

**Remedial Work Plan**  
136 Fuller Road Site  
Brownfield Cleanup Program  
NYSDEC Site No. C401055

City of Albany  
Albany County, New York

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Chazen Project No. 90618.00

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*DER approved modifications.*

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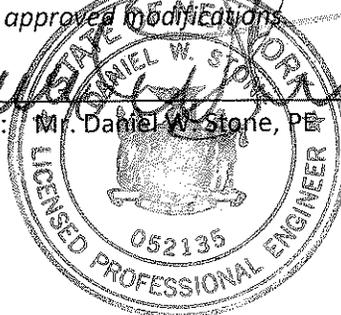


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## EXECUTIVE SUMMARY

This Remedial Work Plan (RWP) outlines the activities undertaken to date and those continued actions that will serve to remove the impacts from soil and groundwater in the subsurface at the former Fuller Brush Facility (hereinafter referred to as the “site”). This RWP is submitted as part of the New York State Brownfields Cleanup Program (BCP) for Site No. C401055, that is located at 136 Fuller Road in Albany, NY.

The Fuller Brush Company produced brushes at the site from the mid-1950s until the early 1970s. Subsequent site operations included the manufacture of poly-fill material until the late 1980s (Star Textiles) and then the production of plastic resins from recycled materials (Star Plastics). UltePET, LLC acquired the business from Star Plastics in 1997, and continues operating a plastic bottle recycling facility today. The site property is a 270,000-square foot industrial use facility which is owned by Fuller Partners, LLC. UltePET LLC occupies the majority of the site building; MerchNow is located on the remainder of the site building and produces and distributes silk screen t-shirts and produces other music media products including a recording label.

Site investigations performed prior to Fuller Partners LLC acquisition of the property served to identify petroleum and chemical solvent impacts to soil and groundwater quality. The primary contaminants identified are the chlorinated solvent tetrachloroethylene (PCE) and other chlorinated volatile organic compounds (CVOCs) and petroleum-range volatile organic compounds (VOCs). PCE was not documented as ever being used at the site, but a source area of PCE groundwater contamination has been discovered. The origin of the PCE contamination is still unknown. The contaminant source area is present along the north central part of the site building at an historic tank farm location where petroleum and solvents were delivered via rail car and stored in aboveground and underground storage tanks. The VOC contamination in this source area extends partially beneath the site building near the former tank farm, and a groundwater plume extends farther southward beneath the central portion of the site. In total, approximately 5 acres of the 15.56-acre site are impacted with CVOCs and petroleum VOCs.

This RWP details the process by which VOC impacts shall be reduced from within the site subsurface and by which progress monitoring shall document the effectiveness of the remedial action. The remedial action objective is to be protective of human health and the environment where no further remedial action is warranted.

The site remedy selected from the alternatives analyzed in the Remedial Investigation Report is the “Continued Sub-Slab Depressurization System (SSDS) and High Vacuum Extraction/Soil Vapor Extraction (HVE/SVE) System Operation” alternative. Under this remedy, the two existing systems that were originally installed as Interim Remedial Measures would be maintained until the source area has been sufficiently mitigated.

- The HVE/SVE system is located in the source area and consists of nine extraction wells that actively lower the groundwater levels to remove impacted groundwater and soil vapors. Extracted liquid and vapor are processed through the remediation trailer system to remove VOCs before effluent discharges to the sanitary sewer system (water) and to the atmosphere

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(vapor). Monthly monitoring data have shown both effluents to consistently be at concentrations less than their respective action levels.

- The SSDS consists of six vapor extraction wells that provide coverage of the groundwater plume area beneath the building.

In addition to the continued operation of these systems, institutional controls and a protective cover engineering control will be implemented. An environmental easement will restrict use of site groundwater, restrict future use of the site to commercial or industrial purposes, and require adherence to a Site Management Plan. An engineering control in the form of a protective cover will be maintained.

The Alternatives Analysis concluded that the continued use of the existing HVE/SVE system and SSDS is a reasonable and appropriate method of site remediation, which may be expected to mitigate the site impacts to a point at which natural attenuation would address remaining residual contaminants. If the system does not fully address the source area impacts as anticipated, an extended remedial action to address dissolved groundwater plume impacts could be considered.

The remedy will be operated according to the Site Management Plan until the remedial action objectives for each system are met and NYSDEC approves the shut down and decommissioning the systems.

This remedy is characterized as a Track 4 remedy in the Brownfield Cleanup Program.

## 1.0 INTRODUCTION

This Remedial Work Plan (RWP) outlines the activities undertaken to date and those by which continued action will serve to remove the volatile organic compound (VOC) impacts from soil and groundwater in the subsurface at the former Fuller Brush Facility (hereinafter referred to as the "site") located at 136 Fuller Road in the City of Albany, Albany County, New York (Figure 1). This RWP details the process by which VOC impacts shall be reduced from within the site subsurface and by which progress monitoring shall document the effectiveness of the remedial action. The remedial action objective is to be protective of human health and the environment where no further remedial action is warranted. This RWP is submitted as part of the New York State Brownfields Cleanup Program (BCP). The site is identified as BCP Site No. C401055. This RWP was prepared with oversight and assistance from the New York State Department Environmental Conservation (NYSDEC).

### 1.1 Site Description

#### 1.1.1 Site Location and Future Use

The 136 Fuller Road site is a 15.56-acre industrial property situated on the eastern side of Fuller Road. It is located approximately 450 feet south of the intersection of Fuller Road and Railroad Avenue. The site is situated in the City of Albany, Albany County, NY.

The site is currently used for commercial and industrial purposes; planned future uses are for commercial use.

#### 1.1.2 Geology

The surficial geology of the area was shaped by the most recent glaciation of New York State. Approximately 20,000 years ago, during the Wisconsinan Glacial Episode, New York State was covered by a continental glacier that extended south to present day Long Island. As the glacier began to melt, it receded northward toward present day Albany. The melt water of the receding glacier was dammed by ice and moraine deposits to the south and formed glacial Lake Albany. Lake Albany spanned from the present-day Glens Falls region south to present-day Newburgh. The Mohawk River emptied into Lake Albany forming a large sand and gravel delta. In addition to sand and gravel deposits, glacial lake deposits of very fine-grained material formed on the lake bottoms as clay layers. The sand, gravel, and clay deposits are characteristic of the site area.

A review of the Geologic Map of New York, Hudson-Mohawk Sheet (1970) indicates the bedrock in the area of the subject property has been mapped as the Normanskill Shale. Bedrock was not encountered in the borings installed during this investigation; the deepest extending 52 feet into the ground.

According to the Natural Resources Conservation Service (NRCS), the majority of the soil on the site has been mapped as Udipsamments or Smoothed and Urban Land. Soil classified as Udipsamments is described as consisting of coarse sand and is well-drained. Soil classified as Smoothed and Urban Land is described as consisting of a variable texture whose drainage class is not reported.

A review of the Surficial Geologic Map of New York: Hudson-Mohawk Sheet (1989) indicates that the soils in the area of the subject property have been mapped as lacustrine sand. Sand deposits are typically associated with large bodies of water, generally forming near-shore or near a sand source. Lacustrine sand soils are well sorted, stratified, and generally consist of quartz sand with a variable thickness of 2 to 20 meters.

Soils encountered during drilling activities consisted primarily of silty sand. Clay was also found in some of the shallow borings completed on the northern side of the building and northern interior locations. The shallow clay layer in the northern site area was encountered between five and ten feet below grade with a great degree of variability in the depth of the clay interface. This clay interface was found to influence the migration (i.e., limited the vertical and horizontal migration) of source contaminants in soil. This clay appears to be present as a clay column with a slight irregularly shaped bowl-like feature at its surface that appears to retain the shallow groundwater and source material. The clay column lies beneath a vegetated area of the site that was formerly occupied by a Fuller Brush chemical storage tank farm, and is considered to be the source area of site contaminants. A deeper and more consistent clay layer at 30+ feet below the ground surface was confirmed across the rest of the site during the installation of deep soil borings. The clay layer encountered at depths equal to or greater than 30 feet is interpreted to be a continuous, naturally-occurring clay layer beneath the shallow sandy site aquifer.

Silt and fine sand are present throughout the site, and the difference between shallow disturbed fill (apparently resulting from cut, fill and grading operations when the site was developed) and naturally occurring sand layers was difficult to distinguish. There appeared to be a slight fining downward gradient in the deepest borings. Beneath the clay layer, till was encountered at a depth of 40 feet bgs in one boring (B-3) and refusal was encountered at 48 feet bgs in another boring (MW-29) that may also have been due to the presence of till.

### 1.1.3 Hydrogeology

The Patroon Creek lies along the southern site boundary and flows eastward to the Hudson River basin. Based on a survey of static water elevations in site monitoring wells, shallow groundwater on the site flows to the south (Figure 4). The hydraulic gradient is relatively flat in the north and west areas of the site. The site shallow groundwater gradient increases as groundwater approaches the Patroon Creek to the south and east. The elevation stage of the Patroon Creek in comparison to the groundwater elevations approaching the creek indicate that the two likely intersect.

In the area of the former tank farm, local groundwater elevations appeared to be influenced by the presence or absence of discontinuous shallow clay deposits which created sharply contrasting differences in the groundwater surface elevations between adjacent monitoring points. Monitoring wells installed above the shallow clay unit were measured as having much higher groundwater elevations, from 2 to 6 feet higher than the rest of the wells in this area which were installed in the sandy soil unit where the clay layer was not encountered until the 30 foot depth interval.

No hydrogeologic information was available for properties which surround the subject site. Based on a review of available information, regional drainage and shallow groundwater flow in the area of the subject site is expected to mimic surface topography and be southward towards the Patroon Creek.

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#### 1.1.4 Surface Water Resources

The closest surface water body to the site is the Patroon Creek. The south branch of the Patroon Creek originates from Lake Rensselaer approximately 1,100 feet west of the site. The Patroon Creek flows in an easterly direction near the south side of the subject property and flows approximately six miles east to the Hudson River.

The original building plans for Mohawk Brush Company show that the Patroon Creek was relocated from its original location during the original 1955 site development process. The creek, which meandered in the southern portion of the property, was diverted to a more direct route via a culvert that directed the water from Lake Rensselaer at Fuller Road farther south of the site. Culverts direct the stream flow from Fuller Road eastward beneath the highway exit ramp system. Just south of the central area of the site, one of the stream culvert sections surfaces to a small surface water area then re-enters another culvert, traverses beneath another section of the exit ramp and then discharges to the exposed stream valley east of the exit ramp and east of the site property. Creek exposure nearest the property is south of the central portion of the site, in a surficial drainage depression area between the site and the I-90 Highway exit ramp.

#### 1.2 Site Background

The site was developed in 1955 as the Mohawk Brush Company which produced brushes for the Fuller Brush Company and operated for approximately 20 years until the early 1970s. Following the exit of Mohawk Brush Company, the property apparently fell tax delinquent and was acquired by the City of Albany in or about 1974. The City then leased to Star Textiles, manufacturers of poly-fill material used for the inside of jackets, blankets, and other textiles until the late 1980s. Star Textiles continued as Star Plastics producing plastic resins from recycled materials. In 1997, UltrePet, LLC acquired the business from Star Plastics, leased the site from then-owner Fuller Reality, who subsequently sold the property to the current owner, Fuller Partners, LLC. A 2004 Phase I Environmental Site Assessment and a 2006 Phase II ESA Site Subsurface Investigation were conducted for Fuller Partners LLC prior to purchasing the site. These investigations were used as the basis of initially characterizing site soil, groundwater and soil vapor impacts. The current site owners purchased the site in December of 2006 and entered into the NYSDEC Brownfields Cleanup Program in 2009. Fuller Partners have continued site investigation activities from 2005 and continuing with the Remedial Investigation (RI) in 2012. Collectively, these investigations have served to identify petroleum and chemical solvent impacts to soil and groundwater quality. The primary contaminants identified are tetrachloroethylene (PCE) and other chlorinated volatile organic compounds (VOCs) and diesel-range petroleum constituents. PCE was not documented as ever being used at the site, but a source area of PCE groundwater contamination has been discovered. The origin of the PCE contamination is still unknown.

#### 1.3 Nature and Extent of Contamination

The Remedial Investigation/Alternatives Analysis Report is dated August 2012 and was prepared by The Chazen Companies. The remedial investigation objective was to gather data to assess soil and groundwater quality, delineate the nature and extent of contaminant impacts for use in a fate and transport assessment, and gather additional geologic and groundwater information for use in evaluating appropriate remedial methods and designing a remedial action. Investigation objectives were met

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through the collection and laboratory analysis of soil and groundwater samples. Specific interim remedial measures (IRMs) were also implemented to address the impacted area.

The contaminant source area is present along the north central part of the site building at an historic tank farm location where petroleum and solvents were delivered via rail car and stored in aboveground and underground storage tanks. These tanks were de-commissioned and removed by prior site owners prior to 1989, but leaks/spills in this area were not addressed until Fuller Partners acquired the site. The VOC contamination in this source area extends partially beneath the site building near the former tank farm, and a groundwater plume extends farther southward beneath the central portion of the site. In the source area, high concentrations of VOCs are present in shallow groundwater and soil. The remainder and majority of the impacted area is a groundwater plume area where dissolved contaminants have migrated via groundwater transport from the source area southward and downgradient toward the southern site boundary. In total, approximately 5 acres of the 15.56-acre site are impacted with chlorinated VOCs (CVOCs) and petroleum VOCs.

This RI investigation served to further delineate the contamination within the source area and in the groundwater plume area. The investigation confirmed that the contamination lies within a single shallow aquifer, which exists from a typical depth of 6 to 8 feet below grade to the top of the glacial till, which is encountered at approximately 30 to 40 feet below grade. The bulk of contamination lies within the top ten feet of the saturated aquifer depth. The investigation also verified that the geologic unit containing the contaminated aquifer is underlain by a dense glacial till layer which provides a vertical aquifer boundary. There is no indication that contamination has extended beyond the till layer. Comprehensive sampling and analysis for heavy metals, polychlorinated biphenyls (PCBs), pesticides and semi-volatile organic compounds has revealed no impacts above NYSDEC standards, criteria or guidelines for these compounds within the VOC impacted area, and no evidence of contamination beyond the limits of the mapped plume or source areas. Within the source area, the source contaminants lie suspended on a shallow clay formation, typically within ten feet of the ground surface.

In the spring of 2011, a vacuum extraction system was installed in the source area as an interim remedial measure (IRM). The intent of this IRM action was/is to reduce the contaminant mass in the site subsurface. This system is situated along the northern side of the building and has been successfully removing contaminated groundwater, vapors and liquid phase non-aqueous contaminants from the source area. The system has been successfully removing these contaminants at a rate of approximately one pound of total VOC contaminants per day since the onset of system operations in April of 2011. To date, it is estimated that more than half of the source area contaminant VOCs have been removed and the system continues to operate. Extracted groundwater is treated to remove the VOCs and the treated groundwater is discharged to the Albany sanitary sewer system. Vapor contaminants are monitored and discharged/vented to the atmosphere under conditions established and approved through the BCP process.

Soil vapor quality impacts beneath the central portion of the site building were found to exist at levels that indicate mitigation is recommended under the New York State Department of Health's (NYSDOH) guidance. To address the potential for exposures and to comply with the NYSDOH Soil Vapor Intrusion Program guidelines, the owners installed a sub-slab depressurization system (SSDS) as a second IRM. The system consists of six vapor extraction wells and three regenerative vacuum blowers that provide coverage over the groundwater plume area beneath the building. The SSDS was installed in the spring of

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2011 and continues to remain in operation. The SSDS will be maintained and operated until such time that the NYSDEC and NYSDOH determine that the source beneath the building has been sufficiently mitigated and is no longer required.

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## 2.0 SELECTED REMEDIAL ACTION

### 2.1 Remedial Goals and Remedial Action Objectives

The overall goal of remedial action is to remediate the site soil and groundwater quality to meet the Commercial Use soil cleanup objectives (SCOs) for VOCs, to the extent feasible and mandated by promulgated SCOs.

The site remedial action objectives (RAOs) are to:

- Prevent contact with, or inhalation of volatiles, in contaminated soil and groundwater
- Restore groundwater aquifer to the extent practicable.
- Remove the source of groundwater contamination to the extent practicable.
- Prevent ingestion/direct contact with contaminated soil and groundwater.
- Prevent exposure to contaminants volatilizing from impacted soil and groundwater.
- Prevent migration of contaminants in groundwater.
- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into site buildings.

### 2.2 Analysis of Alternatives

Based on the findings of the Remedial Investigation, an Alternatives Analysis (AA) was performed to assess reasonable and appropriate site remediation options and to select an appropriate alternative to mitigate the site impacts. Four alternatives were determined to be relevant for the Alternatives Analysis. The alternatives considered are summarized as follows and the selected alternative is identified.

#### Alternative 1: No Further Action

Under the No Further Action (NFA) alternative, the existing site SSDS in place over the contaminant plume area beneath the site building and HVE/SVE soil and groundwater mitigation systems would be terminated. No additional remedial actions would be implemented, which would leave the site with soil and groundwater concentrations in site source and plume areas that exceed the Commercial Use soil cleanup objectives (SCOs) and groundwater SCGs. There would be no institutional or engineering controls for the site under this alternative.

This alternative was considered as a baseline in the assessment process, and was not selected because it is not protective of human health or the environment and did not meet the remedial goals and objectives.

#### Alternative 2: Continued SSDS and HVE/SVE Operation

Under the Continued SSDS and HVE/SVE Operation alternative, these two existing systems would be maintained and monitored to assess the performance and effectiveness of the remedy until the source area has been sufficiently mitigated. Possible follow-up activities might involve post-remedial groundwater monitoring or implementation of monitored natural attenuation (MNA) for residual impacts. Under this alternative an environmental easement would be issued as an institutional control

to restrict site use options (e.g., commercial use) and activities in the impact area (e.g., soil management plan for future excavation work). Further, the existing protective cover would be maintained.

To estimate the duration of continued operation of the SSDS and HVE/SVE system, a contaminant mass estimate was prepared using available soil contaminant quality data. Based on this estimate, it is assumed that the VOC contaminant mass in the subsurface is approximately 1,770 pounds. Given the measured HVE/SVE system recovery of more than 1 pound per day, the remedial systems will need to remain active for approximately one more year to recover the estimated quantity of the presumed contaminant mass. This remediation duration is also used in evaluating Alternative 3.

**This alternative was selected because it was determined to be protective of human health or the environment, met the remedial goals and objectives, and was economically feasible.**

Alternative 3: Continued SSDS and HVE/SVE Operation with Groundwater Treatment

Alternative 3 is similar to Alternative 2 with the addition of groundwater treatment. After the HVE/SVE remedial effort is deemed complete, this alternative includes implementing groundwater plume treatment using in-situ accelerated biological remediation or in-situ chemical oxidation (ISCO) in plume and source areas for final VOC concentration reduction.

This alternative was not selected. Although this alternative was determined to be protective of human health and the environment, did meet the remedial goals and objectives and could be feasibly implemented, there is no immediate necessity to treat groundwater without first determining if aggressive plume treatment is warranted following completion of the HVE/SVE system operation and monitored natural attenuation (MNA). Inherent risks associated with plume mobility and the introduction of chemical or biological additives into the aquifer were also considered an unnecessary risk without first attempting MNA.

Alternative 4: Remediate to Meet Unrestricted Use with No IC/ECs

This alternative would restore the site to pre-release conditions by de-watering and removing impacted soil from the site followed by aggressive in-situ treatment of groundwater throughout the impacted groundwater plume area. Due to the horizontal extent of impacts, this alternative would involve removing soil from the source area, including soil beneath the building. As a result, a section of the building would need to be demolished and then replaced after excavation of impacted soil. This activity would encompass a large section of the industrial concrete floor slab. This effort would require relocation of an existing plastic recycling facility operation; protection, re-location and repair or replacement of site infrastructure utilities; and extensive shoring and de-watering of the excavation area.

This alternative was considered as an aggressive option in the assessment process to determine if it was practical to remediate the site through invasive actions to obtain unrestricted use (pre-release) conditions. This alternative was not selected because it was excessively disruptive to the existing business use of the site (to the point that it would be unlikely that the business could remain at the site) and was determined to be economically impractical.

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## 2.3 Selected Remedial Action Option

The existing HVE/SVE remediation system has been successfully implemented at the site as part of IRM activities and continues to reduce VOC concentrations in source area soil and groundwater trapped in the source area soil matrix. Continued operation of this system combined with the existing SSDS, in addition to the implementation of institutional and engineering controls, were determined through the alternatives analysis to be an appropriate means of mitigating the site VOC impacts through which remedial action objectives are to be met. These systems were installed in 2011 as interim remedial measures and will, along with proper monitoring of the systems and the subsurface to ensure continued effectiveness and outcome, be continued as the selected Remedial Actions.

Therefore, the selected alternative is #2 along with institutional controls and the protective cover engineering control detailed in Section 5: Continued SSDS and HVE/SVE Operation. The analysis of this alternative is presented below.

### *Overall Protection of Human Health and the Environment*

Selecting the Continued SSDS and HVE/SVE Operation alternative will be protective of human health and the environment and will meet the RAOs. This option will remediate the site to levels that comply with standards, criteria and guidance, and is expected to be consistent with planned future use of the site for commercial activities.

### *Compliance with Standards, Criteria and Guidance*

Under this alternative, the site will comply with standards, criteria and guidance as groundwater quality will be monitored to document compliance with NYSDEC-approved action levels for the site.

The continued operation of the SSDS will comply with NYSDOH guidance for soil vapor intrusion as long as the concentrations beneath the building slab warrant the use of this system. Following site remediation activities, it is anticipated that the SSDS will no longer be needed and will be shut down to minimize energy consumption consistent with NYSDEC's DER-31 Green Remediation goals.

### *Long-term Effectiveness and Permanence*

The Continued SSDS and HVE/SVE Operation alternative will have continued positive effects on the soil, groundwater and soil vapor quality in the long term. Site risks will be reduced through implementation of this alternative because groundwater concentrations will ultimately meet NYSDEC goals for the source area and groundwater plume remediation.

This alternative satisfies the RAOs and ultimately is expected to meet SCOs. An environmental easement and a site management plan (SMP) will be issued as institutional controls to restrict site use options (e.g., commercial use), use of site groundwater and activities in the impact area and will include a soil management plan for site maintenance and future excavation work.

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### *Reduction of Toxicity, Mobility, and Volume with Treatment*

The Continued SSDS and HVE/SVE Operation alternative will reduce the volume and thereby the magnitude of the site impacts associated with toxicity and mobility of VOCs at the site. The site will be remediated to the extent practicable and necessary to meet NYSDEC/NYSDOH criteria for the site. The goal is to reduce the existing contaminant mass to a level that will be ultimately managed and mitigated through monitoring and natural attenuation (MNA).

### *Short-Term Impact and Effectiveness*

This alternative will continue the operation of existing IRMs as the selected remedial actions; therefore, no short-term change to remedial activities will be implemented as part of this alternative. The HVE IRM process has proven to be effective at reducing VOCs in groundwater, and the SSDS IRM continues to operate within the design criteria providing an assurance of the ongoing protection of air quality within the site building. There will be no short-term impacts to site occupants as there will be no new site construction for the alternative; nor will there be impacts to the community since the remedial action activities are a continuation of existing IRMs. The remedy will be implemented immediately with continued system operation.

### *Implementability*

The Continued SSDS and HVE/SVE Operation alternative is technically feasible as the existing systems will remain in operation and be maintained and monitored according to a NYSDEC-approved OM&M plans for these two systems. This alternative is also administratively feasible and will include an engineering control (SSDS) and an institutional control (environmental easement). The environmental easement required to leave residual contamination in place at concentrations greater than Unrestricted Use SCOs will ensure land use restrictions (e.g., commercial use) and compliance with the approved Site Management Plan (SMP). There will be no difficulties in securing personnel, materials, equipment or access to continue operation and maintenance of existing IRM systems.

### *Land Use*

The Continued SSDS and HVE/SVE Operation alternative is consistent with the planned future use of the site for commercial use.

### *Community Acceptance*

Community views on the Remedial Work Plan (RWP) will be obtained during the public comment period and public meeting, and will be addressed when the RWP is finalized. Community acceptance will be evaluated as part of the RAWP process.

### 3.0 REMEDIAL MEASURES

This section describes the active remedial components which will be operating at the site.

#### 3.1 Sub-Slab Depressurization System

The SSDS IRM Work Plan was included in the NYSDEC-approved Remedial Investigation Work Plan for the site. The February 2011 Design Report for this IRM was approved by NYSDEC and NYSDOH on March 30, 2011. Construction of the SSDS at the site was completed in March and April 2011 in conformance with the design specifications. The vacuum blowers were started on April 28, 2011 and have remained in continuous operation since startup. The *Construction Completion Report with Operation, Maintenance and Monitoring Plan* was approved by NYSDEC and NYSDOH on March 21, 2012 and is included as Appendix C of the approved Remedial Investigation and Alternatives Analysis Report.

The system consists of three SSDS zones with two screened vapor extraction wells (VEWs) in each zone. Each VEW was constructed below the building floor slab with 20-slot (0.02 inch), Schedule 40, PVC pipe that is approximately 12-inches deep and 4-inches in diameter. Each zone is connected to one 1.5-horsepower regenerative blower with 2-inch PVC pipe and manifold sections. Each blower provides sufficient vacuum extraction capacity to produce a minimum vacuum pressure of 35± inches of Water Column at each VEW with an estimated flow of 10 cubic feet per minute or greater per well. An inline sample port and vacuum pressure gauge at each VEW allow for the operational monitoring of vacuum pressures at wellheads.

Periodic checks of the SSDS confirm that the system is operating within design parameters. Operation, maintenance and monitoring of the system were transferred to the building maintenance personnel in March 2012. The system is checked monthly for proper operations and is maintained periodically, as required under the approved OM&M Plan.

Figure 2 of this report indicates the location of the components of this system including extraction wells within the site building, piping and vacuum extraction blowers maintained exterior to the northern side of the building.

#### 3.2 High Vacuum Extraction /Soil Vapor Extraction System

##### 3.2.1 Overview

The *Interim Remedial Measures Work Plan for the High Vacuum Extraction/Soil Vapor Extraction* system was prepared in December 2010, and was approved by NYSDEC and NYSDOH on March 22, 2011, following a public comment period and NYSDEC review and approval. The May 2011 Design Report for this IRM was approved by NYSDEC and NYSDOH on May 20, 2011. Construction of the HVE/SVE system at the site was completed in March of 2011 in conformance with the design specifications. Following NYSDEC's verbal approval of the Work Plan, the HVE/SVE system pilot test phase was started on March 10, 2011 and extended through August of 2011. This system was approved for the discharge of up to 0.5

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pounds total of volatile organic compounds to the atmosphere, post treatment, through the system discharge stack.

The system was operated from March through August 29, 2011 in a pilot study operational phase. While in operation, the pilot system was fitted with a catalytic oxidation (CatOx) pre-discharge vapor treatment system to combust vapor phase contaminants not otherwise captured or treated by the system prior to atmospheric discharge. Based on extensive monitoring of the system vapor, and the confirmation that the total VOC exhaust concentration was consistently less than the permissible 0.5 pounds per hour threshold, the CatOx system was eliminated from the final system design. The pilot system was replaced with a modified system designed/configured to provide additional flow through the HVE part of the system to provide a more thorough extraction efficiency in the source area. The new system was installed and was operational by mid-November of 2011 and has been operating since that time.

The existing system consists of a series of nine remedial recovery wells connected through a network of piping to both a soil vapor extraction (SVE) component and a High Vacuum Extraction (HVE) component. Both vacuum extraction components (SVE and TFE components) are configured to be interchangeably connected to any or all of the recovery wells, through a vacuum manifold system of 2-inch PVC piping. This allows for routine changes to intake extraction well configuration to achieve the most effective recovery solution. Figure 3 shows the system schematic with area wells for reference.

The system utilized a 25-horsepower liquid ring vacuum pump to generate a vacuum pressure that has a practical operational range of one to twelve inches of mercury (in-Hg) with a typical flow rate of approximately 400 cubic feet per minute of air in this vacuum pressure range. This system is capable of extracting fluids that accumulate in the recovery wells (i.e., water, light non-aqueous phase liquids (LNAPL) like petroleum, and dense non-aqueous phase liquids (DNAPL) like chlorinated solvents. This system is used to dewater the source area so that volatile organic NAPL previously trapped in saturated soil is extracted from the subsurface in the de-watered soil depths. The system continuously evacuates water and NAPL in the wells at depths of up to 14 feet below the ground surface (the vacuum lift equivalent of the TFE pump operating range), effectively dewatering the source area site to the depth of the shallow clay layer and then sustains a de-watered condition under which the VOCs are volatilized by the combined vacuum extraction systems and removed from the ground under unsaturated conditions. The SVE component of the system is used to provide supplemental vacuum flow in the dewatered subsurface further assisting in the volatilization and removal of VOC contaminants.

Contaminated groundwater, LNAPL and DNAPL liquids are drawn into the remediation trailer and through a cyclone phase separator. The cyclone separator separates the liquid phase from the vapor phase and allows the vapor phase to pass into the vacuum pump and then be discharged to the atmosphere through an exhaust stack. The liquid phase is pumped from the cyclone separator tank sump into an oil/water separator where un-dissolved LNAPL, DNAPL and suspended solids (silt, sand and clay particles) are separated from the aqueous phase. The aqueous phase exits the oil/water separator and is then pumped through a 25-micron bag filter and then a shallow tray air stripping tower before being discharged to the sanitary sewer. The shallow tray air stripper removes dissolved VOCs from the aqueous phase by passing a large volume of pressurized air over a very thin film of the water as it drains through a series of trays, as the water passes through the stripper, effectively removing most of the VOCs before discharging the treated water to the sanitary sewer. VOCs stripped from the water are then

passed through and out of the air discharge stack to atmospheric air. When the water is discharged to the sewer, nearly all of the VOCs have been removed. A total of up to 5 parts per million (ppm) total residual VOCs are allowed in the discharged water. The efficiency of the separation and air stripping process in this system has consistently provided for the discharge of water at concentrations well below the permissible 5-ppm limit.

Air/vapors extracted from the subsurface with the SVE pump are directed through the combined system discharge vapor stack. As such, the system air discharge stack contains the combined air/vapor discharges from the HVE pump, the air stripper and the SVE pump. The combined air/vapor effluent for the system is directed to a single 6-inch metal stack that extends approximately 27 feet above ground level, and above the site building's roofline. A discharge concentration of up to 0.5 pounds per hour of total VOCs from this stack is permissible under the approved system operation design. The efficiency of the system has consistently provided for the discharge of air at concentrations well below the permissible limit of 0.5 pounds per day.

LNAPL, DNAPL and contaminated sediment are periodically cleaned from the oil/water separator and are drummed for off-site disposal. Contaminated bag filters containing suspended residuals up to 25 microns in size that may have passed through the separator are periodically removed, drummed and disposed of off-site with the waste from the oil/water separator. Oily waste and used bag filters are routinely drummed and transported off-site for disposal by Environmental Products & Services of Vermont, Inc. (EP&S) to Eldredge, Inc. in West Chester, PA.

### 3.2.2 Remedial Recovery System Monitoring

Monthly sampling and laboratory analysis of influent aqueous phase extracted liquids, discharged treated water, and air discharged from the effluent air stack is performed to monitor the performance of the system and to ensure that the discharges concentrations are at or below the NYSDEC-approved discharge concentrations for the system. Weekly monitoring of flows, field screening of total VOC concentrations and maintenance of the system is performed to ensure that the system is operating properly and according to the approved system design and operating conditions.

These results have been and will continue to be reported to NYSDEC according to the approved OM&M and SMP.

### 3.2.3 Product Mass Recovery

Monthly vapor and aqueous discharge sampling is used to estimate the total VOCs being removed. During typical operations, the combined system has been removing approximately 1 to 2 pounds of VOCs per day. Calculations show the majority of mass removal has been captured via the air or vapor phase of the HVE and SVE systems. In addition, NAPL is being removed via the oil/water separator, although mass removal quantification is difficult due to the presence of bacterial mass mixed with the NAPL waste and some solids and incidental water removed in this mixed waste stream.

As of the end of May 2012, the HVE/SVE remediation system had been operating for approximately 350 days since April of 2011, and continues to operate. The system monitoring through collection and

---

laboratory analysis of effluent samples has indicated that approximately 960 pounds of VOCs (based on averaged recovery rates), had been removed from the subsurface in the source area at that time. Estimates of the total mass quantity of VOCs in the source area indicate that an approximate mass of 1,770 pounds of VOCs may be present in the source area. Using the recovery rates measured to date, and projecting forward, assuming similar system efficiencies, it is estimated that the remaining 810 pounds of VOCs in the source area subsurface would be removed with approximately one additional year of system operation. This estimate was used to support the assumptions made for duration of remaining recovery system operations in the alternatives analysis.

### 3.2.4 Performance Groundwater Quality Monitoring

Groundwater monitoring well sampling was performed every other month during initial operations of the HVE/SVE to assess impacts of the IRM on groundwater concentrations. The sampling program included wells primarily located in the source area (MW-8, MW-9, MW-10, MW-20, MW-25, MW-27, MW-29, MW-30, and MW-32). For some events the well sampling program was expanded to include wells in the groundwater plume area (MW-3, MW-7, MW-13, MW-17, MW-18, MW-31, and MW-33). These results were reported to NYSDEC during monthly progress reports and were used to demonstrate system effectiveness for the alternatives analysis phase of the project. The data showed an overall continued reduction in VOC concentrations in the source area, since the pre-IRM sampling. A few wells (MW-25, MW-30, and MW-33) showed increased VOC concentrations in recent sampling events. This remedial action will be considered complete when contaminants to groundwater quality in the source area have been substantially removed and/or are no longer improving at a rate of effectiveness or efficiency that allows for the practical continued operation of this system.

Groundwater monitoring as a function of the approved remedy will be performed at an interval specified in the groundwater monitoring plan portion of the Site Management Plan. Initial groundwater monitoring events are to be conducted quarterly under this plan and may change over time according to the SMP.

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## **4.0 OPERATIONS, MONITORING AND MAINTENANCE**

This section addresses the operations, monitoring and maintenance, which are necessary to implement the selected remedial site engineering controls.

### **4.1 Sub-Slab Depressurization System**

The SSDS system will be inspected monthly by Fuller Partners, LLC or their assigned agents or operators. Monthly inspection findings will be recorded in a written log according to the approved SSDS OM&M Plan. Any indication of unusual or problematic system performance will be conveyed to the project engineer and the system will be evaluated and maintained or repaired accordingly to obtain conformance with the approved design performance conditions. Routine maintenance including cleaning and replacement of filters will be performed according to the approved OM&M plan.

### **4.2 High Vacuum Extraction / Soil Vapor Extraction Source Area Recovery System**

The HVE/SVE system will be inspected and maintained weekly by a qualified remedial system operator assigned by Fuller Partners, LLC. Operations, maintenance and repair actions will be recorded in a written log for each event according to the approved HVE/SVE OM&M Plan. Any indication of unusual or problematic system performance will be conveyed to the project engineer, and the system will be evaluated and maintained or repaired accordingly to obtain conformance with the approved design performance conditions. Routine maintenance, including replacement of filters and cleaning components, will be performed according to the approved OM&M plan.

The system effluents will be monitored weekly with field screening equipment, and monthly through sample collection and laboratory analysis by a NYS ELAP certified environmental testing laboratory. Laboratory sample analysis results for influent and treated effluent extracted groundwater will be used to evaluate the performance of the system and to adjust the system for maximum efficiency. Effluent sample analysis results will be compared to the project discharge standards, and adjustments or system repairs will be implemented as necessary.

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## 5.0 INSTITUTIONAL CONTROLS AND PROTECTIVE COVER ENGINEERING CONTROL

### 5.1 Institutional Controls

Imposition of institutional controls under the BCP is defined within the approved environmental easement and the SMP. The institutional controls are combined with the engineering controls described in this remedial work plan to constitute the extent of the site remedial actions under the BCP. The institutional controls imposed on this project include the following:

- Requires the site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- Allows the use and development of the controlled property for commercial or industrial uses provided that the long-term Engineering and Institutional Controls are employed;
- Restricts the use of groundwater underlying the property without necessary water quality treatment for intended use;
- Prohibits agriculture or vegetable gardens on the controlled property;
- Requires that all future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;
- Requires that the potential for vapor intrusion be evaluated for any buildings developed on-site, and any potential impacts that are identified must be monitored or mitigated: and
- Requires compliance with the Department-approved environmental easement and Site Management Plan.

### 5.2 Protective Cover

While contaminated soil remains on site at depth above Commercial Use values, a protective cover must be maintained to prevent exposure to this soil.

A site cover currently exists and will be maintained to allow for commercial use of the site. Any site redevelopment will maintain a site cover, which may consist either of the structures such as buildings, pavement and sidewalks comprising the site development or a soil cover in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where a soil cover is required it will be a minimum of one foot of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

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## 6.0 GREEN REMEDIATION GOALS OF THIS REMEDIAL WORK PLAN

Green remediation principals and techniques will be implemented to the extent feasible in the management of the remedy, as per DER-31.

Considerations for the environmental impacts of treatment technologies and remedy stewardship will be continuously evaluated over the long term operations of engineering controls. Special consideration will be applied to the following:

- Reducing direct and indirect greenhouse gas and other emissions;
- Minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste.

Should changes in system operations be identified that would increase compliance with these goals while continuing to meet the remedial objectives, NYSDEC will be advised of recommended changes or discontinued operations of remedial system components and petitioned for system reductions or changes that constitute energy savings while still meeting remedial objectives and compliance with the protection of human health and the environment.

Operation of the SSDS includes continuously running three blowers, which consumes non-renewable energy. It is anticipated that the SSDS will remain operational and running during active remedial activities at the site (i.e., operation of the HVE/SVE). In the event that monitoring data indicates that the SSDS is no longer required, a proposal to discontinue the SSDS will be submitted by the property owner to the NYSDEC and NYSDOH.

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## **7.0 IMPLEMENTATION SCHEDULE**

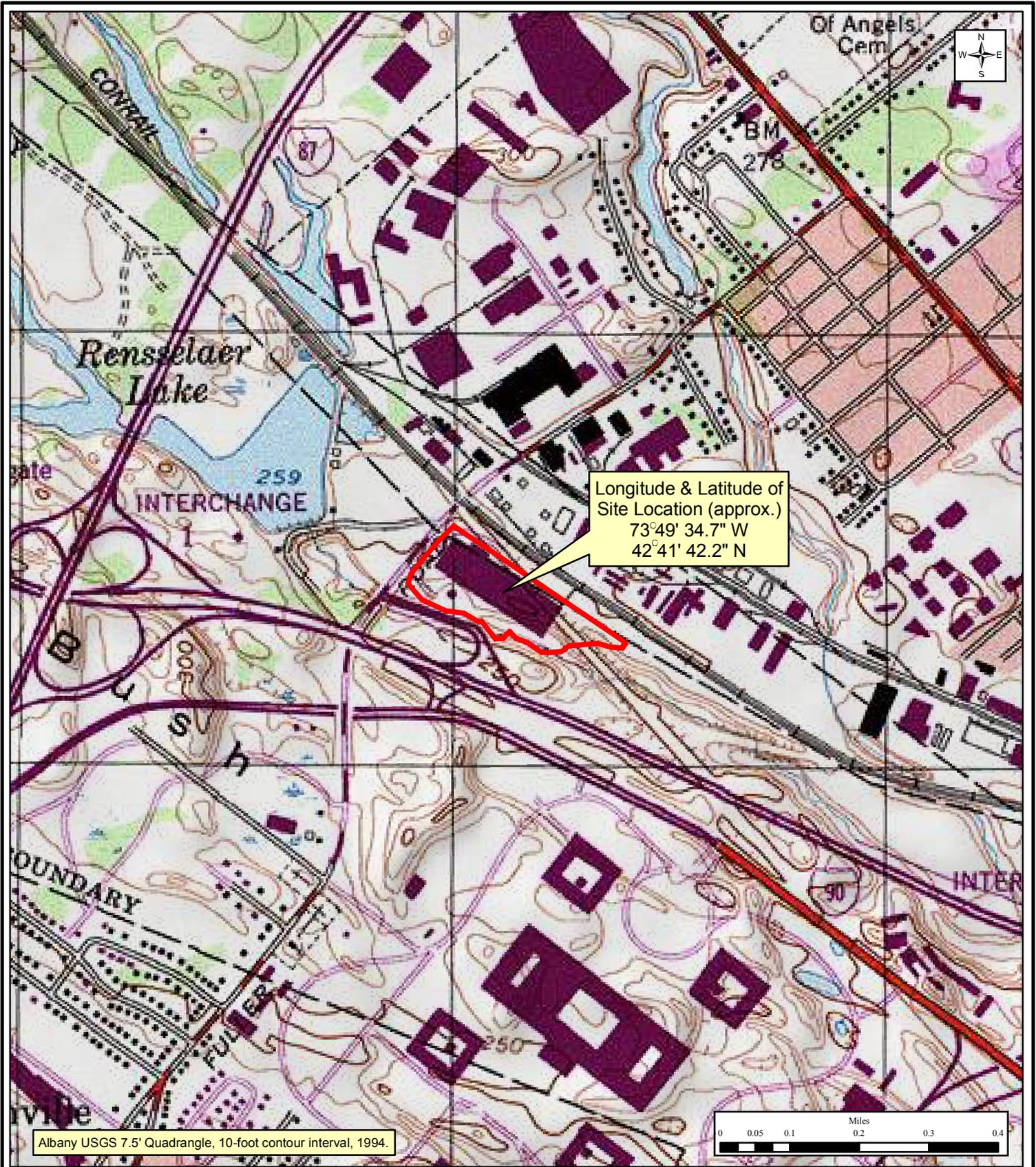
This section describes the schedule under which the described remedial actions will be implemented at the site.

### **7.1 Schedule of Implementation**

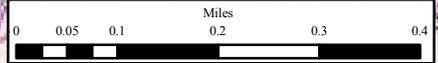
The proposed remedial action engineering controls (i.e., SSDS and HVE/SVE system) were both approved as interim remedial measures, were installed in 2011, and have been operational since final installation and startup. These systems will continue to be operated according to the approved Operations Monitoring and Maintenance Plans and the Site Management Plan.

### **7.2 Duration of System Operation**

The SSDS and HVE/SVE Systems will be operated according to the SMP until the remedial action objectives for each system are met and NYSDEC approves the shut down and decommissioning.



Albany USGS 7.5' Quadrangle, 10-foot contour interval, 1994.



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*Fuller Partners, LLC*

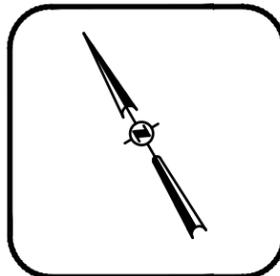
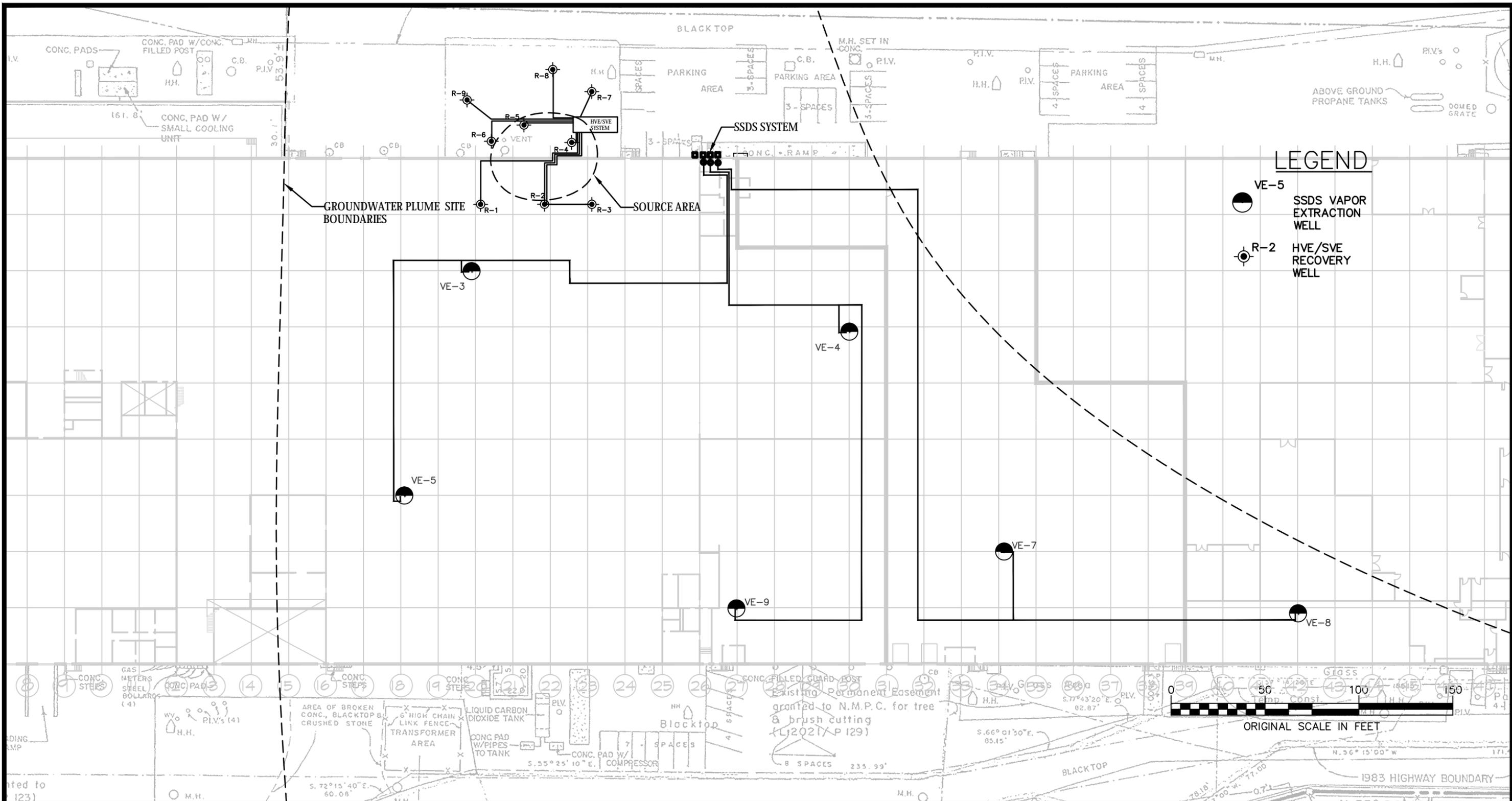
**Site Location Map**

136 Fuller Road  
City of Albany  
Albany County, New York

Drawn:	CLC
Date:	01/01/2007
Scale:	As Shown
Project:	90618.00
Figure:	1



Drawing Name: S:\9\90600-90699\90618\_00\ENG\DWG\SSDS\_FIGS\_90618-00.DWG Date Printed: Dec 14, 2012, 12:22pm



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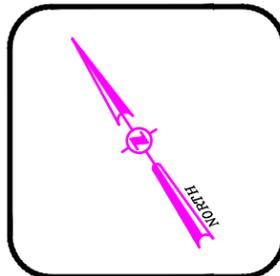
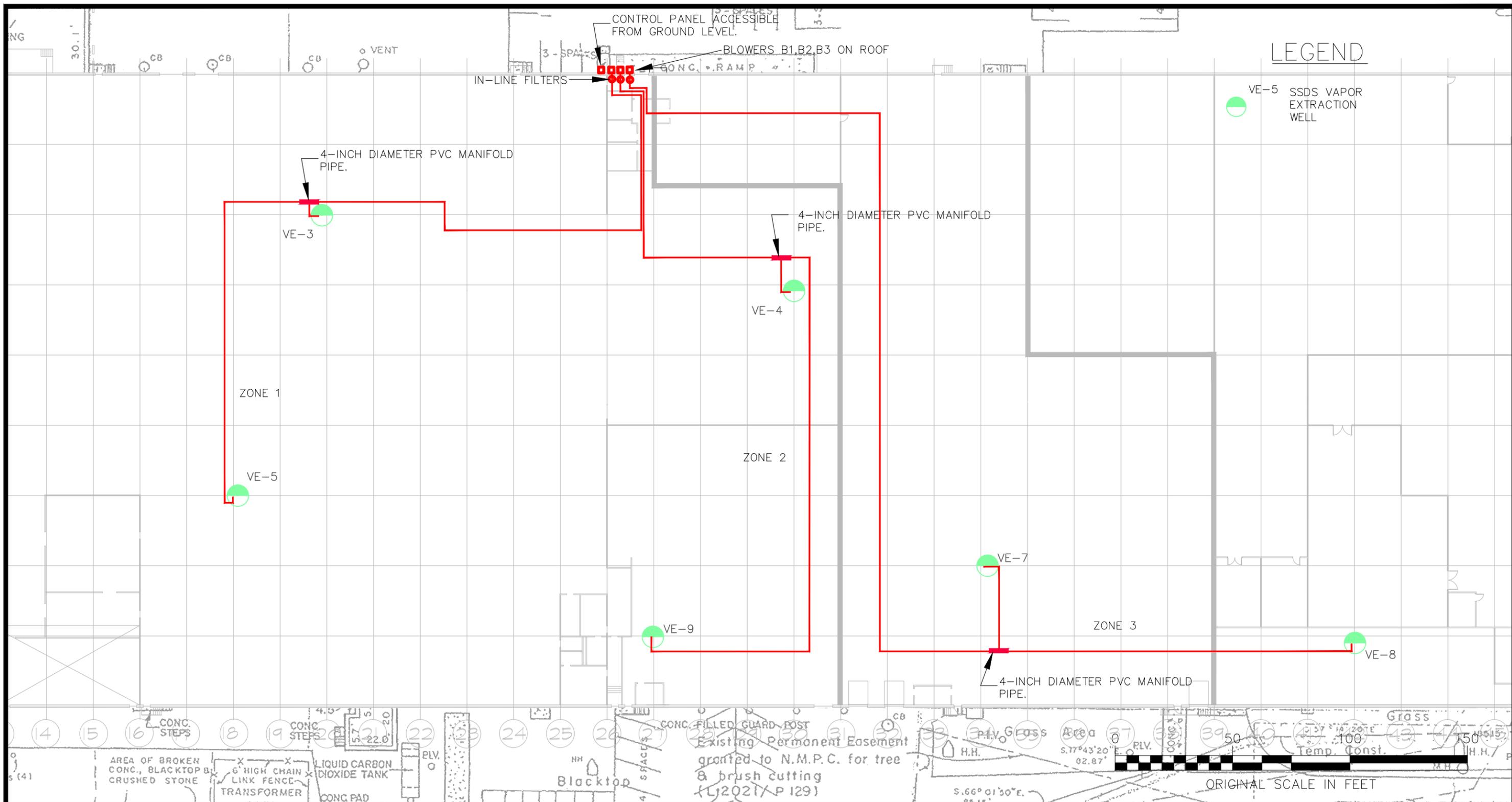
136 FULLER ROAD PROPERTY

**SSDS AND HVE/SVE SYSTEM LOCATIONS**

CITY OF ALBANY, ALBANY CO. NEW YORK

drawn CSD	checked ASM
date 10/3/12	scale 1"=50'
project no. 90618.00	
sheet no. FIGURE 3	

Drawing Name: S:\9\90600-90699\90618\_00\ENG\DWG\SSDS\_FIGS\_90618-00.DWG Date Printed: Dec 14, 2012, 12:29pm



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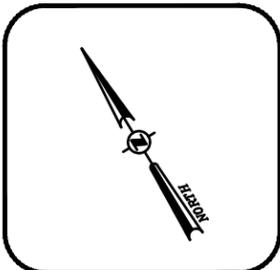
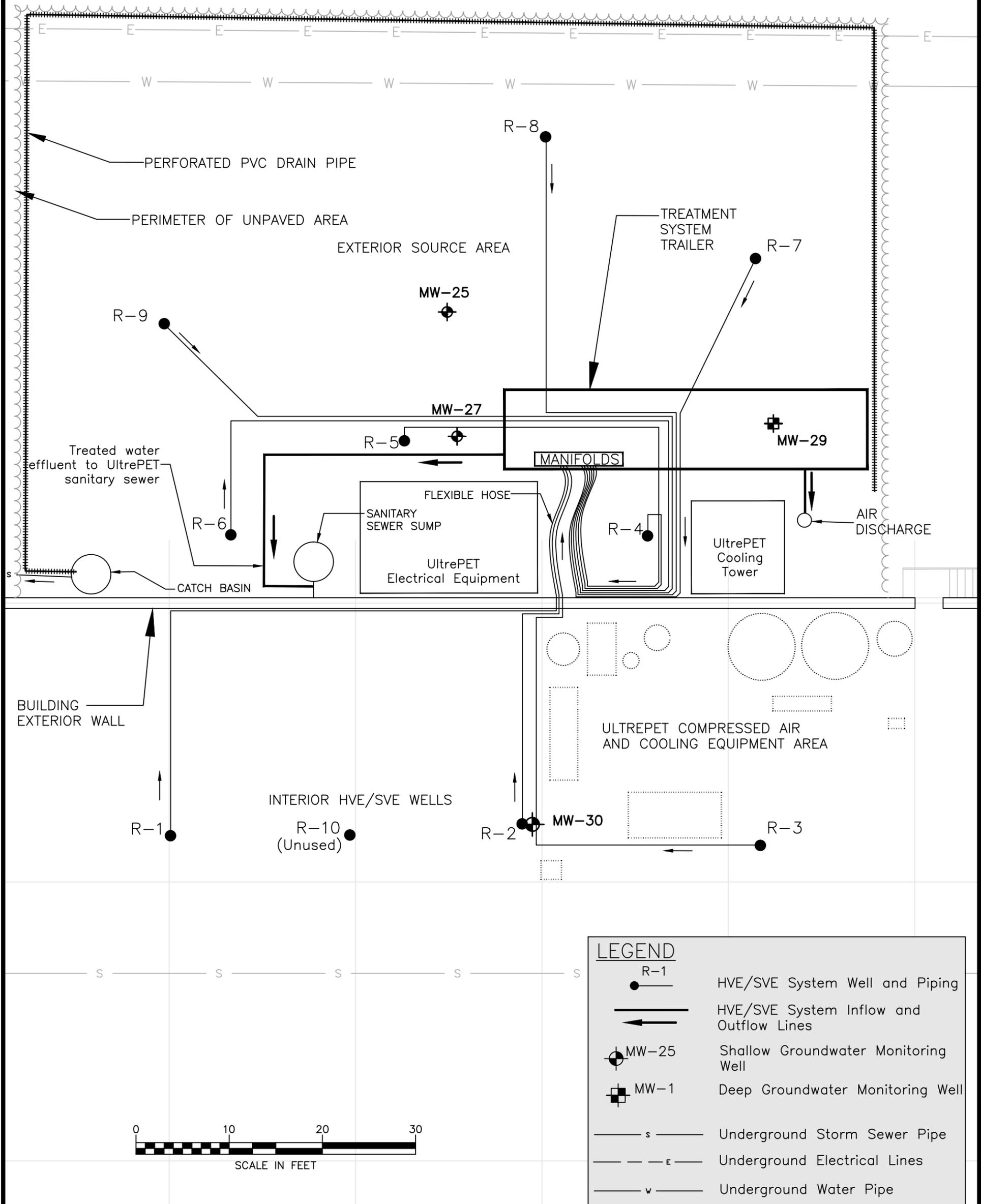
136 FULLER ROAD PROPERTY

**SSDS SYSTEM COMPONENTS/  
LOCATION PLAN**

CITY OF ALBANY, ALBANY CO. NEW YORK

drawn CSD	checked ASM
date 10/2/12	scale 1"=40'
project no. 90618.00	
sheet no. FIG. 4	

PAVED SITE LOOP ROAD



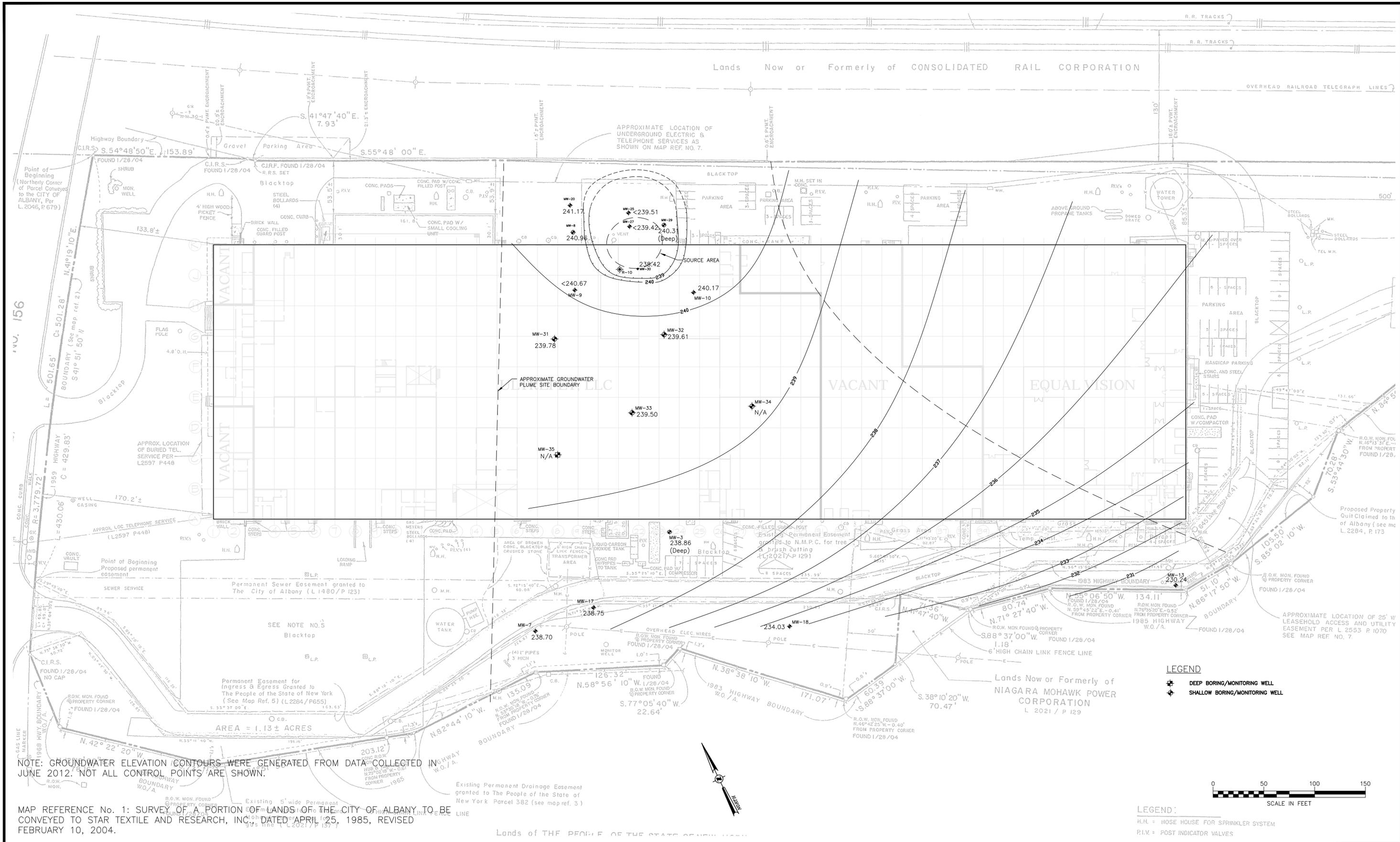
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 100 Glen Street Glens Falls, NY 12801  
 Phone: (518) 812-0513

FULLER PARTNERS, LLC SITE  
**HVE/SVE SYSTEM COMPONENT MAP**  
 136 FULLER ROAD  
 ALBANY, ALBANY CO., NEW YORK

drawn CSD	checked ASM
date 10/2/12	scale 1" = 10'
project no. 90618.00	
sheet no.	

**FIG. 5**



NOTE: GROUNDWATER ELEVATION CONTOURS WERE GENERATED FROM DATA COLLECTED IN JUNE 2012. NOT ALL CONTROL POINTS ARE SHOWN.

MAP REFERENCE No. 1: SURVEY OF A PORTION OF LANDS OF THE CITY OF ALBANY TO BE CONVEYED TO STAR TEXTILE AND RESEARCH, INC. DATED APRIL 25, 1985, REVISED FEBRUARY 10, 2004.

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North Country Office: 100 Dan Street, Glens Falls, New York 12801  
Connecticut Office: 914 Hartford Turnpike, Waterford, CT 06385

rev.	date	description

**FORMER FULLER BRUSH FACILITY**  
**QUARTERLY GROUNDWATER MONITORING WELL LOCATION MAP**  
CITY OF ALBANY, ALBANY CO., NEW YORK

drawn CSD checked ASM  
date 10/2/12 scale 1" = 40'  
project no. 90618.00  
sheet no. **FIG. 6**