital. A Community Air Monitoring Plan (CAMP) will also be developed prior to Phase I construction activities and employed during the implementation of both the Phase I and Phase II construction activities described above.

6.0 QA/QC Plan

The analytical parameters and other Quality Assurance Project Plans (QUAPP) information is provided on Table 3. Standard laboratory deliverables will be submitted and a Data Usability Summary Report (DUSR) will be prepared by Geovation, Mid-Hudson Geosciences, or a third party unaffiliated with this project.

The laboratory testing of air samples will be done for EPA Method TO-15 for samples collected with Summa Canisters. Vapor extraction system effluent samples will be collected as grab samples. The Summa canister will be connected with flexible tubing to the sampling ports constructed in the PVC lines.

York Analytical Laboratories, or another NYSDOH certified laboratory will be preparing the Summa Canisters and analyzing the samples for Volatile Organic Compounds using EPA method TO-15.

7.0 Scheduling

It is proposed that Phase I of this project be completed within three months of approval of this workplan. Subsequent to completion of Phase I, data will be available to complete the final SVE system design which will be submitted to the NYSDEC within three months of the Phase I system start up date.

8.0 Reporting

As described above, the final SVE system design will be provided to the NYSDEC within six months of approval of this workplan. The final SVE plan document will include a report on Phase I activities. A report on the Phase II activities will be included in the first quarterly SVE report. Subsequent quarterly SVE reports will include a table reporting and summarizing any time the system is “off-line”, a summary of off gas effluent sampling and screening, an estimate of contaminants removed from the subsurface and a comparison of remediation progress to previously calculated mass balance estimates. Based on this information, the report will include recommendations for future activities.

9.0 Project Organization

Geovation employee, Mr. Robert Zimmer, P.E., will serve as the project engineer, while Dr. Katherine Beinkafner, PhD. will serve as project manager on this project. Mr. Zimmer will oversee field operations, related to the installation and testing of remedial equipment, while Dr. Beinkafner will act as prime contact and direct testing of all impacted media and discharges. A copy of Mr. Zimmer's and Dr. Beinkafner's resumes are provided in Appendix A.

Table 1
Summary of Soil Sampling for Volatile Organic Compounds
Sampling Dates shown on Table
American Cleaners at Caldor/Lloyds Mall, Middletown – VCP No. V-00461
Geovation Engineering, P.C.

Parameter Detected Description	Previous Table Number	Sample Depth (feet)	Sample Date	PCE	TCE	DCE	VC	Total CVOCs
				ug/kg	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**
NYSDEC 375.6 Unrestricted Use Soil Clean up Objectives				1300	470	250	20	
D-1	RIR 3	0.75'	Nov. 09	ND	ND	ND	ND	ND
D-2	RIR 3	1.5'	Nov. 09	ND	ND	ND	ND	ND
D-3	RIR 3	5'	Nov. 09	ND	ND	ND	ND	ND
D-4	RIR 3	5.75'	Nov. 09	57	ND	ND	ND	57
MW-22	RIR 3	0'-0.5'	Nov. 09	ND	ND	ND	ND	ND
MW-24	RIR 3	14'	Nov. 09	ND	ND	ND	ND	ND
MW-24	RIR 3	16'	Nov. 09	ND	ND	ND	ND	ND
MW-25	RIR 3	6.8'	Nov. 09	44	5	6J	ND	54
MW-28	RIR 3	4.5'	Nov. 09	ND	ND	ND	ND	ND
MW-28	RIR 3	9'	Nov. 09	ND	ND	ND	ND	ND
BEI-1	RIR 5	2'-2.5'	06/18/03	ND	ND	ND	ND	ND
BEI-3	RIR 5	2'	06/18/03	18	ND	ND	ND	18
BEI-3	RIR 5	10'	06/18/03	**1,900**	15	4J	ND	1,919
BEI-4	RIR 5	8'-10'	06/18/03	57	ND	ND	ND	57
BEI-5	RIR 5	2'-3'	06/18/03	130	2J	2J	ND	134
BEI-7	RIR 5	5'-9'	06/19/03	ND	ND	ND	ND	ND
BEI-9	RIR 5	10'-12'	06/19/03	500	19	51	ND	570
BEI-5/11	RIR 5	3.5'	07/16/03	840J	25	29	ND	894
BEI-5/11	RIR 5	7'-8'	07/16/03	20	ND	5	ND	25
BEI-10	RIR 5	5'-6'	07/16/03	**78,000**	63	ND	ND	78,063
BEI-12	RIR 5	5'	07/16/03	**1,300**	46	64	ND	1,410
BEI-12	RIR 5	7'	07/16/03	940	16	28	ND	984
B-1	RIR Fig. 5-3	---	Mar. 01	860				
B-2	RIR Fig. 5-3	---	Mar. 01	489				
B-3	RIR Fig. 5-3	---	Mar. 01	449				
B-4	RIR Fig. 5-3	---	Mar. 01	217				
B-5	RIR Fig. 5-3	---	Mar. 01	**1,420**				
B-9	RIR Fig. 5-3	---	Mar. 01	**3,296**				
B-10	RIR Fig. 5-3	---	Mar. 01	482				

Notes:
ND Not detected above the method detection limits.

Table 2
Summary of Soil-Gas Sampling for Volatile Organic Compounds
American Cleaners at Caldor/Lloyds Mall, Middletown – VCP No. V-00461
Geovation Engineering, P.C.

Parameter Detected Description	Previous Table Number	Sample Depth (feet)	Sample Date	PCE	TCE	DCE	VC	Total VOCs
				ug/m3	**ug/m3**	**ug/m3**	**ug/m3**	**ug/m3**
SG-1	6		06/16/03	1800J	1500J	ND	3J	3371J
SG-2	6		06/16/03	630J	530J	ND	160	1373J
SG-3	6		06/16/03	620J	ND	ND	ND	707J
SG-4	6		06/16/03	510J	20J	ND	3J	542J
SG-5	6		06/16/03	480J	ND	ND	ND	492J
SG-6	6		06/16/03	ND	ND	ND	ND	ND
SG-7	RIR fig 5-6		Jun. 2003	ND	---	---	---	3
SG-8	RIR fig 5-6		Jun. 2003	500J	---	---	---	572J
SG-9	RIR fig 5-6		Jun. 2003	1800J	---	---	---	2366J
SG-10	RIR fig 5-6		Jun. 2003	ND	---	---	---	6
SG-11	RIR fig 5-6		Jun. 2003	460	---	---	---	474J
SG-12	RIR fig 5-6		Jun. 2003	ND	---	---	---	7
SG-14	RIR fig 5-6		Jun. 2003	ND	---	---	---	66
SG-15	RIR fig 5-6		Jun. 2003	ND	---	---	---	71
SG-16	RIR fig 5-6		Jun. 2003	ND	---	---	---	15
SG-18	RIR fig 5-6		Jun. 2003	ND	---	---	---	ND
SG-19	RIR fig 5-6		Jun. 2003	ND	---	---	---	361
SG-1(rep)	9		11/17/05	580,000	11000	710	ND	598,100
SG-20	RIR fig 5-6		Jun. 2003	520J	---	---	---	523J
SG-21	RIR fig 5-6		Jun. 2003	610J	---	---	---	1181J
SG-22	RIR fig 5-6		Jun. 2003	1600J	---	---	---	2745J
SG-23	RIR fig 5-6		Jun. 2003	410J	---	---	---	448J
SG-24	RIR fig 5-6		Jun. 2003	63	---	---	---	73
SG-25	9		11/17/05	120,000	640	ND	ND	120,640
SG-26	9		11/17/05	2	90	75	6.6	297
SG-27	9		11/17/05	160	49	ND	ND	567
SG-28	9		11/17/05	120	79	ND	ND	278
SG-29	9		11/18/05	2	150	ND	ND	375
SG-30	9		11/18/05	ND	24	ND	ND	111
SG-31	9		11/18/05	ND	120	ND	ND	6,750
SSSV-1	9		11/18/05	20,000	ND	160	ND	20,170

Notes:
ND Not detected above the method detection limits.

Table 3
SVE Air/Gas Effluent Sampling for VOCs using USEPA Method TO-15 and Summa Canisters
Quality Assurance Program Plan in Vapor Extraction System Work Plan
February 6, 2012
American Cleaners, Inc., 360 Route 211 East, Middletown, NY
NYSDEC DER VCP Site V-00601-3
Compiled by Mid-Hudson Geosciences with Geovation, Inc.

SAMPLE TIMING, RATIONALE, NUMBERS, AND LABORATORY METHOD
for Summa Canister at VES Effluent Port

Sample Identification	Time of Sample Collection & Rationale	Number of Samples	VOCs EPA Method TO-15
Sample 1	2 hours after system start up, time to stabilize blower, yet get initial concentrations	1	√
Sample 2	1 day after system start up, to observe any early decline or increase in contaminant removal	1	√
Sample 3	1 week after system start up, to observe system stabilization to estimate cleanup duration	1	√

Notes:
VOCs are Volatile Organic Compounds.
EPA TO-15 is the US EPA Analytical Method for VOCs in air or soil gas mixture.

SAMPLE QUANTIFICATION

Parameter	AIR	
Maximum number of samples	4	
Number of field blanks	Not Applicable	
Number of trip blanks	Not Applicable	
Number of duplicate samples	Not Applicable	
Number of matrix spike samples	Not Applicable	
Number of matrix spike duplicate samples	Not Applicable	
Sample preservation	sealed in stainless steel canister	
Sample container volume	6 Liter	
Sample container type	stainless steel Summa	
Sample holding time	30 days	
Sample storage in field	inside canister	
Transport to laboratory	inside canister	

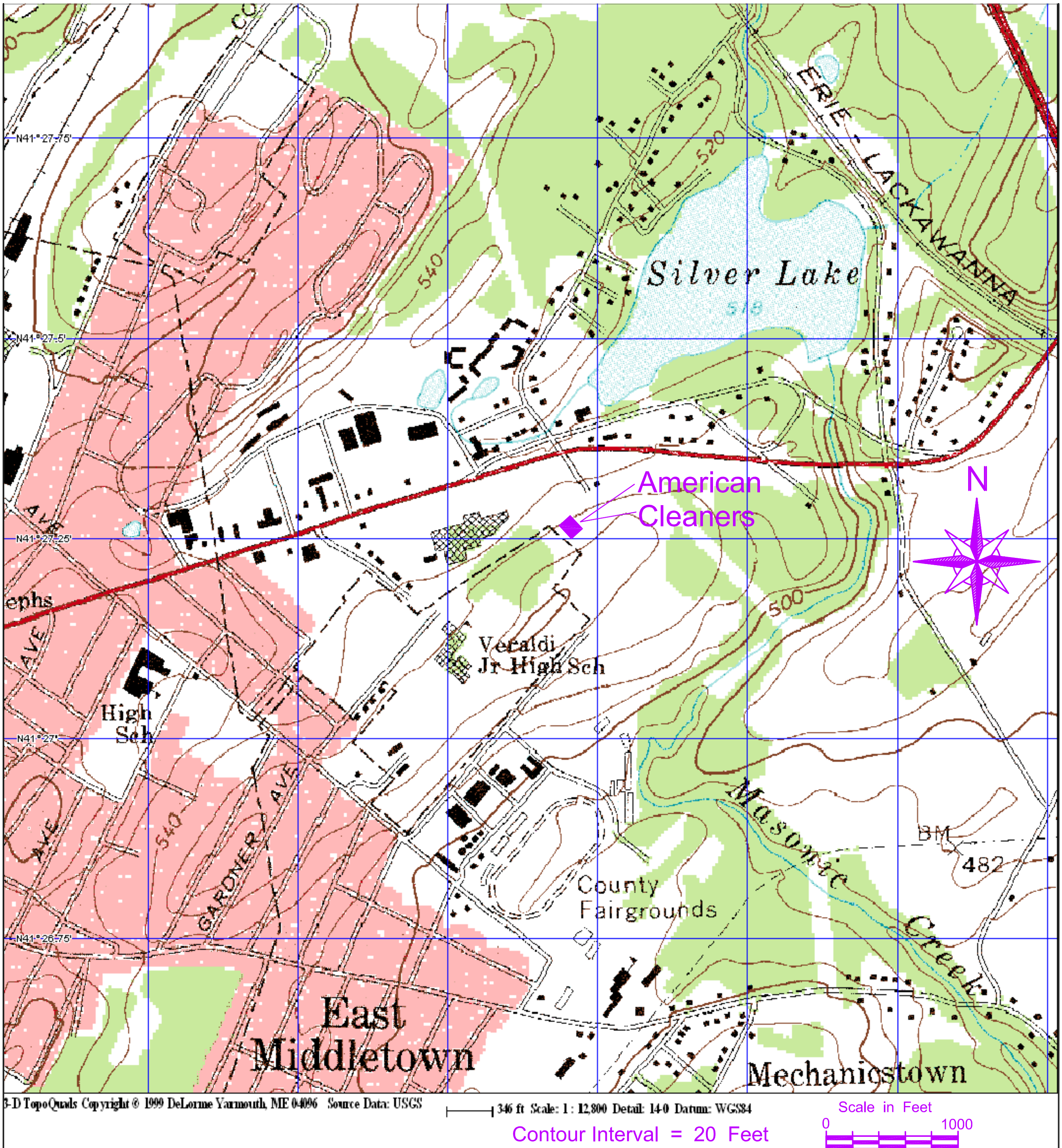

Figure 1-1. Site Location Map
USGS 7.5 Minute Quadrangle: Middletown, NY
American Cleaners at Caldor Lloyds Mall
340 Route 211 East, Middletown, NY 10940
NYSDEC DER VCP V-00601-3, February 22, 2010

Mid-Hudson Geosciences
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rockdoctor@optonline.net

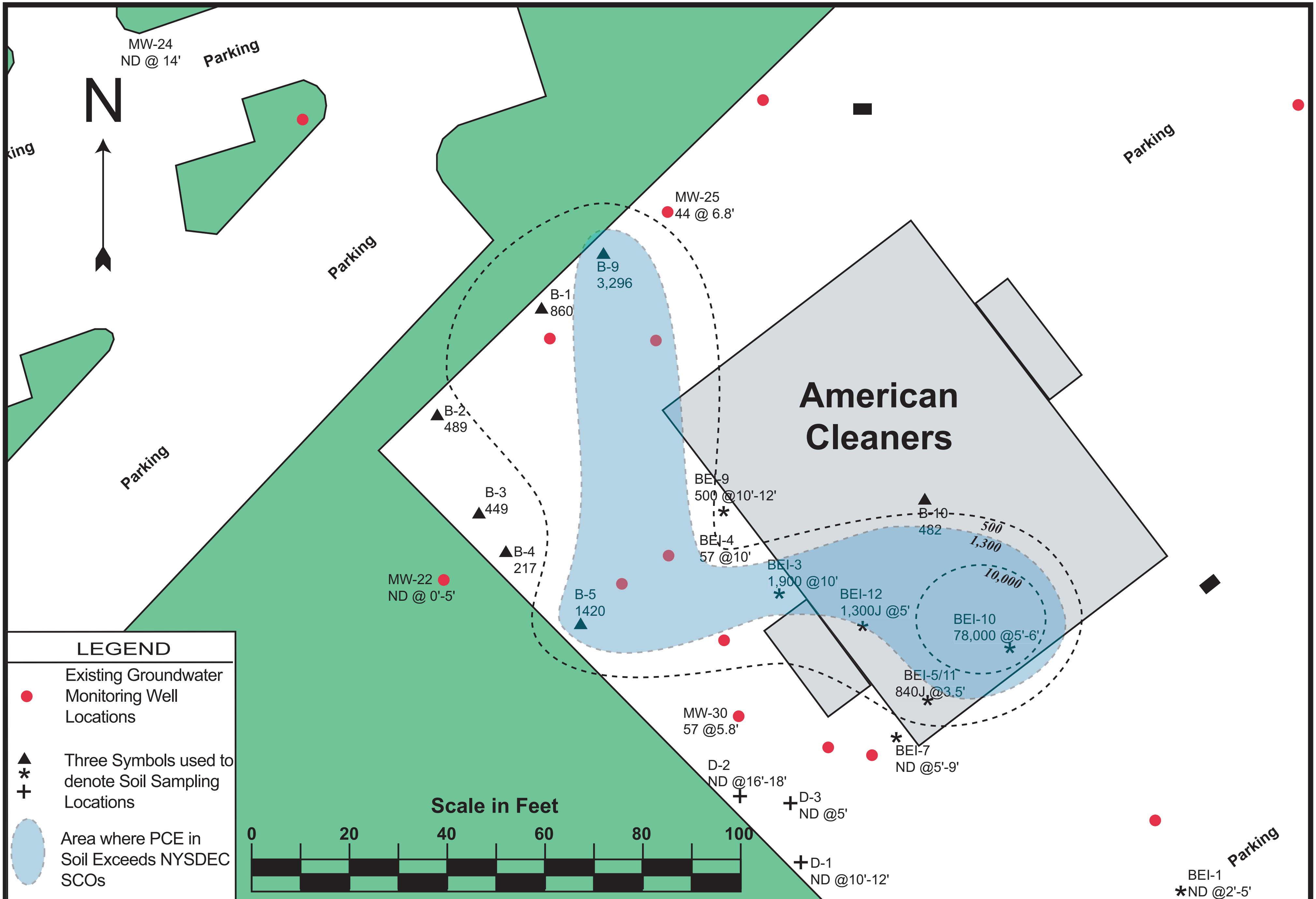

Figure 2
Contour Map of PCE in Soil (ppb)

American Cleaners at Caldor Lloyds Mall
340 Route 211 East, Middletown, NY 10940
NYSDEC DER VCP V-00461, Nov 2011

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2016 Route 284
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Figure 3
Contour Map of PCE in Soil Gas (ug/m3)

American Cleaners at Caldor Lloyds Mall
340 Route 211 East, Middletown, NY 10940
NYSDEC DER VCP V-00461, Nov 2011

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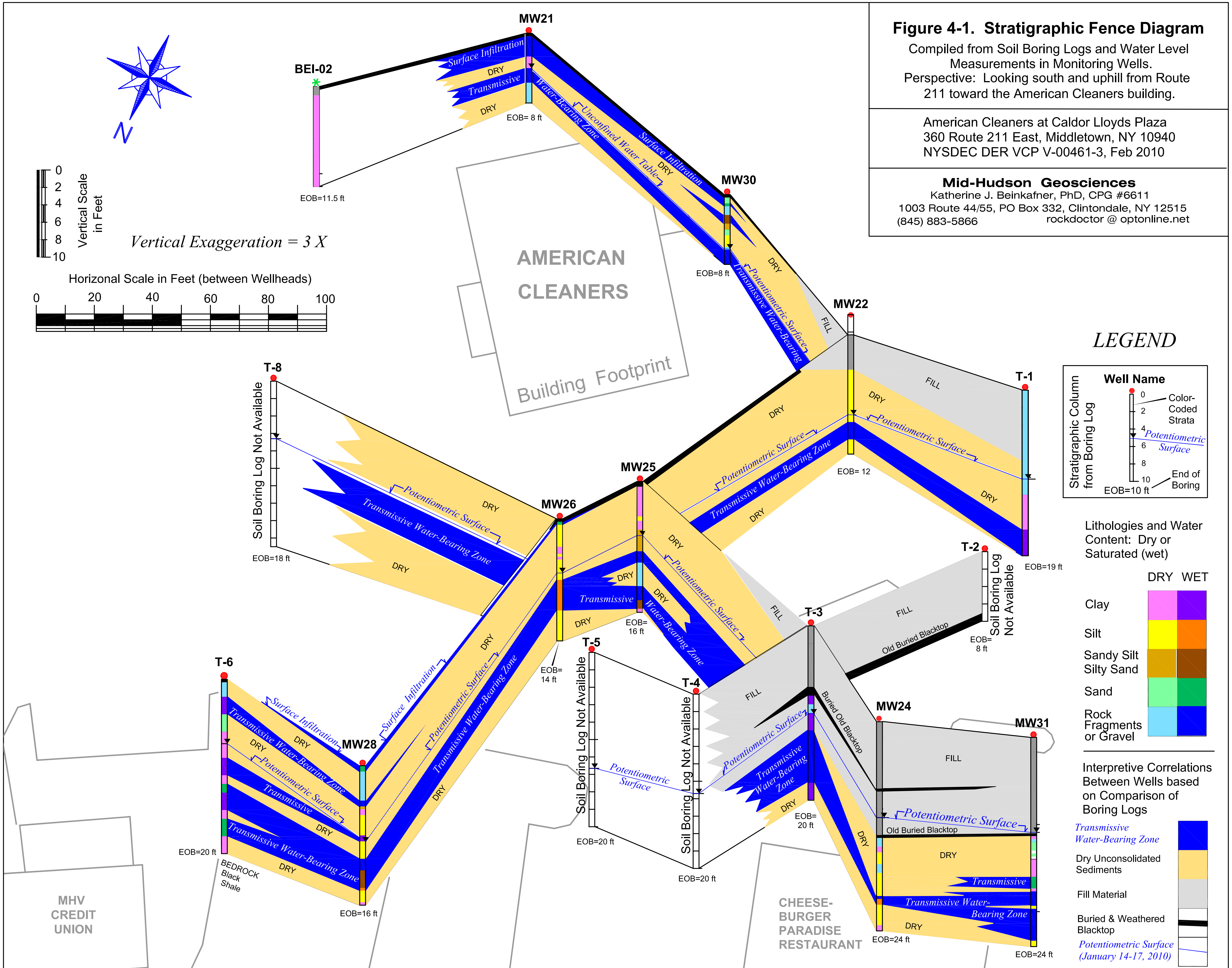

Figure 4-1. Stratigraphic Fence Diagram

Compiled from Soil Boring Logs and Water Level Measurements in Monitoring Wells.
Perspective: Looking south and uphill from Route 211 toward the American Cleaners building.

American Cleaners at Caldor Lloyds Plaza
360 Route 211 East, Middletown, NY 10940
NYSDEC DER VCP V-00461-3, Feb 2010

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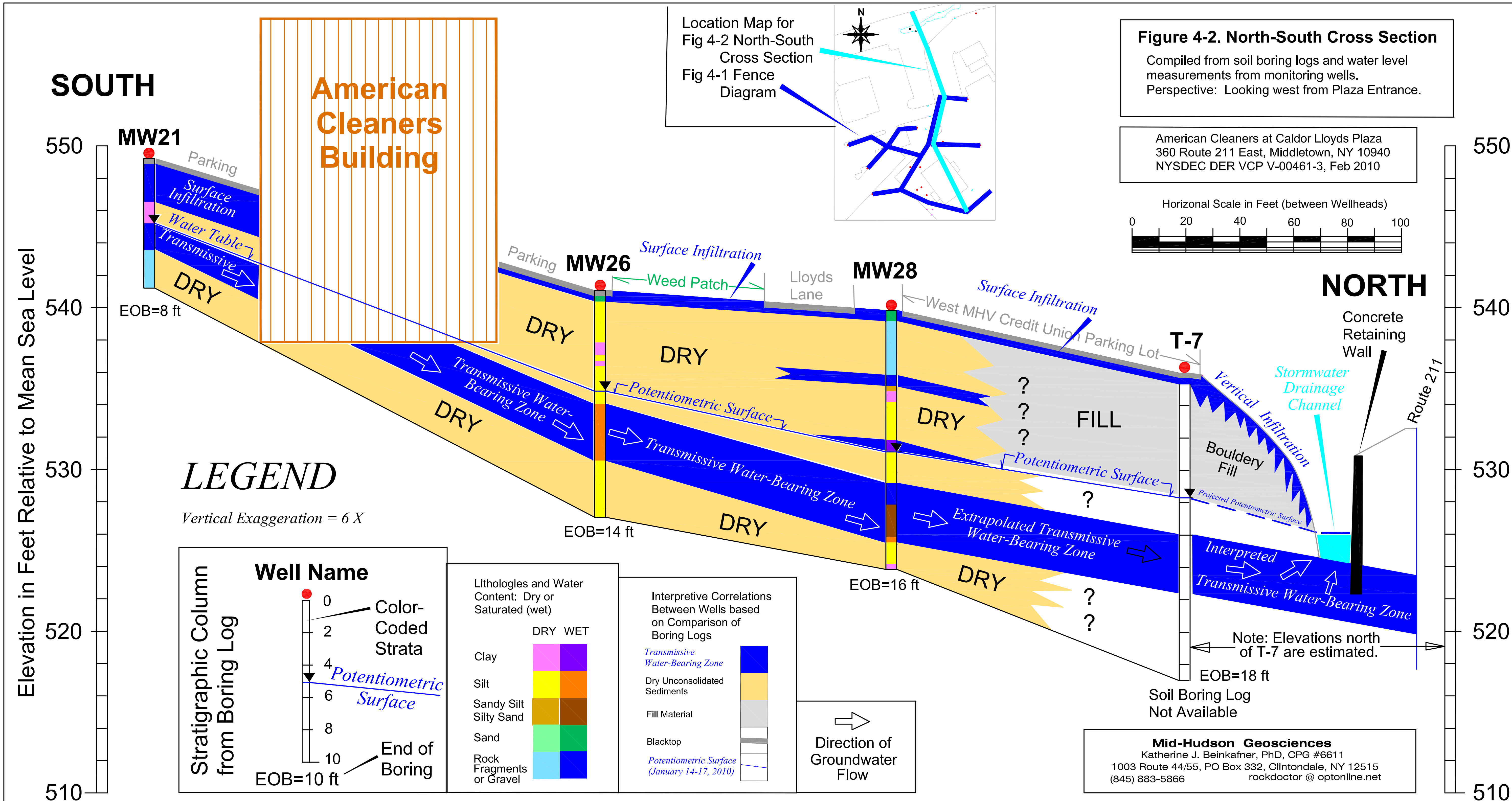

Figure 4-2. North-South Cross Section
Compiled from soil boring logs and water level measurements from monitoring wells.
Perspective: Looking west from Plaza Entrance.
American Cleaners at Caldor Lloyds Plaza
360 Route 211 East, Middletown, NY 10940
NYSDEC DER VCP V-00461-3, Feb 2010
Horizonal Scale in Feet (between Wellheads)
0
20
40
60
80
100
Location Map for
Fig 4-2 North-South Cross Section
Fig 4-1 Fence Diagram
N
SOUTH
NORTH
Elevation in Feet Relative to Mean Sea Level
550
540
530
520
510
MW21
Parking
Surface Infiltration
Water Table
Transmissive
DRY
EOB=8 ft
American Cleaners Building
Parking
MW26
Surface Infiltration
Weed Patch
Lloyds Lane
MW28
Surface Infiltration
West MHV Credit Union Parking Lot
T-7
DRY
DRY
Transmissive Water-Bearing Zone
DRY
Potentiometric Surface
Transmissive Water-Bearing Zone
DRY
EOB=14 ft
DRY
?
?
?
FILL
Potentiometric Surface
?
Extrapolated Transmissive Water-Bearing Zone
Projected Potentiometric Surface
DRY
?
?
EOB=16 ft
Vertical Infiltration
Bouldery Fill
Stormwater Drainage Channel
Concrete Retaining Wall
Route 211
Interpreted Transmissive Water-Bearing Zone
Note: Elevations north of T-7 are estimated.
EOB=18 ft
Soil Boring Log Not Available
LEGEND
Vertical Exaggeration = 6 X
Stratigraphic Column from Boring Log
Well Name
0
2
4
6
8
10
Color-Coded Strata
Potentiometric Surface
End of Boring
EOB=10 ft
Lithologies and Water Content: Dry or Saturated (wet)
DRY
WET
Clay
Silt
Sandy Silt
Silty Sand
Sand
Rock Fragments or Gravel
Interpretive Correlations Between Wells based on Comparison of Boring Logs
Transmissive Water-Bearing Zone
Dry Unconsolidated Sediments
Fill Material
Blacktop
Potentiometric Surface (January 14-17, 2010)
Direction of Groundwater Flow
Mid-Hudson Geosciences
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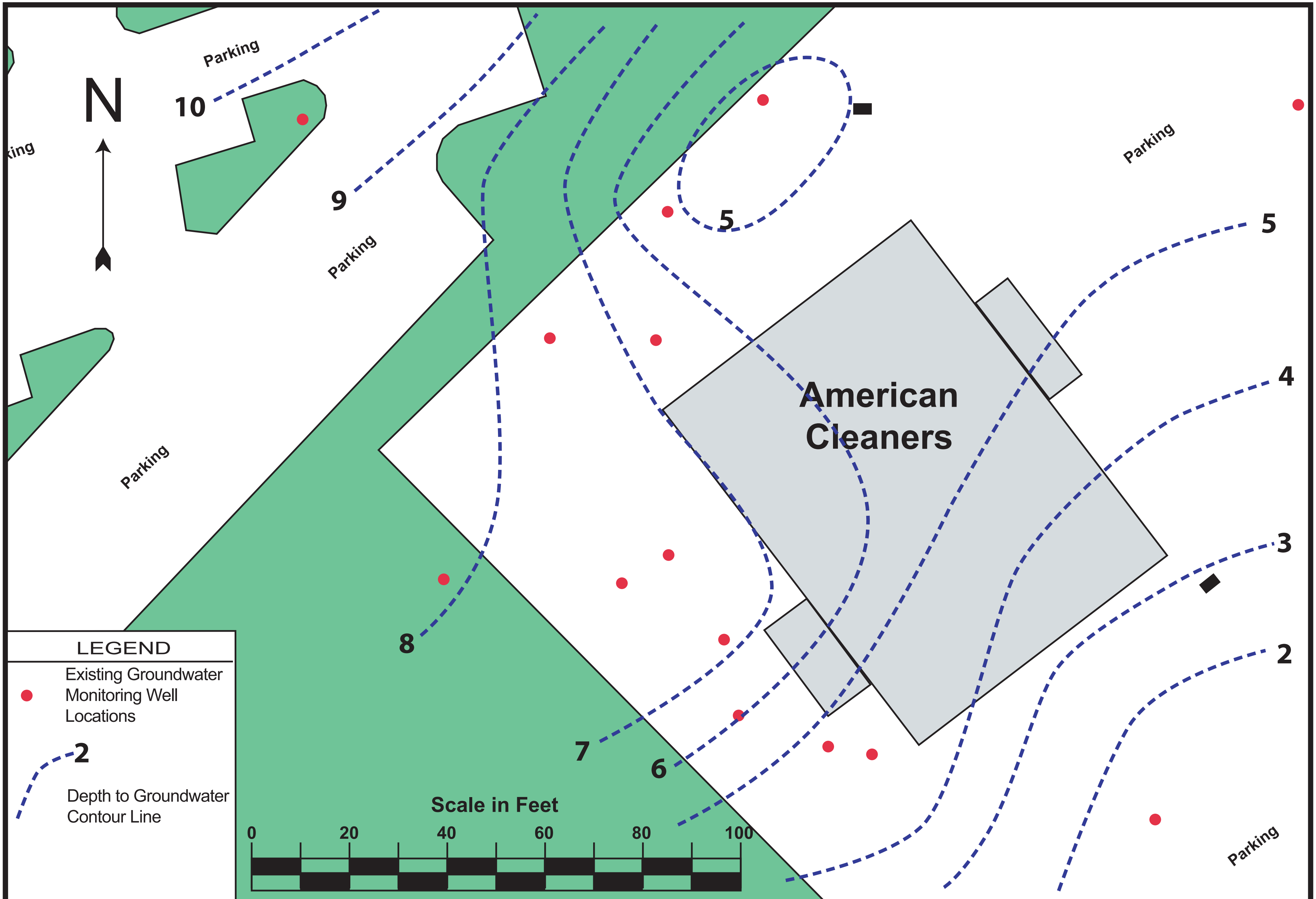

Figure 5
Depth to Groundwater Contour Map

American Cleaners at Caldor Lloyds Mall
340 Route 211 East, Middletown, NY 10940
NYSDEC DER VCP V-00461, Nov 2011

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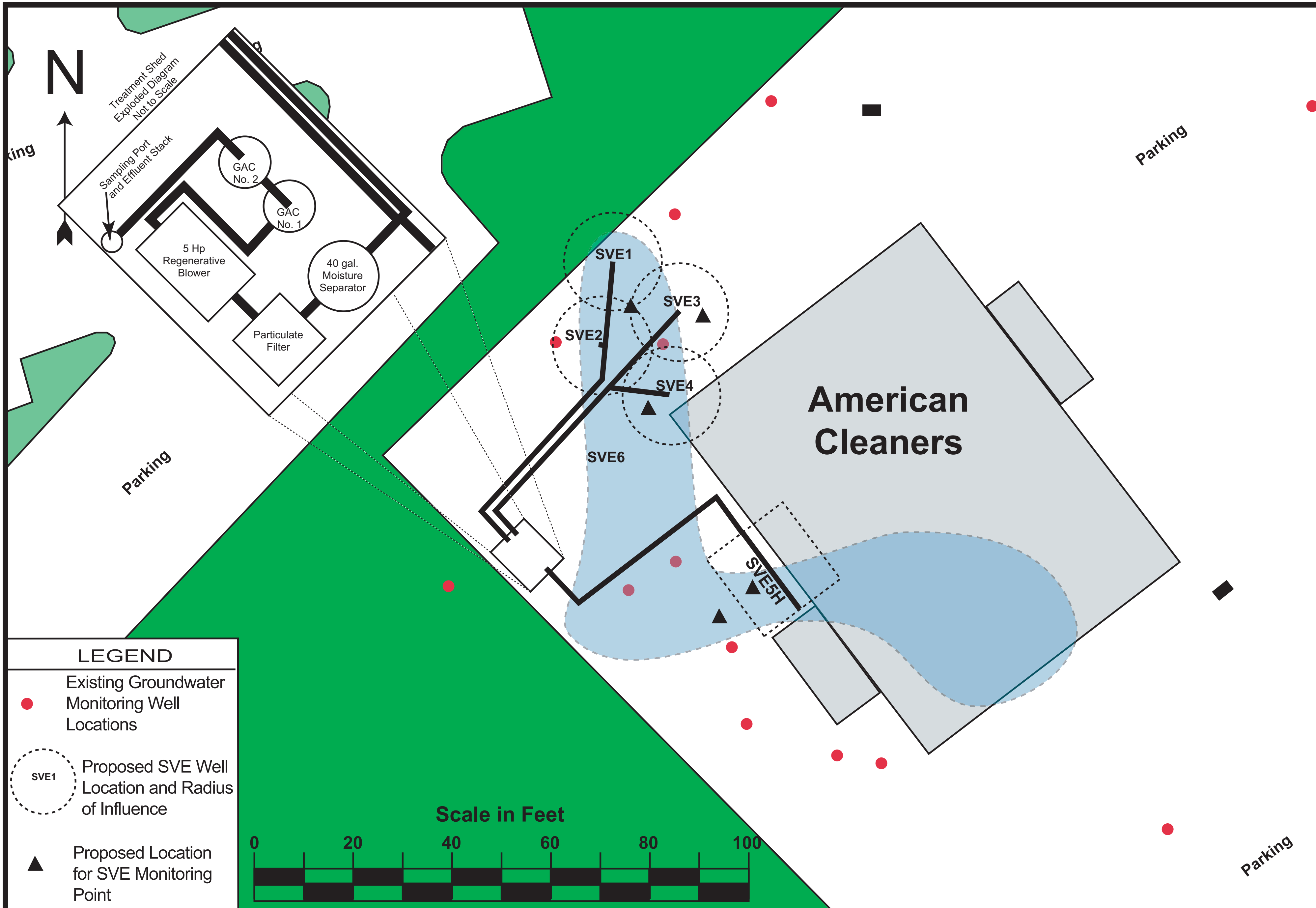

Figure 6.
Location of Phase I - SVE Design Elements

American Cleaners at Caldor Lloyds Mall
340 Route 211 East, Middletown, NY 10940
NYSDEC DER VCP V-00461, Nov 2011

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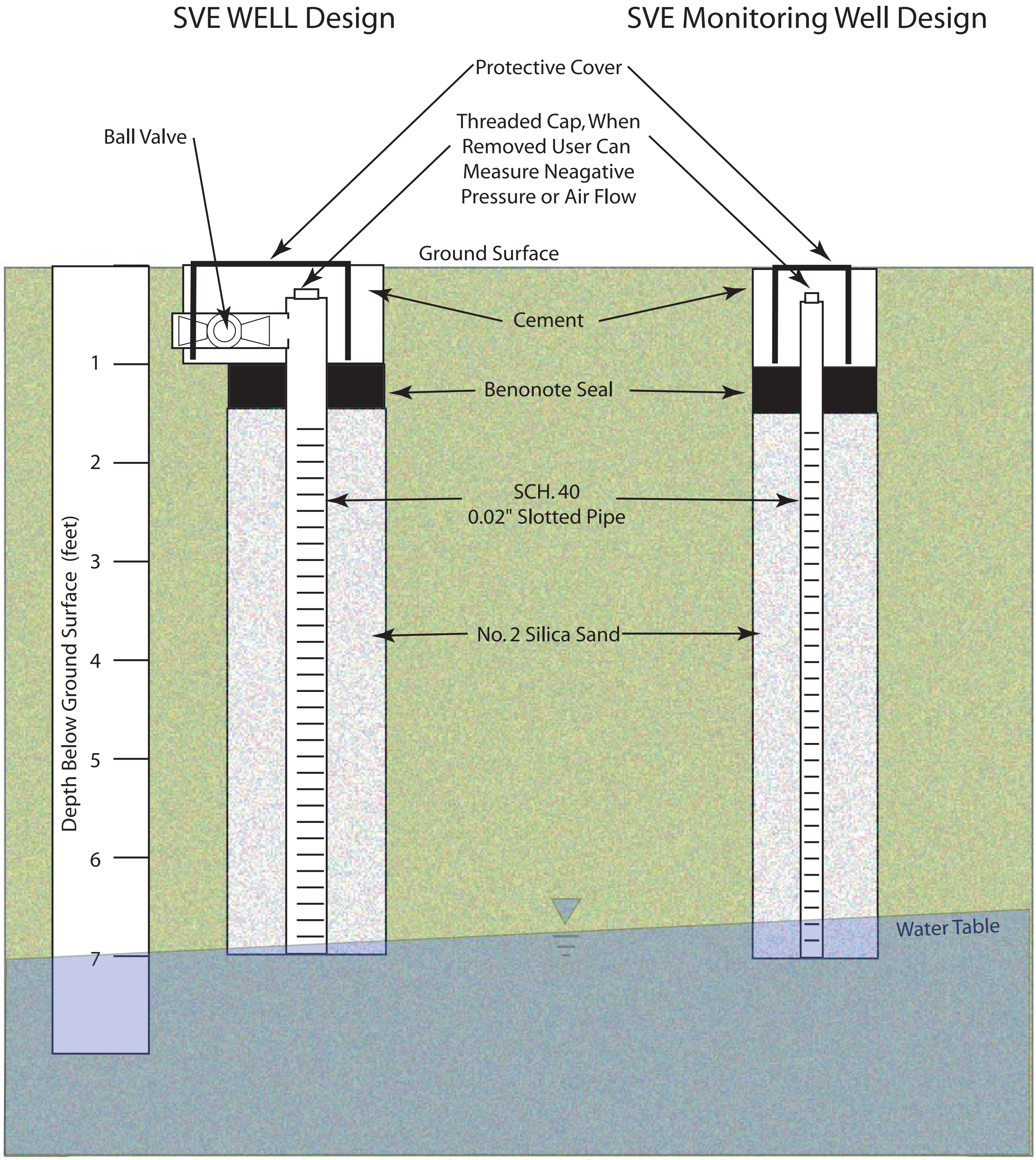

Not to Scale: Horizontal Scale Exaggerated for Clarity

Notes:

American Cleaners - Middletown
Caldor/Lloyds Mall, MIddletown, NY 10940

SVE Well Design and
SVE Monitoring Well Design

DATE: 2-1-12 | RLZ | Figure 7

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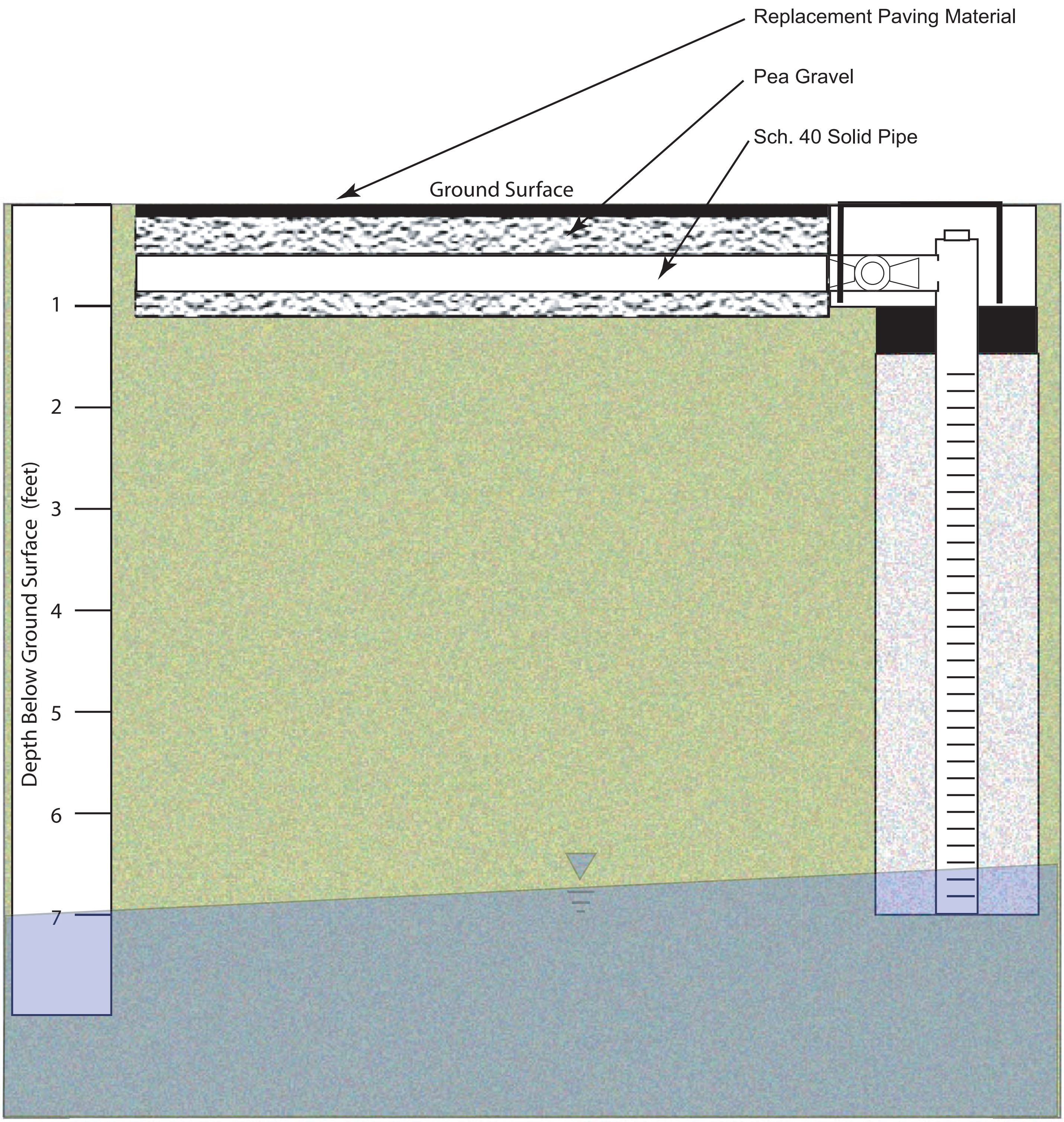
Trenching Detail



Not to Scale: Horizontal Scale Exaggerated for Clarity

Notes:

American Cleaners - Middletown
Caldor/Lloyds Mall, MIddletown, NY 10940

Trenching Construction Detail

DATE: 2-10-12 | RLZ | Figure 8

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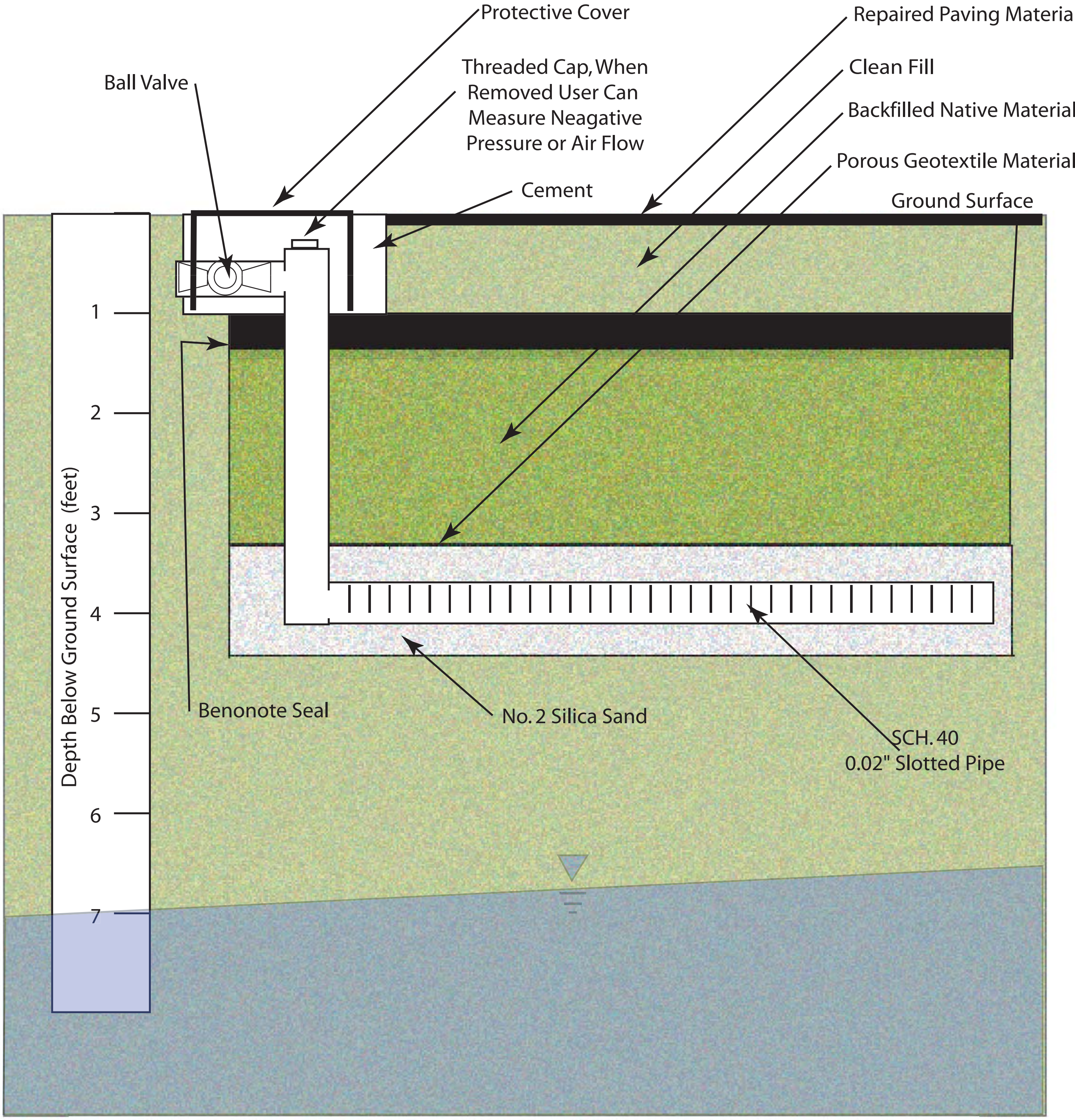
SVE WELL Design



Not to Scale: Horizontal Scale Exaggerated for Clarity

Notes:	American Cleaners - Middletown Caldor/Lloyds Mall, MIddletown, NY 10940		
	Horizontal SVE Well Design		
	DATE: 2-10-12	RLZ	Figure
	GEOVATION Geovation Engineering, P.C. 2016 Route 284 - Slate Hill, NY		9

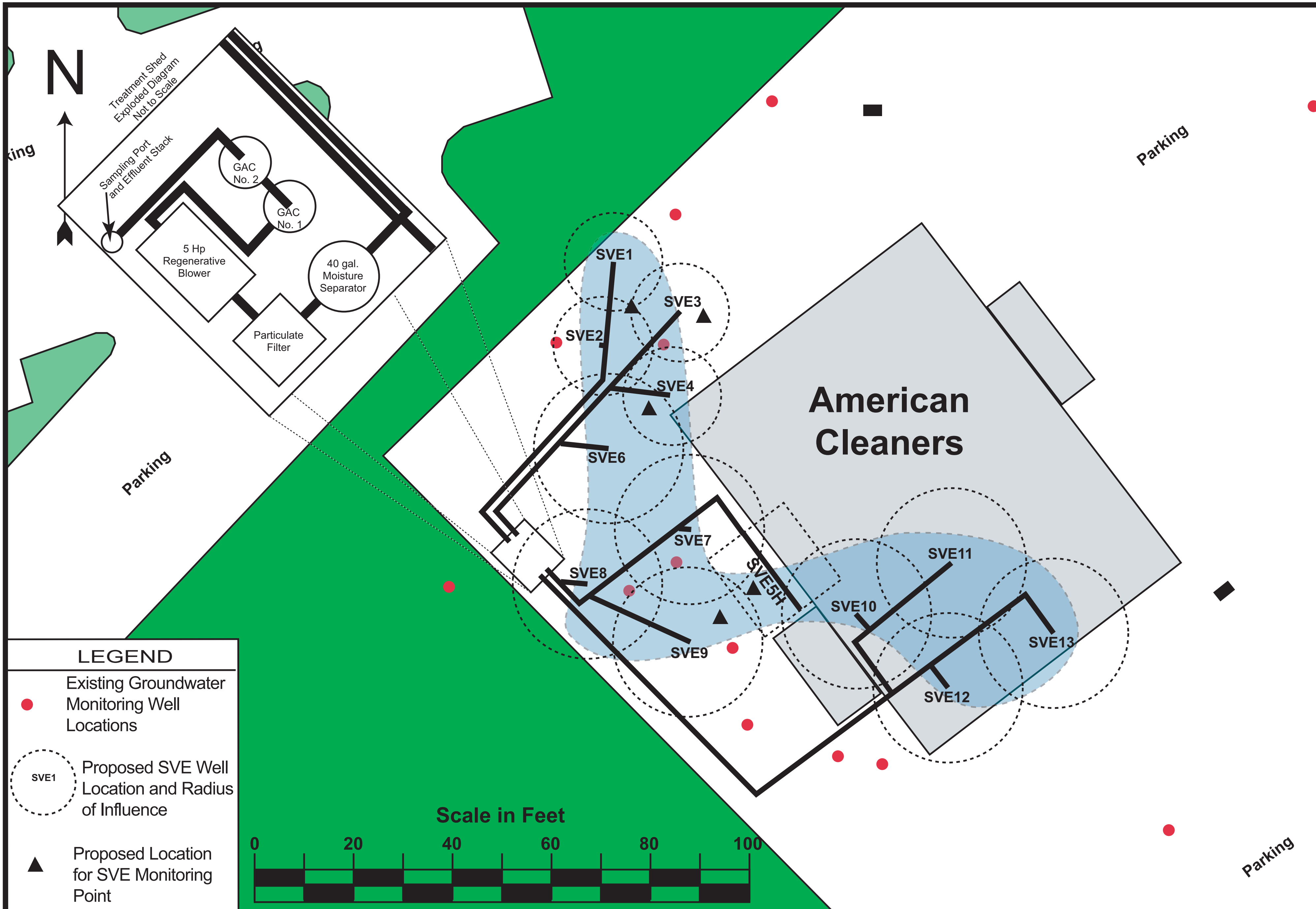


Figure 10.
Location of Phase II - SVE Design Elements

American Cleaners at Caldor Lloyds Mall
340 Route 211 East, Middletown, NY 10940
NYSDEC DER VCP V-00461, Nov 2011

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