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Focused Feasibility Study

Former S & S Cleaners and Dyers Site

13 Willow Street

Cohoes, New York

Site # 401063

Work Assignment # D-007618-1

October 2014

New York State Department of
Environmental Conservation
Albany, New York

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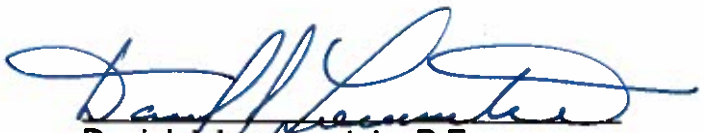
I, Daniel J. Loewenstein, certify that I am currently a NYS registered professional engineer and that this Report was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER approved work plan and any DER approved modifications.



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Focused Feasibility Study

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Site # 401063

Work Assignment # D-007618-1

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Malcolm Pirnie, Inc. was acquired by ARCADIS in July 2009.

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1. Introduction

This Focused Feasibility Study (FFS) has been prepared to evaluate remedial alternatives for chlorinated volatile organic compounds (CVOCs) in soil and groundwater at the former S & S Cleaners and Dyers Site, in Cohoes, Albany County, New York (site) (Figures 1 and 2). The FFS was conducted under New York State Department of Environmental Conservation (NYSDEC) State Superfund Standby Contract Work Assignment No. D-007618-1. The purpose of this report is to evaluate potential remedial alternatives based on the seven evaluation criteria listed in the NYSDEC Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10).

After approval of this FFS, the NYSDEC will issue a Proposed Remedial Action Plan (PRAP) which is open to public comment. Following the public comment period, the NYSDEC will issue a Record of Decision (ROD) for the site.

This FFS was completed in accordance with DER-10, NYSDEC DER program policy for Presumptive/Proven Remedial Technologies (DER-15), NYSDEC DER program policy for Green Remediation (DER-31), and other appropriate NYSDEC and United States Environmental Protection Agency (USEPA) guidance.

1.1 Site Location and Background

The former S & S Cleaners and Dyers Site located at 13 Willow Street, in the northern portion of the City of Cohoes (City) (Figure 1), consists of a vacant lot that was once occupied by a building containing a dry cleaning facility. The ground surface over the majority of the site is composed largely of gravel with minor asphalt paved areas. The site is flat with the exception of the rear approximately one-quarter of the parcel which slopes upward to a retaining wall up to five feet above the elevation of the remainder of the parcel. The site is located within a mixed residential-commercial neighborhood adjacent to the North Mohawk Street area of the City. The North Mohawk Street area is dominated by the former Harmony Mills textile complex and is one of the City's primary redevelopment target areas. The site is bordered by Willow Street and Worth Street to the east and west, respectively, and residential properties to the north and south. The City of Cohoes acquired the property through tax foreclosure in 1993. The building on the site was demolished in 2000 due to public safety concerns. The property is currently used as an informal parking lot.

1.2 Previous Investigations

The City of Cohoes received a grant under the United States Environmental Protection Agency's (USEPA) Brownfields Assessment Program to support economic development in the City through the identification, assessment, cleanup, and redevelopment of Brownfields properties. During the process of screening City-owned properties to assess where further investigation would be warranted, environmental database and historical city directory searches were conducted. Review of these historical data and local knowledge identified the 13 Willow Street site as containing a dry cleaning facility owned and occupied by S&S Cleaners from at least 1962 through 1976. The presence of a dry cleaning operation constitutes a recognized environmental condition as defined by the American Society for Testing and Materials (ASTM) Standard E 1527-05 guideline for Phase I Environmental Site Assessments (ESAs). Given the historical environmental record of dry cleaning operations throughout the nation, there was a potential for soil and groundwater contamination at this and surrounding properties resulting from the release of chlorinated dry cleaning solvents. In addition, there was also a potential for vapor intrusion into the surrounding structures from any subsurface contamination. Consequently, the City proceeded directly to a Phase II ESA at the site.

On behalf of the City of Cohoes, Malcolm Pirnie, Inc. conducted a Phase II ESA at the site in 2009 (Malcolm Pirnie, 2009). Chlorinated volatile organic compounds (CVOCs) were found to be present in the subsurface soil, groundwater, and soil vapor at the site. One groundwater sample from the site contained tetrachloroethene (PCE) at a concentration greater than the corresponding NYSDEC Class GA Standard. The two on-site soil vapor samples contained PCE and trichloroethene (TCE) at elevated concentrations. These findings were reported to the NYSDEC Spill Hotline in March 2009 and Spill number 0814131 was issued for the site.

In November 2009, at the request of the NYSDEC and New York State Department of Health (NYSDOH), soil vapor intrusion evaluations were conducted at the adjacent properties to the north (9 Willow Street) and south (17 Willow Street) of the site. Additionally, a supplemental round of groundwater samples was collected from each of the five existing monitoring wells (Malcolm Pirnie, 2010a). PCE was detected at elevated concentrations in the basement and indoor air samples from 17 Willow Street and the sub-slab and basement air samples from 9 Willow Street. One groundwater sample, from well MW-2, contained PCE at a concentration greater than the corresponding NYSDEC Class GA Groundwater Standard. The concentration of PCE in the sample from MW-2 was consistent with that of the March 2009 Phase II ESA sampling. The NYSDEC and

NYSDOH determined that vapor intrusion mitigation was necessary at 9 and 17 Willow Street.

In May 2010, at the request of the NYSDEC and NYSDOH, a soil vapor intrusion evaluation was conducted at 19/21 Willow Street. Additional soil, groundwater, and soil vapor sampling was also conducted (Malcolm Pirnie, 2010b). PCE was detected in the sub-slab and basement air at elevated concentrations, however, the NYSDEC and NYSDOH requested that additional indoor air samples be collected during the heating season to properly evaluate whether mitigation would be required at 19/21 Willow Street. PCE was detected at elevated concentrations in soil vapor samples collected along the Willow Street sewer line, suggesting that the sewer utility bedding material was acting as a preferential pathway for soil vapor migration. Soil samples from the northeast corner of the site between seven and 10 feet below ground surface (bgs) contained PCE at concentrations up to three orders of magnitude greater than the corresponding 6 NYCRR Part 375 Residential Soil Cleanup Objective (SCO), suggesting that this portion of the site was a potential source area for soil vapor and groundwater contamination. The groundwater sample from well MW-7, within this area, contained PCE, TCE, cis-1,2-dichloroethene, chlorobenzene, 1,1-dichloroethene, and vinyl chloride at concentrations greater than the corresponding NYSDEC Class GA Groundwater Standards. The concentrations of PCE and TCE in the sample from MW-7 were greater than the NYSDEC Class GA Groundwater Standard by four and two orders of magnitude, respectively. The groundwater sample from down-gradient well MW-8 contained PCE (7 micrograms per liter [µg/L]) and TCE (14 µg/L) at concentrations greater than the corresponding NYSDEC Class GA Groundwater Standards, indicating that CVOC-impacted groundwater has migrated off-site. Dissolved oxygen values between approximately 4.1 and 8.7 milligrams per liter (mg/L) and oxidation-reduction potential values between approximately 90 and 131millivolts (mV) measured at MW-6, MW-7, and MW-8 during groundwater purging suggested oxidizing subsurface conditions with limited potential to naturally degrade the CVOCs.

As directed by the NYSDEC and NYSDOH, the City installed soil vapor mitigation systems at 9 and 17 Willow Street in September 2010. A sub-slab depressurization system (SSDS) was installed at 9 Willow Street, which has a full-height basement with a concrete slab. At 17 Willow Street, which has a low-height basement with dirt floor, a sub-membrane depressurization system was installed by placing air extraction piping beneath an EPDM membrane sealed to the building foundation. Differential pressure testing conducted in November 2010 verifying the efficacy of the systems was performed and the results of the testing were sent to the NYSDEC and NYSDOH along with the final system layouts.

In November 2010, at the request of the NYSDEC and NYSDOH, additional indoor air sampling was conducted at 19/21 Willow Street and an additional round of groundwater samples was collected from the three new wells, MW-6, MW-7, and MW-8, installed in May 2010 (Malcolm Pirnie, 2011). PCE was detected at a low concentration in the air sample from the basement of the 19 Willow Street (northern) side of the building. The NYSDEC and NYSDOH determined that vapor intrusion mitigation was not required for this property. The groundwater sample from well MW-7, contained PCE, TCE, cis-1,2-dichloroethene, chlorobenzene, 1,1-dichloroethene, and vinyl chloride at concentrations greater than the corresponding NYSDEC Class GA Groundwater Standards. The groundwater samples from wells MW-6 and MW-8 did not contain CVOCs at concentrations greater than the corresponding NYSDEC Class GA Groundwater Standards.

In May 2011 spill number 0814131 was closed following the transfer of the site into the Inactive Hazardous Waste Site Program.

1.3 Geology/Hydrogeology

The Ordovician Normanskill Shale and Austin Glen Formations, consisting largely of shale, are present beneath the site and the surrounding area (Fisher et al., 1970). Bedrock was not encountered during the Phase II ESA or subsequent investigative activities. Drivepoints advanced to refusal at the site suggest that bedrock is present at an approximate depth of 27 feet below ground surface (bgs). Off-site, refusal was reached at depths of approximately 18 (till) and 20 feet (bedrock) bgs at well locations MW-4 and MW-5, respectively. During the RI, the thickness of overburden and/or fill materials in the vicinity of site was generally between 20 and 30 feet, although a thicker overburden sequence (greater than 50 feet) is present in the source area. Overburden materials overlie competent bedrock composed of what is likely the Normanskill Shale formation. Locally, a glacial till unit is present between the competent bedrock and overlying silt and clay. Consistent with field observations, natural overburden materials in the area are characterized as lacustrine silt and clay (Caldwell et al., 1987). Urban fill materials overlie the clay and silt. Groundwater flow at the site is generally to the north toward the Mohawk River, which is the regional groundwater discharge.

2. Remedial Investigation Summary

2.1 Remedial Investigation

A Remedial Investigation (RI) was conducted between 2012 and 2013. Additional delineation of CVOCs in soil and groundwater guided an Interim Remedial Measure (IRM) consisting of excavation and removal of approximately 182 tons of CVOC-impacted soil at and below the water table from the source area in the northeast corner of the site near the former building's sewer connection. Unsaturated subsurface soil at, and in the vicinity of, the site does not appear to be negatively impacted by site-related COCs. As shown on Figure 3, isolated areas near the periphery of the Soil IRM area and beneath the sidewalk adjacent to the site still contain PCE at concentrations greater than the corresponding 6 NYCRR Part 375 Unrestricted Use SCO; however, these soils are present at depths greater than approximately 10 feet bgs. Additionally, soil containing PCE at concentrations greater than the corresponding 6 NYCRR Part 375 Residential SCO was left in place adjacent to the sidewalk at the east-central bottom of the Soil IRM excavation due to the proximity of the Willow Street sidewalk and roadway. As shown on Figure 4, PCE was present in seven post-IRM groundwater samples collected from overburden wells during the investigation with daughter products TCE, cis-1,2-dichloroethene, and vinyl chloride increasing following IRM source removal. TCE was estimated at a concentration less than the NYSDEC Class GA Standard in the deep overburden well (MW-12) in the source area. CVOCs were not detected in the bedrock wells (MW-10B and MW-11B) installed during the RI. The extent of CVOC groundwater impacts extends northward from the site parallel to Willow Street and is generally bounded to the east and west with a maximum width of approximately 50 feet and maximum known length of approximately 150 feet. Overburden groundwater contamination extends northward from the site beneath the residential building at 9 Willow Street, causing indoor air impacts to this building which have been mitigated by a SSDS. Soil vapor intrusion has also been documented and mitigated in 17 Willow Street, although vapor migration into this structure is more likely via sewer line bedding materials.

2.2 Conceptual Site Model

With the conclusion of RI sampling and IRM activities, the current Conceptual Site Model is as follows:

Previous investigations indicated that the source of the groundwater and soil vapor contamination at, and in the vicinity of, the site, was located in the northeast corner of the site near the former building's sewer connection. Additional contaminant delineation and

sampling efforts during the RI guided an IRM to remove source area soil from this area. Field screening and confirmation soil sampling indicate that the conceptual model of CVOC introduction to the environment via the sewer line bedding was confirmed. The majority of CVOC-impacted soil was removed from the source area during the IRM, although minor areas of CVOC-impacted soil were left in place due to the inability to excavate the material. CVOC-impacted groundwater remains at the site, although concentrations have decreased following IRM source removal. The appearance of CVOC daughter products in groundwater samples suggests that natural degradation is likely occurring at the site. Groundwater flow in the vicinity of the site is generally to the north.

The thickness of overburden and/or fill materials in the vicinity of the site is generally between 20 and 30 feet, although a thicker overburden sequence (greater than 50 feet) is present in the source area. The underlying bedrock is comprised of what is likely the Normanskill Shale formation. Locally, a glacial till unit is present between the competent bedrock and overlying silt and clay. Unsaturated soil, fill materials, and building debris at the site appeared to be un-impacted by site-related contaminants. With source area soil removal completed it is expected that overburden groundwater and soil vapor intrusion impacts will diminish with time.

3. Exposure/Risk Assessment

A qualitative exposure assessment was performed using the data collected during the RI. The qualitative exposure assessment consists of characterizing the exposure setting, identifying potential exposure pathways, and evaluating contaminant fate and transport. An exposure pathway describes the means by which an individual may be exposed to contaminants originating from the site. An exposure pathway has five elements: (1) a contaminant source; (2) contaminant release and transport mechanism; (3) a point of exposure; (4) a route of exposure; and (5) a receptor population.

3.1 Exposure Pathways

3.1.1 Soil

Subsurface soil, generally in the northeastern portion of the site, contains PCE at concentrations greater than the corresponding 6 NYCRR Part 375 Unrestricted Use SCO; however, these soils are present at depths greater than approximately 10 feet bgs. Additionally, soil containing PCE at concentrations greater than the corresponding 6 NYCRR Part 375 Residential SCO was left in place adjacent to the sidewalk and the east-central bottom of the Soil IRM excavation, also at depths greater than approximately

10 feet bgs. These subsurface soils do not presently have a direct exposure point or route, as they are at depth. However, contact with the impacted soils by construction and/or utility workers represents a possible future exposure pathway. Contact with impacted water from leaching of VOCs in soil left in place is expected to be minimal due to asphalt and concrete above.

3.1.2 Groundwater

Overburden groundwater at the site contains CVOCs at concentrations greater than the NYSDEC Class GA Standards. These compounds have been mobilized from the northeast corner of the site, via generally northward groundwater flow and potentially via the Willow Street sewer line, impacting an area with a maximum width of approximately 50 feet and maximum known length of approximately 150 feet. The down-gradient homes do not utilize groundwater as a drinking water source. However, there are no institutional controls to prevent the use of groundwater in the area; therefore, ingestion of contaminated groundwater is a potential exposure pathway.

3.1.3 Soil Vapor

Overburden CVOC groundwater contamination extends northward from the site beneath the residential building at 9 Willow Street, causing indoor air impacts to this building which have been mitigated by a SSDS. Soil vapor intrusion has also been documented and mitigated in 17 Willow Street to the south, although vapor migration into this structure is more likely via sewer line bedding materials. Given the current groundwater CVOC concentrations at and in the vicinity of the site, soil vapor intrusion for any future buildings on the site represents a possible future exposure pathway. Based on sampling of soil vapor points along the sewer line and indoor air and sub-slab vapor sampling at 8 Willow Street, the potential for soil vapor intrusion into buildings further north appears to be minimal.

4. Remedial Action Objectives and Evaluation Criteria

The remedial goal for the Former S&S Cleaners and Dyers Site will be the restoration of the site to pre-release conditions, to the extent feasible, given the existing and anticipated land use. At this time, the end use of the property is unknown, but is expected to be consistent with the residential land use that is typical of the area. Accordingly, the remedial action objectives (RAOs) discussed in this section were developed based upon a similar end-use of the site.

4.1 Remedial Action Objectives

4.1.1 Soil

- Restoration to pre-release conditions, to the extent practical.
- Prevent direct contact with contaminated soil.
- Prevent inhalation of, or exposure to, contaminants volatilizing from soil.
- Prevent migration of contaminants which would result in further groundwater contamination.

4.1.2 Groundwater

- Prevent ingestion of contaminated groundwater.
- Prevent contact with, or inhalation of, contaminants volatilizing from contaminated groundwater.
- Restore the groundwater aquifer to pre-release conditions, to the extent practical.
- Remove the source of groundwater contamination.

4.1.3 Soil Vapor

- Prevent contact with, or inhalation of, contaminants volatilizing from contaminated soil and/or groundwater.
- Remove the source of soil vapor contamination.

Generally, these RAOs may be achieved by minimizing the:

- Magnitude and extent of contamination in the affected media;
- Migratory potential of the contaminants; and
- Potential for human exposure to in-situ contaminated media.

4.2 Evaluation Criteria

In accordance with DER-10 Technical Guidance for Site Investigation and Remediation (DER-10) (NYSDEC, 2010), the remedial measure alternatives developed in this Feasibility Study will be screened based on an evaluation of the following criteria:

- Overall Protection of Human Health and the Environment;
- Compliance with Standards, Criteria, and Guidance (SCGs);
- Long-term Effectiveness and Permanence;
- Reduction of Toxicity, Mobility, and Volume;
- Short-term Effectiveness;
- Implementability;
- Cost;
- Community Acceptance.

4.2.1 Overall Protection of Human Health and the Environment

This criterion serves as a final check to assess whether each alternative meets the requirements that are protective of human health and the environment. The overall assessment of protection is based on a composite of factors assessed under other evaluation criteria; especially long-term effectiveness and performance, short-term effectiveness; and compliance with SCGs. The evaluation focuses on how a specific alternative achieves protection over time and how site risks are reduced. The analysis includes how each source of contamination is to be eliminated, reduce, or controlled for each alternative.

4.2.2 Compliance with SCGs

This evaluation criterion assesses how each alternative complies with 6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives, 6 NYCRR Part 375 Residential Soil Cleanup Objectives, NYSDEC Class GA Standards, and the guidelines set forth in the NYSDOH October 2006 Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York.

4.2.3 Long-Term Effectiveness and Permanence

This evaluation criterion addresses the results of a remedial action in terms of its permanence and quantity/nature of waste or residual remaining at the site after response objectives have been met. The primary focus of this evaluation is the extent and effectiveness of the controls that may be required to manage the waste or residual remaining at the site and operating system necessary for the remedy to remain effective. The factors being evaluated include the permanence of the remedial alternative, magnitude of the remaining risk, adequacy of controls used to manage residual waste, and reliability of controls used to manage residual waste.

4.2.4 Reduction of Toxicity, Mobility, and Volume

This evaluation criterion assesses the remedial alternative's use of the technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous wastes as their principal element. The NYSDEC's policy is to give preference to alternatives that eliminate any significant threats at the site through destruction of toxic contaminants, reduction of the total mass of toxic contaminants, irreversible reduction in the contaminants mobility, or reduction of the total volume of contaminated media. This evaluation includes: the amount of the hazardous materials that would be destroyed or treated, the degree of expected reduction in toxicity, mobility, or volume measured as a percentage, the degree in which the treatment would be irreversible, and the type and quantity of treatment residuals that would remain following treatment.

4.2.5 Short-Term Effectiveness

This evaluation criterion assesses the effects of the alternative during the construction and implementation phase. Alternatives are evaluated with respect to the effects on human health and the environment during implementation of the remedial action. The aspects evaluated include: protection of the community during remedial actions, environmental impacts as a result of remedial actions, time until the remedial response objectives are achieved, and protection of workers during the remedial action.

4.2.6 Implementabilty

This criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation. The evaluation includes: feasibility of construction and operation; the reliability of the technology; the ease of undertaking additional remedial action; monitoring

considerations; activities needed to coordinate with other offices or agencies; availability of adequate off-site treatment, storage, and disposal services; availability of equipment; and the availability of services and materials.

4.2.7 Cost

Cost estimates are prepared and evaluated for each alternative. The cost estimates include capital costs, operation and maintenance (O&M) costs, and future capital costs. A cost sensitivity analysis is performed which includes the following factors: the effective life of the remedial action, the O&M costs, the duration of the cleanup, the volume of contaminated material, other design parameters, and the discount rate. Cost estimates developed at the detailed analysis of alternatives phase of a feasibility study generally have an expected accuracy range of -30 to +50 percent (USEPA, 2000).

4.2.8 Community Acceptance

Following submission of this report and the generation of the Proposed Remedial Action Plan (PRAP) by the NYSDEC, a summary of the proposed remedial action will be sent to the project's contact list, which will include the date, time, and location of the public meeting, and announcement of the 30-day period for submission of written comments from the public. A Responsiveness Summary will be prepared to address public comments on the PRAP. After the submission of Responsiveness Summary, a final remedy will be selected and publicized. If the final remedy differs significantly from the proposed remedy, public notices will include descriptions of the differences and the reason for the changes.

5. Remedial Alternatives Analysis

Based upon the site characteristics and in consultation with the NYSDEC, the following remedial alternatives were considered to be potentially applicable to the soil and groundwater contamination at the site:

Alternative 1: No Further Action

Alternative 2: Institutional Controls + Long-Term Monitoring

Alternative 3: Excavation to Residential Use SCOs + Long-Term Monitoring

Alternative 4: Excavation to Unrestricted Use SCOs + Long-Term Monitoring

This section presents an analysis of the potential remedial alternatives for remediation of the Former S&S Cleaners and Dyers Site in accordance with the criteria described in Section 4.2.

5.1 Remedial Alternatives Evaluation

5.1.1 Alternative 1: No Further Action

5.1.1.1 Description

The no further action alternative, by definition, involves no further institutional controls, environmental monitoring, or remedial action, and therefore, includes no technological barriers. In accordance with DER-10, this alternative serves as a baseline, defining the minimum steps that would be taken at the site in the absence of any type of action directed at the existing contamination.

5.1.1.2 Overall Protection of Human Health and the Environment

The No Further Action alternative may not be protective of public health and the environment. Although the majority of the site contaminants are present at depth and soil vapor intrusion has been mitigated at adjacent properties, soil, groundwater, and soil vapor impacted by CVOCs would be left at the site and the immediate off-site vicinity, and could provide a potential source for soil vapor intrusion into future buildings at the site. The nearest receptor is supplied with public drinking water; however, there is no restriction on the use of groundwater in the area. Therefore, potential future exposure to contaminated soil and groundwater would be through ingestion of soil or groundwater and/or to construction/excavation activities at the site or adjacent properties.

5.1.1.3 Compliance with SCGs

The No Further Action alternative may meet the SCGs over the long term as the primary source of groundwater contamination was removed during the IRM, with only low-level residual soil contamination remaining, and natural attenuation of groundwater contaminants over time is expected.

5.1.1.4 Long-Term Effectiveness and Permanence

The No Further Action alternative may meet the SCGs over the long term as the primary source of groundwater contamination was removed during the IRM, with only low-level residual soil contamination remaining, and natural attenuation of groundwater contaminants over time is expected.

5.1.1.5 Reduction of Toxicity, Mobility, and Volume with Treatment

The No Further Action alternative would not reduce the toxicity, mobility, or volume of the contaminants.

5.1.1.6 Short-Term Effectiveness

Community Protection

The No Further Action alternative may be protective of the community during the short-term because the contaminants are present at depth and known soil vapor intrusion impacts have been mitigated. However, the potential for ingestion of soil or groundwater and soil vapor intrusion into future onsite buildings must be considered.

Worker Protection

Not applicable as there would be no site work conducted.

Environmental Impacts

Implementation of this alternative may reduce environmental impacts over the long term as the primary source of groundwater contamination was removed during the IRM, with only low-level residual soil contamination remaining, and natural attenuation of groundwater contaminants over time is expected.

Time Required to Implement

The No Further Action alternative would not require any time to implement.

5.1.1.7 Implementability

The No Further Action alternative can be easily implemented.

5.1.1.8 Cost

The No Further Action Alternative would not require any additional costs to implement.

5.1.2 **Alternative 2: Institutional Controls and Long-Term Monitoring**

5.1.2.1 Description

Institutional controls are not technologies, but rather, are legal actions that reduce or prevent exposure of the human population to the contaminated soil and/or groundwater (e.g., deed restrictions, fencing/signs, health advisories). Institutional controls can be used as a stand-alone alternative or can be used in conjunction with other technologies to achieve RAOs.

Alternative 2 would include all of the elements of the No Further Action alternative, plus the following items:

- The implementation of restrictions on the access to on-site soil and the use of groundwater at the site and in the immediate vicinity;
- The requirement for the installation of sub-slab depressurization systems (SSDSs) in any future on-site buildings;
- Groundwater use restrictions which would include deed restrictions to prevent future use of the groundwater and control activities at the site, including notification procedures for future owners and/or developers/workers of the restricted use of the property, and/or a moratorium on groundwater use within the impacted area enacted by the City of Cohoes.

This alternative would not actively reduce contaminant concentrations; however, by prohibiting the use of groundwater as a drinking water source, this alternative would be effective in preventing ingestion of groundwater that contains contaminants. Because contamination would remain both on- and off-site, a Site Management Plan (SMP) would be required that would provide specific requirements for site development and use including annual site inspections. A long-term monitoring program will be implemented at the site to evaluate the extent of contaminant migration and attenuation. Annual groundwater monitoring of the existing groundwater monitoring well network would be part of the long-term monitoring program.

5.1.2.2 Overall Protection of Human Health and the Environment

Alternative 2 may be protective of public health and the environment. Although the contaminants are present at depth, groundwater impacted by CVOCs is known to exist beneath the adjacent residence to the north of the site, although soil vapor intrusion has been mitigated with a SSDS. However, continued monitoring would provide a means to evaluate contaminant concentrations over time and ensure that mitigation remains effective. Prohibition of the use of groundwater would prevent the future exposure to groundwater via ingestion, therefore, potential future exposure to contaminated groundwater would be to construction/excavation activities at the site or utility rights-of-way. This exposure pathway could be mitigated through the use of appropriate health and safety protocols during any such work. Requirements for SSDSs for future on-site buildings would prevent the future exposure to soil vapor via inhalation.

5.1.2.3 Compliance with SCGs

Alternative 2 may meet the SCGs over the long term as the primary source of groundwater contamination was removed during the IRM, with only low-level residual soil contamination remaining, and natural attenuation of groundwater contaminants over time is expected.

5.1.2.4 Long-Term Effectiveness and Permanence

Alternative 2 may meet the SCGs over the long term as the primary source of groundwater contamination was removed during the IRM, with only low-level residual soil contamination remaining, and natural attenuation of groundwater contaminants over time is expected.

5.1.2.5 Reduction of Toxicity, Mobility, and Volume with Treatment

Alternative 2 would not reduce the toxicity or mobility of the contaminants. Long-term monitoring would document any potential reductions in contaminant volume over time.

5.1.2.6 Short-Term Effectiveness

Community Protection

This alternative would be protective of the community during the short-term because the contaminants are present at depth and known soil vapor intrusion impacts have been

mitigated. However, the potential for ingestion of soil or groundwater and soil vapor intrusion into future onsite buildings must be considered.

Worker Protection

Implementation of this alternative would be undertaken using standard procedures for worker protection including the establishment of a health and safety plan which would outline the appropriate protective measures which should be undertaken during any subsurface activities in the affected area.

Environmental Impacts

Implementation of this alternative may reduce environmental impacts over the long term as the primary source of groundwater contamination was removed during the IRM, with only low-level residual soil contamination remaining, and natural attenuation of groundwater contaminants over time is expected.

Time Required to Implement

This alternative would likely require less than one year to implement.

5.1.2.7 Implementability

Alternative 2 could be easily implemented using readily available technologies.

5.1.2.8 Cost

The capital, O&M and present worth costs for Alternative 2 are presented in Table 1. A 27 year monitoring period was chosen for this alternative.

- **Capital Costs**: The probable capital cost to construct and implement Alternative 2 is approximately $60,000.
- **O&M Costs**: The probable annual operations, monitoring, and maintenance cost for the first two years for this alternative is $12,500. The probable operations, monitoring, and maintenance cost incurred every five years for this alternative is $8,500.
- **Present Worth Cost**: Over a 27 year monitoring period, the probable net present worth for this alternative is approximately $121,000. This was calculated using a 5% annual discount rate.

5.1.3 Alternative 3: Excavation to Residential Use SCOs and Long-Term Monitoring

5.1.3.1 Description

Alternative 3 would include all of the elements of the Institutional Controls alternative, plus the following items, which are depicted on Figure 5:

- Excavation of on-site soil within the remediation area to a depth of 15 feet bgs based on prior bottom samples with CVOCs greater than SCGs or the water table, whichever is shallower. The remediation area is generally based on IRM bottom sample CS-B3 which contained PCE at a concentration greater than the Residential Use SCO, with excavation to points approximately half the distance from the nearest soil sample location with CVOCs less than SCGs;
- On-site staging of upper 10 feet of soil for reuse as backfill;
- Off-site disposal of excavated soil as F-listed hazardous waste in accordance with applicable federal, state, and local regulations;
- Backfilling of excavation with clean off-site fill and staged clean on-site soil following confirmation sampling that indicates that impacted soil has been removed; and
- Post-excavation groundwater monitoring.

Based on conditions encountered during the IRM, this alternative assumes that sloping and/or benching of excavation side walls will not be necessary. Additionally, this alternative assumes that the excavated soil would be classified as an F-listed hazardous waste.

5.1.3.2 Overall Protection of Human Health and the Environment

Alternative 3 would likely be protective of public health and the environment in that this alternative removes residual soil contamination remaining at concentrations greater than Residential Use SCOs after the IRM, but does not directly address the groundwater contamination or soil vapor intrusion. However, with the majority of source material removed, continued monitoring would provide a means to evaluate natural attenuation of groundwater contaminants over time and ensure that mitigation remains effective. Prohibition of the use of groundwater would prevent the future exposure to groundwater via ingestion, therefore, potential future exposure to contaminated groundwater would be

to construction/excavation activities at the site or utility rights-of-way. This exposure pathway could be mitigated through the use of appropriate health and safety protocols during any such work. Requirements for SSDSs for future on-site buildings would prevent the future exposure to soil vapor via inhalation.

5.1.3.3 Compliance with SCGs

Alternative 3 should meet soil SCGs and may meet groundwater SCGs over the long term by removing most remaining sources of groundwater contamination and allowing for natural attenuation of remaining groundwater contaminants.

5.1.3.4 Long-Term Effectiveness and Permanence

Alternative 3 may be effective in the long-term through removal of the remaining sources of groundwater contamination and allowing for natural attenuation of remaining groundwater contaminants.

5.1.3.5 Reduction of Toxicity, Mobility, and Volume with Treatment

Alternative 3 would not reduce the toxicity of the contaminants, but would reduce their mobility and contaminant mass in the soil.

5.1.3.6 Short-Term Effectiveness

Community Protection

This alternative would be protective of the community during the short-term because remaining contaminants above Residential Use SCOs in soil would be removed and known soil vapor intrusion impacts have been mitigated. However, the potential for ingestion of groundwater and soil vapor intrusion into future onsite buildings must be considered.

Worker Protection

Implementation of this alternative would be undertaken using standard procedures for worker protection including the establishment of a health and safety plan which would outline the appropriate protective measures which should be undertaken during any subsurface activities in the affected area.

Environmental Impacts

Implementation of this alternative would reduce environmental impacts over time through the removal of sources of groundwater contamination and continued natural attenuation of remaining groundwater contaminants.

Time Required to Implement

The time required to implement this alternative is approximately one year.

5.1.3.7 Implementability

Alternative 3 could be implemented using readily available technologies.

5.1.3.8 Cost

The capital, O&M, and Present worth costs for Alternative 3 are presented in Table 2. A 30 year monitoring period was chosen for the analysis.

- **Capital Costs:** The probable capital cost to construct and implement this alternative is approximately $115,000.
- **O&M Costs:** The probable annual operations, monitoring, and maintenance cost for the first two years for this alternative is $12,500. The probable pent-annual operations, monitoring, and maintenance cost for this alternative is $8,500.
- **Present Worth Cost:** Over a 30 year monitoring period, the probable net present worth for this alternative is approximately $176,000.

5.1.4 Alternative 4: Excavation to Unrestricted Use SCOs and Long-Term Monitoring

5.1.4.1 Description

Alternative 4 would include all of the elements of the Institutional Controls alternative, plus the following items, which are depicted on Figure 6:

- Excavation of on-site soil within the remediation area to depths between 10 and 15 feet bgs based on prior bottom samples with CVOCs greater than SCGs or the water table, whichever is shallower. The remediation area is generally based on expansion of the eastern and southern portions of the IRM area to points approximately half the distance from the nearest soil sample location with CVOCs less than SCGs;
- On-site staging of upper five feet of soil for reuse as backfill;
- Off-site disposal of excavated soil as F-listed hazardous waste in accordance with applicable federal, state, and local regulations;

- Backfilling of excavation with clean off-site fill and staged clean on-site soil following confirmation sampling that indicates that impacted soil has been removed;
- Replacement of groundwater monitoring well within excavation area; and
- Post-excavation groundwater monitoring.

This alternative assumes that slide rail systems or similar protection methods would be required to support the excavation and protect the adjacent roadway and sewer. Additionally, this alternative assumes that the excavated soil would be classified as an F-Listed hazardous waste. Due to the proximity of the adjacent roadway and sewer, it is possible that not all of the contaminated soil would be removed.

5.1.4.2 Overall Protection of Human Health and the Environment

Alternative 4 would likely be protective of public health and the environment in that this alternative removes residual soil contamination remaining after the IRM, but does not directly address the groundwater contamination or soil vapor intrusion. However, with the majority of source material removed, continued monitoring would provide a means to evaluate natural attenuation of groundwater contaminants over time and ensure that mitigation remains effective. Prohibition of the use of groundwater would prevent the future exposure to groundwater via ingestion, therefore, potential future exposure to contaminated groundwater would be to construction/excavation activities at the site or utility rights-of-way. This exposure pathway could be mitigated through the use of appropriate health and safety protocols during any such work. Requirements for SSDSs for future on-site buildings would prevent the future exposure to soil vapor via inhalation.

5.1.4.3 Compliance with SCGs

Alternative 4 should meet soil SCGs and may meet groundwater SCGs over the long term by removing most remaining sources of groundwater contamination and allowing for natural attenuation of remaining groundwater contaminants.

5.1.4.4 Long-Term Effectiveness and Permanence

Alternative 4 may be effective in the long-term through removal of the remaining sources of groundwater contamination and allowing for natural attenuation of remaining groundwater contaminants.

5.1.4.5 Reduction of Toxicity, Mobility, and Volume with Treatment

Alternative 4 would not reduce the toxicity of the contaminants, but would reduce their mobility and contaminant mass in the soil.

5.1.4.6 Short-Term Effectiveness

Community Protection

This alternative would be protective of the community during the short-term because remaining contaminants in soil would be removed and known soil vapor intrusion impacts have been mitigated. However, the potential for ingestion of groundwater and soil vapor intrusion into future onsite buildings must be considered.

Worker Protection

Implementation of this alternative would be undertaken using standard procedures for worker protection including the establishment of a health and safety plan which would outline the appropriate protective measures which should be undertaken during any subsurface activities in the affected area.

Environmental Impacts

Implementation of this alternative would over time reduce environmental impacts through the removal of sources of groundwater contamination and continued natural attenuation of remaining groundwater contaminants.

Time Required to Implement

The time required to implement this alternative is approximately one year.

5.1.4.7 Implementability

Alternative 4 could be implemented using readily available technologies.

5.1.4.8 Cost

The capital, O&M, and Present worth costs for Alternative 4 are presented in Table 3. A 27year monitoring period was chosen for the analysis.

- **Capital Costs:** The probable capital cost to construct and implement this alternative is approximately $462,720.

- **O&M Costs:** The probable annual operations, monitoring, and maintenance cost for the first two years for this alternative is $12,500. The probable pent-annual operations, monitoring, and maintenance cost for this alternative is $8,500.

- **Present Worth Cost:** Over a 27 year monitoring period, the probable net present worth for this alternative is approximately $524,000.

5.2 Comparative Analysis

5.2.1 Overview

The RAOs for the site are concerned with the prevention of contact with contaminated soil, groundwater, and soil vapor and the remediation of the affected media to pre-release conditions or the Unrestricted Use SCOs and NYSDEC Class GA Standards for soil and groundwater, respectively, to the extent practicable. The alternatives presented for the site provide varying levels of remedial actions.

Alternative 1, the No Further Action alternative, defines the minimum steps to be taken for remediation of the site. This alternative alone, may meet the RAOs over the long-term. Alternative 2, the Institutional Controls plus Long-Term Monitoring alternative, is similar to the No Further Action alternative, but would include deed restrictions, activity/use limitations for groundwater, groundwater monitoring to document plume distribution over time, and indoor air sampling and SSDS monitoring to ensure effective mitigation of vapor intrusion. Alternative 3, Excavation to Residential Use SCOs, includes the components of the No Further Action and Institutional Controls plus Long-Term Monitoring alternatives. Alternative 3, Excavation to Residential Use SCOs, would likely meet some of the RAOs over the short-term, but would not directly address the groundwater contamination. As with Alternative 2, groundwater would be addressed by monitored natural attenuation. Alternative 4, Excavation to Unrestricted Use SCOs, includes the components of the No Further Action and Institutional Controls plus Long-Term Monitoring alternatives. Alternative 4, Excavation to Unrestricted Use SCOs, would likely meet some of the RAOs over the short-term, but would not directly address the groundwater contamination. As with Alternative 2, groundwater would be addressed by monitored natural attenuation. Alternative 4, Excavation to Unrestricted Use SCOs, is considered to be the alternative most effective for returning the site to pre-release conditions.

5.2.2 Overall Protection of Public Health

Alternative 1 may not be protective of human health and the environment as the potential for soil and groundwater ingestion and soil vapor intrusion exists. Additional routes of exposure include construction and utility workers. However, this exposure can be controlled through the implementation of health and safety protocols for work in the area.

Alternative 2 provides more protection than Alternative 1 in that property and groundwater use would be restricted and the exposure pathways would be monitored over time. Residual off-site groundwater contamination would be addressed over time by monitored natural attenuation.

Alternative 3 provides more protection than Alternative 2 in that direct contact with on-site source material would be nearly eliminated through excavation and waste removal and on-going sources to groundwater contamination would be removed. Residual off-site groundwater contamination would be addressed over time by monitored natural attenuation.

Alternative 4 provides more protection than Alternative 3 in that direct contact with on-site source material would be eliminated through excavation to Unrestricted Use SCOs and waste removal and on-going sources to groundwater contamination would be removed. Residual off-site groundwater contamination would be addressed over time by monitored natural attenuation.

5.2.3 Compliance with SCGs

Alternatives 1 and 2 may meet the SCGs with time. Alternatives 3 and 4 are capable of meeting SCGs in less time.

5.2.4 Long-Term Effectiveness and Permanence

Alternatives 1 and 2 may be effective in the long-term. Alternatives 3 and 4 would be effective in the long-term.

5.2.5 Reduction of Toxicity, Mobility, and Volume with Treatment

Alternatives 1 and 2 would not reduce the toxicity or mobility of the contaminants, and may reduce the contaminant volume over time. Alternatives 3 and 4 would reduce the mobility and volume of the contaminants, but would not reduce their toxicity.

5.2.6 Short-Term Effectiveness

The ranking of each of the alternatives, in order of short-term effectiveness (from greatest to least) is shown below.

1. Alternative 4 – Excavation to Unrestricted Use SCOs + Long-Term Monitoring

2. Alternative 3 – Excavation to Residential Use SCOs + Long-Term Monitoring

3. Alternatives 1 and 2 – No Further Action, Institutional Controls plus Long-Term Monitoring.

5.2.7 Implementability

Each of the alternatives could be readily implemented using regionally available resources.

5.2.8 Cost

A comparison of the costs for each alternative is provided in Table 4. The ranking of each of the alternatives, in order of the cost (from lowest to highest) required to meet the RAOs is shown below.

1. Alternative 1 – No Further Action
2. Alternative 2 – Institutional Controls plus Long-Term Monitoring
3. Alternative 3 – Excavation to Residential Use SCOs + Long-Term Monitoring
4. Alternative 4 – Excavation to Unrestricted Use SCOs + Long-Term Monitoring

6. References

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Figures

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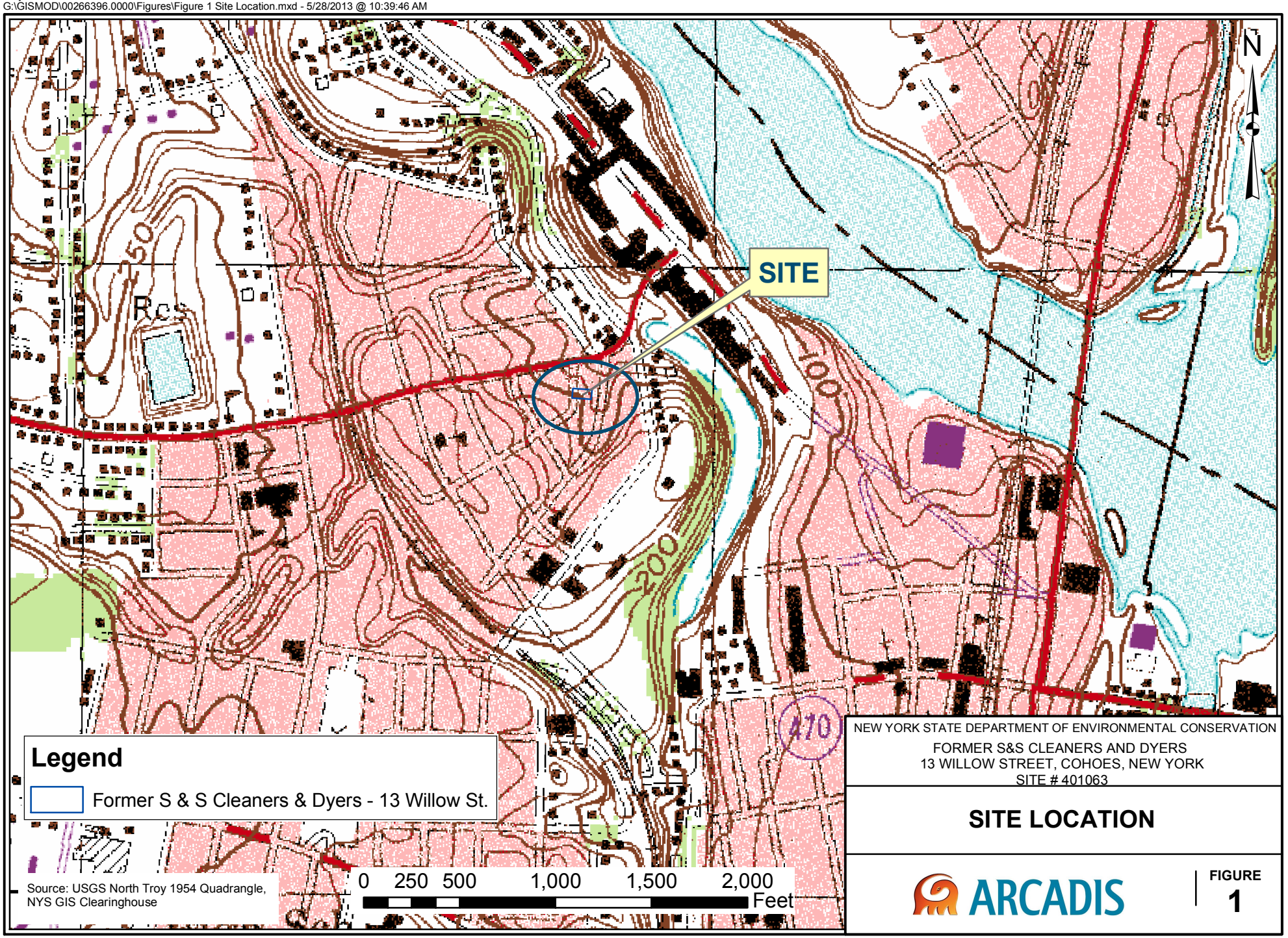

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

FORMER S&S CLEANERS AND DYERS
13 WILLOW STREET, COHOES, NEW YORK
SITE # 401063

SITE LOCATION

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FIGURE
1

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FORMER S&S CLEANERS AND DYERS
13 WILLOW STREET, COHOES, NEW YORK
SITE # 401063

AERIAL PHOTOGRAPH

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FIGURE
2

CS-N1 (9'-10')	5/15/13
Compound	
PCE	0.97
cis-1,2-DCE	0.062 J

CS-B2 (14')	5/20/13
Compound	
PCE	5.2

CS-N2 (9'-10')	5/15/13
Compound	
PCE	1.3

CS-N3 (12')	5/20/13
Compound	
PCE	2.7

CS-W1 (9'-10')	5/15/13
Compound	
CVOCs	ND

CS-E1 (13')	5/20/13
Compound	
PCE	39

CS-B1 (10')	5/15/13
Compound	
PCE	0.0053 J

CS-W2 (9'-10')	5/15/13
Compound	
PCE	0.09
cis-1,2-DCE	0.056
Vinyl Chloride	0.011 NJ

CS-B3 (10')	5/20/13
Compound	
PCE	67

CS-S3 (13')	5/20/13
Compound	
PCE	2.7

CS-S1 (9'-10')	5/15/13
Compound	
PCE	4.1

CS-S2 (9'-10')	5/15/13
Compound	
PCE	0.45

SB-13	12/19/12	
	Depth (ft.)	
Compound	9'-10'	10'-11'
PCE	2.5 DJ	2.8 DJ
TCE	0.046	0.073 J
cis-1,2-DCE	0.0087	0.0039 J
trans-1,2-DCE	ND	ND
Vinyl Chloride	ND	ND

MW-9, SB-19, SB-16, SB-10, SB-18, SIDEWALK, STREET, SV-8, MW-6, MW-6R, CS-N1, CS-N2, CS-N3, CS-W1, SV-5, SB-11, CS-B3, MW-7R, MW-7, CS-B2, CS-E1, MW-12, SB-6, SB-5, CS-B1, SB-12, SB-14, CS-S3, CS-W2, CS-S2, SB-15, CS-S1, SB-4, MW-2, SB-13, SB-9, SV-9, SV-6, MW-3, SB-7, SV-7

N

0 2.5 5 10 15 20 Feet

Legend

- Confirmation Samples
- Groundwater Monitoring Wells
- Former Groundwater Monitoring Wells
- Soil Borings
- Soil Vapor Points
- IRM Excavation Area - 14 ft. bgs
- IRM Excavation Area - 10 ft. bgs
- Gas
- Sewer
- Sewer Manhole
- Water
- Former S&S Cleaners

NOTE: Soil CVOC concentrations for detected compounds given in mg/kg.
ND = Not detected.
J = Estimated concentration.

= Concentration exceeds Residential Soil Cleanup Objective.

= Concentration exceeds Unrestricted Use Soil Cleanup Objective.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

FORMER S&S CLEANERS & DYERS SITE
13 WILLOW STREET, COHOES, NEW YORK
NYSDEC SITE # 401063

REMAINING SOIL SCG EXCEEDANCES CHLORINATED VOLATILE ORGANIC COMPOUNDS

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FIGURE 3

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MW-10B	11/11/13
Compound	
CVOCs	ND

MW-11B	11/13/13
Compound	
CVOCs	ND

MW-8	11/13/13
Compound	
PCE	ND
TCE	ND
cis-1,2-DCE	1.2
trans-1,2-DCE	ND

MW-9	11/12/13
Compound	
PCE	5.4
TCE	6.3

MW-5	11/12/13
CVOCs	ND

MW-6R	11/11/13
Compound	
PCE	ND
TCE	1.2
cis-1,2-DCE	76
Vinyl Chloride	18

MW-7R	11/11/13
Compound	
PCE	ND
TCE	1.1
1,1-DCE	ND
cis-1,2-DCE	620 D
trans-1,2-DCE	1.9
Vinyl Chloride	110
Chlorobenzene	ND
1,2-Dichloropropane	ND

MW-12	11/11/13
Compound	
TCE	ND
cis-1,2-DCE	1.3

MW-1	11/11/13
Compound	
PCE	1.4

MW-4	11/11/13
CVOCs	ND

MW-3	11/11/13
Compound	
PCE	7.1

MW-10B
MW-11B
MW-8
SV-15
MW-9
SB-17
SB-19
SB-16
SB-18
SB-10
9W-BA
9 Willow St.
9W-SS
SV-14
MW-5
SV-2
SV-1
MW-6R
SB-11
MW-7R
MW-12
SV-5
13W-AA, 13W-AA2
MW-1
SB-1
SB-5
SB-12
SB-15
SB-6
SB-14
SB-13
SB-8
SB-4
SB-9
SV-9
SB-2
SB-3
MW-3
SV-6
SB-7
SV-7
SV-4
MW-4
17W-BA
17W-IA
17 Willow St.
SV-10
SV-3
19W-BA
19W-SS
19/21 Willow St.
21W-BA
SV-13
SV-12

NOTE: Groundwater CVOC concentrations for detected compounds given in µg/L.
ND = Not detected.
J = Estimated concentration.

= Concentration exceeds corresponding NYSDEC Class GA Standard.

Legend

- Soil Borings
- Soil Vapor Points
- Groundwater Monitoring Wells
- Former Groundwater Monitoring Wells
- VI Evaluation
- Indoor Air Samples
- Outdoor Air Samples
- Sub-Slab Vapor Samples
- IRM Excavation Area - 14 ft bgs
- IRM Excavation Area - 10 ft bgs
- Gas
- Sewer
- Sewer Manhole
- Water
- Target Property
- City Owned Property

N

0 10 20 40 60 80 Feet

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
FORMER S&S CLEANERS & DYERS SITE
13 WILLOW STREET, COHOES, NEW YORK
NYSDEC SITE # 401063

POST-IRM GROUNDWATER SAMPLING RESULTS CHLORINATED VOLATILE ORGANIC COMPOUNDS

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Infrastructure · Water · Environment · Buildings

FIGURE 4

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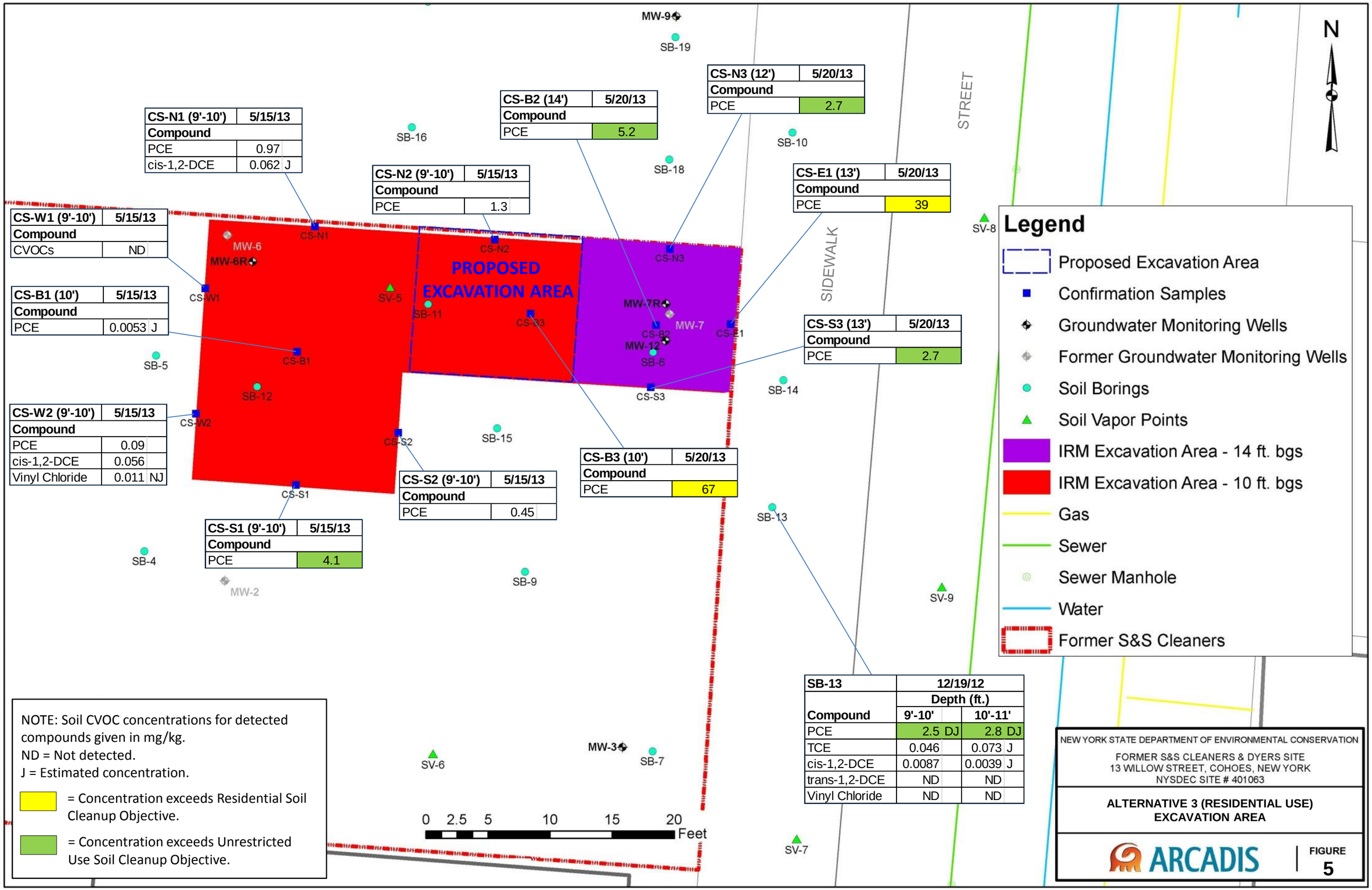
MW-9
SB-19
CS-N3 (12') 5/20/13
Compound
PCE 2.7
CS-B2 (14') 5/20/13
Compound
PCE 5.2
CS-N1 (9'-10') 5/15/13
Compound
PCE 0.97
cis-1,2-DCE 0.062 J
SB-16
SB-10
SB-18
CS-N2 (9'-10') 5/15/13
Compound
PCE 1.3
CS-E1 (13') 5/20/13
Compound
PCE 39
STREET
SIDEWALK
SV-8
CS-W1 (9'-10') 5/15/13
Compound
CVOCs ND
MW-6
MW-6R
CS-N1
CS-N2
CS-N3
PROPOSED
EXCAVATION AREA
CS-W1
SV-5
SB-11
MW-7R
MW-7
CS-B3
CS-B2
CS-E1
MW-12
SB-6
CS-B1 (10') 5/15/13
Compound
PCE 0.0053 J
SB-5
CS-B1
CS-S3 (13') 5/20/13
Compound
PCE 2.7
SB-12
CS-S3
SB-14
CS-W2 (9'-10') 5/15/13
Compound
PCE 0.09
cis-1,2-DCE 0.056
Vinyl Chloride 0.011 NJ
CS-W2
CS-S2
SB-15
CS-B3 (10') 5/20/13
Compound
PCE 67
CS-S2 (9'-10') 5/15/13
Compound
PCE 0.45
CS-S1
CS-S1 (9'-10') 5/15/13
Compound
PCE 4.1
SB-13
SB-4
SB-9
MW-2
SV-9
SV-6
MW-3
SB-7
SV-7
0 2.5 5 10 15 20
Feet
N
Legend
Proposed Excavation Area
Confirmation Samples
Groundwater Monitoring Wells
Former Groundwater Monitoring Wells
Soil Borings
Soil Vapor Points
IRM Excavation Area - 14 ft. bgs
IRM Excavation Area - 10 ft. bgs
Gas
Sewer
Sewer Manhole
Water
Former S&S Cleaners
SB-13 12/19/12
Depth (ft.)
Compound 9'-10' 10'-11'
PCE 2.5 DJ 2.8 DJ
TCE 0.046 0.073 J
cis-1,2-DCE 0.0087 0.0039 J
trans-1,2-DCE ND ND
Vinyl Chloride ND ND
NOTE: Soil CVOC concentrations for detected compounds given in mg/kg.
ND = Not detected.
J = Estimated concentration.
= Concentration exceeds Residential Soil Cleanup Objective.
= Concentration exceeds Unrestricted Use Soil Cleanup Objective.
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
FORMER S&S CLEANERS & DYERS SITE
13 WILLOW STREET, COHOES, NEW YORK
NYSDEC SITE # 401063
ALTERNATIVE 3 (RESIDENTIAL USE)
EXCAVATION AREA
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FIGURE
5
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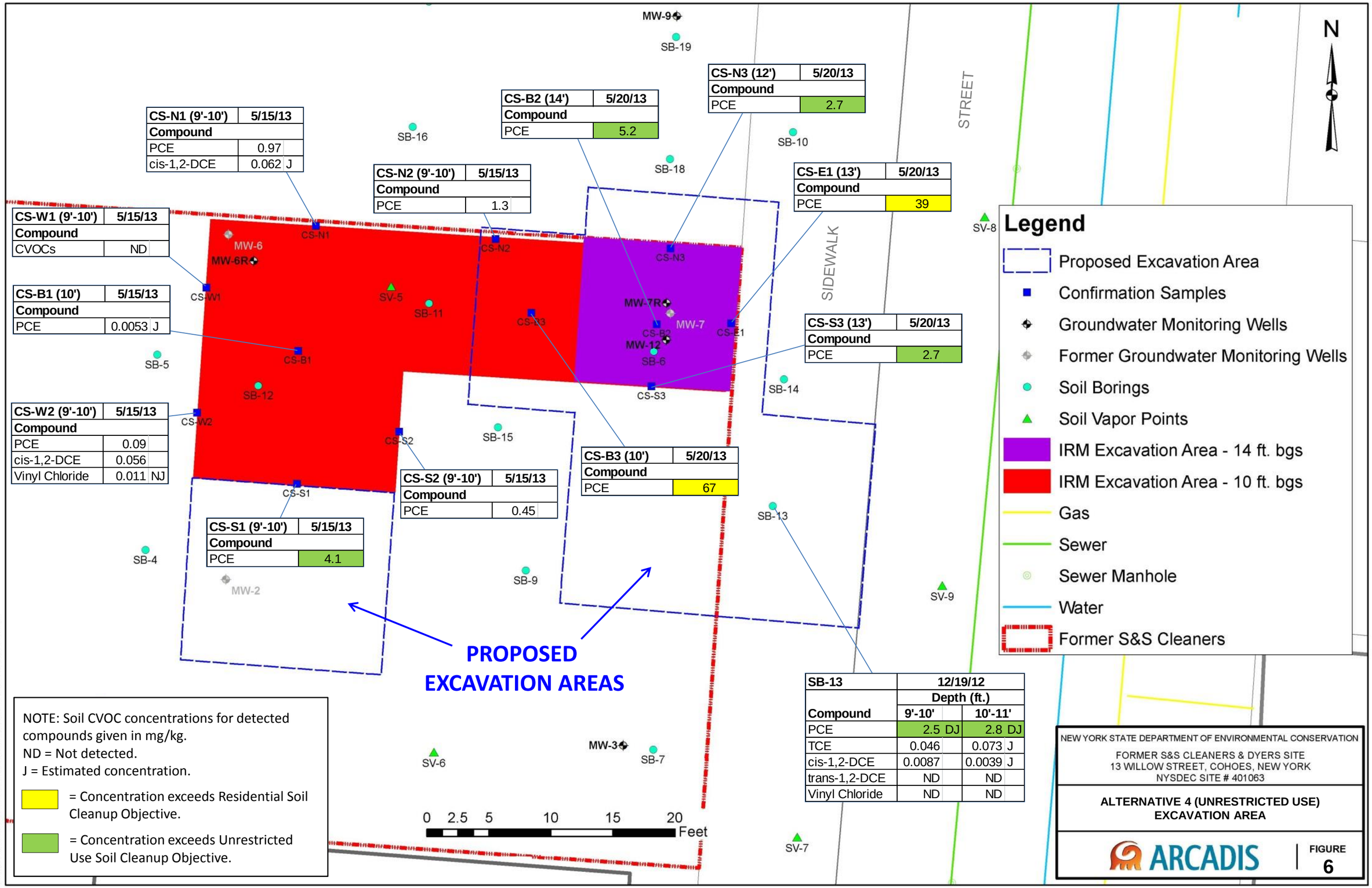
MW-9
SB-19
CS-N3 (12') 5/20/13
Compound
PCE 2.7
CS-B2 (14') 5/20/13
Compound
PCE 5.2
CS-N1 (9'-10') 5/15/13
Compound
PCE 0.97
cis-1,2-DCE 0.062 J
SB-16
SB-10
SB-18
CS-N2 (9'-10') 5/15/13
Compound
PCE 1.3
CS-E1 (13') 5/20/13
Compound
PCE 39
STREET
SIDEWALK
SV-8
CS-W1 (9'-10') 5/15/13
Compound
CVOCs ND
MW-6
MW-6R
CS-N1
CS-N2
CS-N3
CS-W1
SV-5
SB-11
MW-7R
MW-7
CS-B3
CS-B2
CS-E1
MW-12
SB-6
CS-B1 (10') 5/15/13
Compound
PCE 0.0053 J
SB-5
CS-B1
CS-S3 (13') 5/20/13
Compound
PCE 2.7
SB-12
CS-S3
SB-14
CS-W2 (9'-10') 5/15/13
Compound
PCE 0.09
cis-1,2-DCE 0.056
Vinyl Chloride 0.011 NJ
CS-W2
CS-S2
SB-15
CS-B3 (10') 5/20/13
Compound
PCE 67
CS-S2 (9'-10') 5/15/13
Compound
PCE 0.45
CS-S1
CS-S1 (9'-10') 5/15/13
Compound
PCE 4.1
SB-13
SB-4
SB-9
MW-2
SV-9
PROPOSED
EXCAVATION AREAS
SB-13 12/19/12
Depth (ft.)
Compound 9'-10' 10'-11'
PCE 2.5 DJ 2.8 DJ
TCE 0.046 0.073 J
cis-1,2-DCE 0.0087 0.0039 J
trans-1,2-DCE ND ND
Vinyl Chloride ND ND
MW-3
SV-6
SB-7
SV-7
0 2.5 5 10 15 20 Feet
N
Legend
Proposed Excavation Area
Confirmation Samples
Groundwater Monitoring Wells
Former Groundwater Monitoring Wells
Soil Borings
Soil Vapor Points
IRM Excavation Area - 14 ft. bgs
IRM Excavation Area - 10 ft. bgs
Gas
Sewer
Sewer Manhole
Water
Former S&S Cleaners
NOTE: Soil CVOC concentrations for detected compounds given in mg/kg.
ND = Not detected.
J = Estimated concentration.
= Concentration exceeds Residential Soil Cleanup Objective.
= Concentration exceeds Unrestricted Use Soil Cleanup Objective.
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
FORMER S&S CLEANERS & DYERS SITE
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NYSDEC SITE # 401063
ALTERNATIVE 4 (UNRESTRICTED USE)
EXCAVATION AREA
ARCADIS
FIGURE
6
Project 00286396.0000
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Tables

TABLE 1
Remedial Alternative Cost Summary

Alternative 2
INSTITUTIONAL CONTROLS + LONG-TERM MONITORING

OPINION OF PROBABLE COST

Site: Former S&S Cleaners and Dyers Site
Location: Cohoes, New York
Phase: Alternatives Analysis (-30% to +50%)
Base Year: 2014
Date: May 2014

Description: Alternative 2 consists of institutional controls and long-term monitoring of the existing well network and SSDSs. Capital costs are incurred in Year 1. O&M costs are incurred in Years 1-10.

CAPITAL COSTS:

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES:
Institutional Controls Legal/Administrative Costs	1	lump sum	$25,000	$25,000	
Site Management Plan	1	lump sum	$15,000	$15,000	
SUBTOTAL				$40,000	
Contingency	20%			$8,000	
SUBTOTAL				$48,000	
Project Management	10%			$4,800	
Remedial Oversight/Reporting	15%			$7,200	
TOTAL CAPITAL COST				**$60,000**	

OPERATION, MAINTENANCE, AND MONITORING (OM&M) COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES:
Site Monitoring - First 2 Years					
Groundwater Sampling & Analysis	1	YR	$7,500	$7,500	Annual sampling - 11 wells
Data Evaluation and Reporting	1	YR	$5,000	$5,000	
SUBTOTAL				$12,500	
TOTAL ANNUAL O&M COST - FIRST 2 YEARS				**$12,500**	
Site Monitoring - Years 7 - 27					
Groundwater Sampling & Analysis	1	YR	$3,500	$3,500	Pent-annual sampling - 5 wells
Data Evaluation and Reporting	1	YR	$5,000	$5,000	
SUBTOTAL				$8,500	
TOTAL PENT-ANNUAL O&M COST - YEARS 7 - 27				**$8,500**	

PRESENT VALUE ANALYSIS:

COST TYPE	YEAR	TOTAL COST	TOTAL COST PER YEAR	DISCOUNT FACTOR (5%)	PRESENT VALUE	NOTES:
Capital	1	$72,500	$72,500	1.00	$72,500	Capital + 1st Year O&M Costs
Annual OM&M	2	$12,500	$12,500	0.95	$11,905	
Annual OM&M	7-27	$42,500	$8,500	4.33	$36,801	
		$127,500			$121,205	
TOTAL PRESENT VALUE OF ALTERNATIVE					**$121,000**	

TABLE 2
Remedial Alternative Cost Summary

Alternative 3
EXCAVATION TO RESIDENTIAL USE SCOs + LONG-TERM MONITORING

OPINION OF PROBABLE COST

Site: Former S&S Cleaners and Dyers Site
Location: Cohoes, New York
Phase: Alternatives Analysis (-30% to +50%)
Base Year: 2014
Date: May 2014

Description: Alternative 3 consists of Alternative 2 (Institutional Controls + LTM) plus soil excavation and backfill of residual soil contamination areas and long-term monitoring. Capital costs are incurred in Year 1. O&M costs occur in Years 1-27

CAPITAL COSTS:

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES:
Institutional Controls Legal/Administrative Costs	1	lump sum	$25,000	$25,000	
Site Management Plan	1	lump sum	$15,000	$15,000	
Excavation of F-Listed Hazardous Soil					
Mobilization, Site Prep, & Staging	1	lump sum	$10,000	$10,000	
Excavation, Stockpiling, and/or Loading of Soil and/or Debris	87	CY	$25	$2,175	Assumes max. depth = 15'
Confirmation Sampling	5	EA	$150	$750	
Transportation & Disposal	44	Tons	$440	$19,360	Assumes disposal of 10-15' zone as F-Listed waste
SUBTOTAL				$32,285	
Backfill & Site Restoration					
Backfill Placement (reuse of non-contaminated soil)	58	CY	$15	$870	Assumes reuse of upper 10 feet of excavated soil
Backfill Placement (incl. Load and Haul)	29	CY	$30	$870	
Backfill & Compaction	87	CY	$10	$870	
SUBTOTAL				$2,610	
SUBTOTAL				$74,895	
Contingency	20%			$14,979	
SUBTOTAL				$89,874	
Design	12%			$10,785	
Project Management	6%			$5,392	
Remedial Oversight/Reporting	10%			$8,987	
TOTAL CAPITAL COST				**$115,039**	

OPERATION, MAINTENANCE, AND MONITORING (OM&M) COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES:
Site Monitoring - First 2 Years					
Groundwater Sampling & Analysis	1	YR	$7,500	$7,500	Annual sampling - 11 wells
Data Evaluation and Reporting	1	YR	$5,000	$5,000	
SUBTOTAL				$12,500	
TOTAL ANNUAL O&M COST - FIRST 2 YEARS				**$12,500**	
Site Monitoring - Years 7 - 27					
Groundwater Sampling & Analysis	1	YR	$3,500	$3,500	Pent-annual sampling - 5 wells
Data Evaluation and Reporting	1	YR	$5,000	$5,000	
SUBTOTAL				$8,500	
TOTAL PENT-ANNUAL O&M COST - YEARS 7 - 27				**$8,500**	

PRESENT VALUE ANALYSIS:

COST TYPE	YEAR	TOTAL COST	TOTAL COST PER YEAR	DISCOUNT FACTOR (5%)	PRESENT VALUE	NOTES:
Capital	1	$127,539	$127,539	1.00	$127,539	Capital + 1st Year O&M Costs
Annual OM&M	2	$12,500	$12,500	0.95	$11,905	
Annual OM&M	7-27	$42,500	$8,500	4.33	$36,801	
		$182,539			$176,244	
TOTAL PRESENT VALUE OF ALTERNATIVE					**$176,000**	

TABLE 3
Remedial Alternative Cost Summary

Alternative 4
EXCAVATION TO UNRESTRICTED USE SCOs + LONG-TERM MONITORING

OPINION OF PROBABLE COST

Site: Former S&S Cleaners and Dyers Site
Location: Cohoes, New York
Phase: Alternatives Analysis (-30% to +50%)
Base Year: 2014
Date: May 2014

Description: Alternative 4 consists of Alternative 2 (Institutional Controls + LTM) plus soil excavation and backfill of residual soil contamination areas and long-term monitoring. Capital costs are incurred in Year 1. O&M costs occur in Years 1-27

CAPITAL COSTS:

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES:
Institutional Controls Legal/Administrative Costs	1	lump sum	$25,000	$25,000	
Site Management Plan	1	lump sum	$15,000	$15,000	
Excavation of F-Listed Hazardous Soil					
Mobilization, Site Prep, & Staging	1	lump sum	$10,000	$10,000	
Rental, Delivery, Setup, and Removal of Slide Rail Components	1	lump sum	$25,000	$25,000	
Excavation, Stockpiling, and/or Loading of Soil and/or Debris	480	CY	$25	$12,000	Assumes depth range 10' - 15'
Confirmation Sampling	20	EA	$150	$3,000	
Transportation & Disposal	440	Tons	$440	$193,600	Assumes disposal as F-Listed waste
SUBTOTAL				$243,600	
Backfill & Site Restoration					
Backfill Placement (reuse of non-contaminated soil)	185	CY	$15	$2,775	Assumes reuse of upper 5 feet of excavated soil
Backfill Placement (incl. Load and Haul)	295	CY	$30	$8,850	
Replacement Well Installation	2	EA	$2,000	$4,000	MW-7R, MW-12
Backfill & Compaction	480	CY	$10	$4,800	
SUBTOTAL				$17,650	
SUBTOTAL				$301,250	
Contingency	20%			$60,250	
SUBTOTAL				$361,500	
Design	12%			$43,380	
Project Management	6%			$21,690	
Remedial Oversight/Reporting	10%			$36,150	
TOTAL CAPITAL COST				**$462,720**	

OPERATION, MAINTENANCE, AND MONITORING (OM&M) COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES:
Site Monitoring - First 2 Years					
Groundwater Sampling & Analysis	1	YR	$7,500	$7,500	Annual sampling - 11 wells
Data Evaluation and Reporting	1	YR	$5,000	$5,000	
SUBTOTAL				$12,500	
TOTAL ANNUAL O&M COST - FIRST 2 YEARS				**$12,500**	
Site Monitoring - Years 7 - 27					
Groundwater Sampling & Analysis	1	YR	$3,500	$3,500	Pent-annual sampling - 5 wells
Data Evaluation and Reporting	1	YR	$5,000	$5,000	
SUBTOTAL				$8,500	
TOTAL PENT-ANNUAL O&M COST - YEARS 7 - 27				**$8,500**	

PRESENT VALUE ANALYSIS:

COST TYPE	YEAR	TOTAL COST	TOTAL COST PER YEAR	DISCOUNT FACTOR (5%)	PRESENT VALUE	NOTES:
Capital	1	$475,220	$475,220	1.00	$475,220	Capital + 1st Year O&M Costs
Annual OM&M	2	$12,500	$12,500	0.95	$11,905	
Annual OM&M	7-27	$42,500	$8,500	4.33	$36,801	
		$530,220			$523,925	
TOTAL PRESENT VALUE OF ALTERNATIVE					**$524,000**	

Table 4

Remedial Alternative Cost Summary

OPINION OF PROBABLE COST SUMMARY

Site: Former S&S Cleaners and Dyers Site
Location: Cohoes, New York
Phase: Alternatives Analysis (-30% to +50%)
Base Year: 2014
Date: May 2014

Alternative	Description	Capital Costs	First 2 Years Annual O&M Costs	Pent-annual O&M Costs	Assumed Remediation Time (years)	Total Present Value
Alternative 1	NO FURTHER ACTION	$0	$0	$0	NA	$0
Alternative 2	INSTITUTIONAL CONTROLS + LONG-TERM MONITORING	$60,000	$12,500	$8,500	30	$121,000
Alternative 3	EXCAVATION TO RESIDENTIAL USE SCOs + LONG-TERM MONITORING	$115,039	$12,500	$8,500	30	$176,000
Alternative 4	EXCAVATION TO UNRESTRICTED USE SCOs + LONG-TERM MONITORING (PRE-RELEASE CONDITIONS)	$462,720	$12,500	$8,500	30	$524,000