Feasibility Study Report
for the
Former Elite Vogue
Dry Cleaners Site
Rochester, Monroe County
New York

Site No. 828164

November 2018

Prepared for:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
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List of Abbreviations and Acronyms

bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cis-DCE	cis-1,2-dichloroethene
COC	contaminants of concern
E & E	Ecology and Environment Engineering and Geology, P.C.
Elite site	Former Elite Vogue Dry Cleaners site
EPA	[United States] Environmental Protection Agency
ISCO	In situ chemical oxidation
LNAPL	light non-aqueous-phase liquid
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
mg/kg	milligrams per kilogram
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCE	perchloroethylene or tetrachloroethene
RAO	Remedial Action Objective
RI	Remedial Investigation
SCG	Standards, Criteria and Guidance
SCO	soil cleanup objective
SVOC	semivolatile organic compound
TCE	trichloroethene
TOGS	Technical and Operational Guidance Series
UST	underground storage tank
VOC	volatile organic compound

1 Introduction

1.1 Purpose and Organization

Ecology and Environment Engineering and Geology, P.C. (E & E) prepared this Feasibility Study (FS) for the Former Elite Vogue Dry Cleaners site (Elite site) under contract to the New York State Department of Environmental Conservation (NYSDEC) (Work Assignment Number D007617-38). The Elite site (NYSDEC Site No. 828164) is located in the city of Rochester, Monroe County, New York (see Figure 1-1). This FS was developed in accordance with the procedures outlined for an alternatives analysis report in NYSDEC's DER-10, *Technical Guidance for Site Investigation and Remediation*, Section 4.4(c) (NYSDEC 2010a).

In March 2018, E & E completed a remedial investigation (RI) to characterize the nature and extent of contamination at the Elite site. Details of the RI and its findings are described in the *Draft Remedial Investigation for the Former Elite Vogue Dry Cleaners Site, Rochester, Monroe County, New York* (E & E 2018).

This FS describes the technologies proposed and evaluated to address the contamination identified during the RI at the Elite site. The report is divided into the following sections:

- Section 1 describes the purpose of the study and provides site background information, including a summary of the RI.
- Section 2 presents the process used to identify the appropriate standards, criteria, and guidance (SCG) values applicable to the various contaminants found at the site and provides insight into the development of appropriate remedial action objectives (RAOs) to protect human health and the environment.
- Section 3 evaluates various technologies that may be appropriate for remediating site contamination and presents combinations of these technologies as remedial alternatives.
- Section 4 presents detailed analyses and comparison of the proposed remedial alternatives along with supporting rationale and preliminary cost estimates for each of the proposed alternatives.
- Section 5 presents a list of the references cited in this report.

1.2 Site Background Information

1.2.1 Site Description

The Elite site is located at 527-533 East Main Street, Rochester, New York, on a 0.126-acre parcel. The site consists of a privately owned, single-story, multi-use commercial building, which is currently operating as a multi-occupant structure. The building is subdivided into several units, including a grocery store, a mini-mart, and a diner/luncheonette. Elite operated a dry cleaning operation at this location from 1936 through 2003. The site is bordered by East Main Street to the north, a paved parking lot to the east (the former 15 Richmond Street Site), a commercial building to the west, and Haags Alley and a new apartment complex to the south (the former 14-60 Charlotte Street Site). The surface water body nearest to the facility is the Genesee River, which is located approximately 0.6 miles west of the site. The site location is shown on Figure 1-1, and the site plan is included as Figure 1-2.

1.2.2 Site History/Previous Investigations

The following discussion is based primarily on information in E & E's RI report (E & E 2018).

Phase I, Phase II, and Supplemental Phase II Environmental Site Assessments were performed by Day Environmental, Inc. (Day) between 1997 and 2002 (Day 1997a, 1997b, 1997c, 2000, 2002) on the adjacent city-owned parcels at 14-60 Charlotte Street, immediately south of the Elite site, including portions of an adjoining right-of-way along Haags Alley (see Figure 1-2). In April 2000, the City of Rochester notified NYSDEC of the preliminary field findings of these environmental studies. NYSDEC assigned an active spill number (NYSDEC Spill No. 0070043) to the parcels addressed as 26-60 Charlotte Street. A separate active spill number (NYSDEC Spill No. 0070044) was assigned to the parcel addressed as 14-16 Charlotte Street (Day 2000).

In 2001, an interim remedial measure was performed on the Charlotte Street site. The interim remedial measure included the following (Day 2002):

- Demolition of the residential dwelling at 26 Charlotte Street;
- Demolition of the former automobile repair building at 42 Charlotte Street and removal of a former floor drain and catch basin on this parcel;
- Removal of two in-ground hydraulic lifts that were located on the 14-16 and 42 Charlotte Street parcels;
- Removal of a 1,000-gallon underground storage tank (UST) containing fuel oil or diesel fuel on the 14-16 Charlotte Street parcel. The UST was located in proximity to former groundwater monitoring well MW-7 where LNAPL was previously detected;
- Removal of 1,887 tons of petroleum-contaminated soil. The soil was removed to the top of bedrock or until the seam of soil contamination above the bedrock was less than 1 foot thick, except in areas in close proximity to street improvements

(e.g., sidewalk, paved street) and buried utilities in the right-of-way of Charlotte Street and Haags Alley, or areas in Haags Alley where contamination appeared to be attributable to an off-site source; and

- Placement of an oxygen release compound at the bottom of excavations on the 14-16 Charlotte Street parcel to enhance biodegradation of residual petroleum contamination in the saturated zone.

Additional Phase I and Phase II studies (Stantec 2010a,b) were completed by Stantec Consulting Services, Inc., in 2010 at 15 Richmond Street, located east of the Elite site and now a paved parking lot. Furthermore, Shaw Environmental & Infrastructure Engineering of New York, P.C. (Shaw) completed a Site Characterization Study of the site in 2012 (Shaw 2012, revised February 2014) that identified:

- Volatile organic compounds (VOCs) were detected at concentrations above soil cleanup objectives (SCOs) in samples from SB-1 and SB-5 (beneath the Elite building). All eight soil samples contained gasoline-range organics (GROs);
- VOCs were detected at concentrations above NYSDEC drinking water standards in samples from PZ-1 and MW-13. All samples except from MW-14 contained GROs, and the sample from MW-12 also contained diesel-range organics (DROs);
- DROs/GROs were detected in the sanitary sewer solid sample;
- The samples from SB-1/PZ-1 contained the highest VOC concentrations in both soil and groundwater;
- Chlorinated VOCs detected in soils consisted of cis-1,2-dichloroethene (DCE) and trans-1,2-DCE at concentrations above the SCOs; and
- Chlorinated VOCs in groundwater at concentrations above NYSDEC drinking water standards consisted of vinyl chloride, trichloroethene (TCE), cis-1,2-DCE, and trans-1,2-DCE.

In September/October 2013, Shaw removed three USTs from beneath the building slab in the part of the former Elite Vogue Dry Cleaners building adjacent to Haags Alley (Shaw 2014). The tank near the east wall of the building at the current location of the passive soil vapor extraction (SVE) system was described as a Stoddard solvent UST. A Stoddard solvent is a mixture of petroleum naphtha composed of over 200 different compounds. These solvents are composed predominantly of alkanes and cycloalkanes, with some aromatic compounds.

A second tank was found adjacent to the Stoddard solvent tank. This tank was partially filled with soil and exhibited a “solvent-like” odor. Both of these USTs were about 6 feet long and 3 feet in diameter, were in poor condition (i.e., had holes and significant corrosion), and the surrounding soils exhibited strong solvent odors and elevated photo-ionization detector results.

The third UST, which was located to the left of the garage door entrance along Haag's Alley, was believed to be a fuel oil tank. The approximately 6-foot-long and 4-foot-diameter tank was found with no obvious holes or corrosion. The surrounding soils did not show any visible signs of contamination, and there were no photo-ionization detector results from the soils.

Only a small amount of product/sludge was recovered from the Stoddard solvent tank due to viscosity; approximately 50 gallons of product was removed from the fuel oil tank; and no product/sludge was in the tank partially filled with soil.

As mentioned above, a 4-inch-diameter SVE well with a 5-foot screen was placed within the Stoddard solvent tank excavation, with the bottom of the well placed at 7.5 feet below ground surface (bgs). The well was passively vented out the roof of the former Elite Vogue Dry Cleaners building (Shaw 2014). The locations of the three USTs and SVE well are presented in Appendix A of the 2018 RI.

The soil sample from the bottom of the Stoddard solvent tank contained 10 compounds, two of which were detected at concentrations that exceeded restricted commercial SCOs: 1,2,4-trimethylbenzene (250 milligrams per kilogram [mg/kg]) and tetrachloroethene (PCE) (1,400 mg/kg). This soil sample had a 13 times dilution factor, so other compounds may have been present and at concentrations above the SCOs (e.g., the SCO for vinyl chloride is 13 mg/kg, but due to the dilution factor, the detection limit was 15 mg/kg). Several semivolatile organic compound (SVOCs) were also detected; however, due to a 5 times dilution factor, many of the reporting limits were greater than the restricted commercial SCOs.

The five soil samples collected from around the fuel oil UST contained 25 VOCs, but none exceeded unrestricted or restricted commercial SCOs. However, one sample from the north excavation wall contained SVOCs (benz[(a]anthracene, benzo[a]pyrene, and dibenz[a,h]anthracene) at concentrations above the restricted SCOs.

The product from the Stoddard solvent tank and the fuel oil UST only underwent Toxicity Characteristic Leaching Procedure (TCLP) analyses. The Stoddard solvent tank sludge analytical results indicated 10,000 micrograms per liter (µg/L) PCE, 165 µg/L total chromium, 2.6 µg/L mercury, and 136 µg/L lead.

1.3 Elite Vogue Remedial Investigation

E & E completed an RI at the Elite site in March 2018 on behalf of NYSDEC in order to define the nature and extent of identified contamination remaining at the site. The RI also assessed the potential risks posed to human health by site contaminants. A summary of the RI findings is presented below in Sections 1.3.1 through 1.3.4.

1.3.1 Site Geology and Hydrology

The topography of the site is relatively flat. During the RI, soil borings were advanced to the top of bedrock, which ranged from 7 to 12 feet bgs. Three borings were then advanced to total depths of 20 to 21 feet bgs into the top of the dolomite bedrock and completed as open-hole bedrock groundwater monitoring wells. Soil borings completed near the site indicate that the overburden soils consist of gray and brown silty sand to sandy silt with little clay and gravel.

The site consists of a single-story slab-on-grade cement block building and an adjacent parking lot. The parking lot is characterized by paved surfaces adjacent to and east of the site building. Little to no vegetation is present within the site, and no water bodies are present. Surface water drains either to storm water grates along East Main Street (north of the site) or Richmond Street (northeast of the site), or collects in topographic lows before evaporating or slowly infiltrating into the subsurface. There is no direct surface water drainage to the Genesee River, which is located approximately 0.6 miles west of the site.

Groundwater elevations were collected from 12 newly installed temporary overburden piezometer wells within Haags Alley, three newly constructed bedrock monitoring wells, three newly constructed permanent overburden piezometer wells, and three existing overburden monitoring wells (see Figure 1-3). Figures 1-4 and 1-5 present the groundwater elevations and interpreted isopleths of the shallow overburden and bedrock groundwater aquifer based on the groundwater elevations. Although the groundwater flow patterns vary between the overburden and bedrock layers, the general groundwater flow directions are similar: Bedrock groundwater flows in an apparent southeasterly direction, and groundwater in the overburden flows in a northeasterly direction.

1.3.2 Nature and Extent of Contamination

The RI sample results confirmed that chlorinated VOCs, including PCE, TCE, cis-DCE, vinyl chloride, and several chlorobenzenes are present at the Elite site. Chlorinated VOCs are commonly used in the dry cleaning industry for their ability to dissolve and remove stains without damaging natural or man-made fibers. Chlorinated VOCs have light to moderate molecular weight, are more soluble in water than heavier semivolatile compounds (solubilities generally range from 150 to 3,500 milligrams per liter), tend to have high volatilization rates, and do not sorb to soil or other organic material at a high rate. Because of these characteristics, the migration of chlorinated compounds via groundwater can be significant (especially for cis-DCE and vinyl chloride).

Based on the concentrations in the samples tested and the presence of former USTs beneath the building slab, the primary source area for groundwater contamination appears to be beneath the former Elite building slab, and secondary non-site-related sources could be located to the south and east. The groundwater contaminant plume appears to extend from the area near PZ-05 to SB-01 and SB-09 and eastward to the area around SB-12, encompassing a total area of approximately 65 feet by 75 feet (see Figure 1-6). The primary soil source area appears

to extend south from PZ-05 to MW-12 and laterally along Haags Alley to SB-12 (see Figures 1-7 and 1-8). Based on the results of prior and current investigations at the Elite site and 15 Richmond Street, the primary area of contaminated soil encompasses a volume of approximately 35,000 cubic feet.

Based on the groundwater information in the RI and prior investigations, the primary contaminant source(s) appears to be a combination of incidental spills or dumping of waste solvents inside the former Elite building in the vicinity of PZ-05 and/or the cleaning and storage of used solvent filters outside the back door of the facility, and the former leaky USTs beneath the building slab. Additionally, given the findings of prior investigations that the Stoddard solvent USTs located within the former Elite building were in poor condition and that aromatic compounds similar to those found at the site were used in the production of Stoddard solvent, it is likely these tanks are responsible for the high levels of aromatic VOCs, including petroleum hydrocarbons, detected in the soils and groundwater beneath the former Elite building and Haags Alley and the free product found in MW-12 and MW-03. These tanks were removed several years prior to the current investigation. Previous investigations also detected high concentrations of aromatic compounds in the 14-16 Charlotte Street parcel. Because the overburden groundwater predominantly flows toward the Elite site, it is possible that the 14-16 Charlotte Street parcel is contributing to the VOC and DRO/GRO contamination found at the Elite site. Some solvent wastes may have been disposed of in sanitary sewer lines via interior drains, but no significant source or leaching from drain lines was identified. Based on the analytical results for subsurface soil samples from SB-06, SB-07, SB-09, and SB-12, the depth of contamination in the primary source area is estimated to extend from 4 to 10.4 feet bgs (i.e., several feet above to several feet below the water table).

As the chlorinated VOCs migrated downward through the vadose zone soil, the contamination appears to have spread laterally outward to the surrounding area. It is possible that contaminants followed preferential pathways along buried utilities beneath Haags Alley. Based on the RI, the aromatic VOCs have spread southward to locations SB-09 and SB-01, southeastward to location SB-12, and eastward to MW-03 and, based on the findings of previous investigations, eastward to the eastern boundary of the 15 Richmond Street parcel (Stantec 2010a,b).

1.3.3 Contaminant Fate and Transport

The RI evaluated various modes of contaminant transport at the Elite site:

- A majority of the Elite site is covered by the site building and paved surfaces; however, the poor condition of Haags Alley pavement can allow infiltration of surface water and pure product through the vadose zone and into the groundwater. Infiltration appears to have been the main mechanism that allowed chlorinated VOCs and, to a lesser extent, aromatic compounds to migrate downward through the soil column and to the groundwater table. Since chlorinated solvents are no longer used at the site and the former Stoddard solvent USTs have been removed, infiltration is no longer expected to be a significant

route of additional contaminant migration in the future, except for residual levels of contaminants that remain sorbed to the soil particles.

- Overburden groundwater flow allows both vertical and lateral migration of water-soluble contaminants within the saturated zone. Groundwater flow is typically considered a significant transport mechanism for chlorinated VOC contamination as the constituents are soluble in water at concentrations that exceed regulatory levels. This typically allows the contaminants to travel significant distances from their source area. Contaminant migration rates were estimated to be approximately 2.2 feet per year based on the sandy silt makeup of the soils encountered at the site.
- Based on the groundwater contour map developed for the site, groundwater in the bedrock and overburden generally flow to the southeast and northeast, respectively. The majority of contamination at the site appears to be in the area near PZ-05, and it appears that groundwater contamination in the overburden is migrating generally eastward across the site. In the bedrock, groundwater generally flows to the southeast and the majority of contamination remains in the area near PZ-05 with minimal migration to the east.
- Utility corridors beneath Haags Alley may have been a route of migration for chlorinated contamination it the past, especially in regard to the contamination identified on the northern side of Haags Alley. However, since (1) chlorinated solvents are no longer used at the site, (2) no significant contaminant sources were identified in or near drain lines, and (3) the depth to overburden groundwater at the site appears to be below the utility corridors, contaminant migration along utility corridors does not appear to be a concern at this site.
- VOC contamination in soil and groundwater can migrate above the groundwater table in the form of vapor. Preferential migration pathways can occur at utility beddings, building slabs and footers, etc., with ultimate migration to the ambient air at the ground surface or building interiors. Volatilization was confirmed by the detection of site-related contaminants in soil vapor.
- Utility corridors can provide a pathway for seepage, leakage, or sifting into bedding surrounding the utility. GROs and DROs were detected in samples within the sanitary sewer line that runs along Haags Alley (Shaw 2012, revised February 2014). Although this may have been a contamination migration pathway in the past, no significant contaminant sources were identified in or near drain lines. Therefore, utility corridors are not considered a significant contamination migration pathway at the Elite site.
- Excavations or construction activities in the contaminant source area related to future site development could contribute to contaminant exposure and migration by directly exposing contaminated soil to the surface.

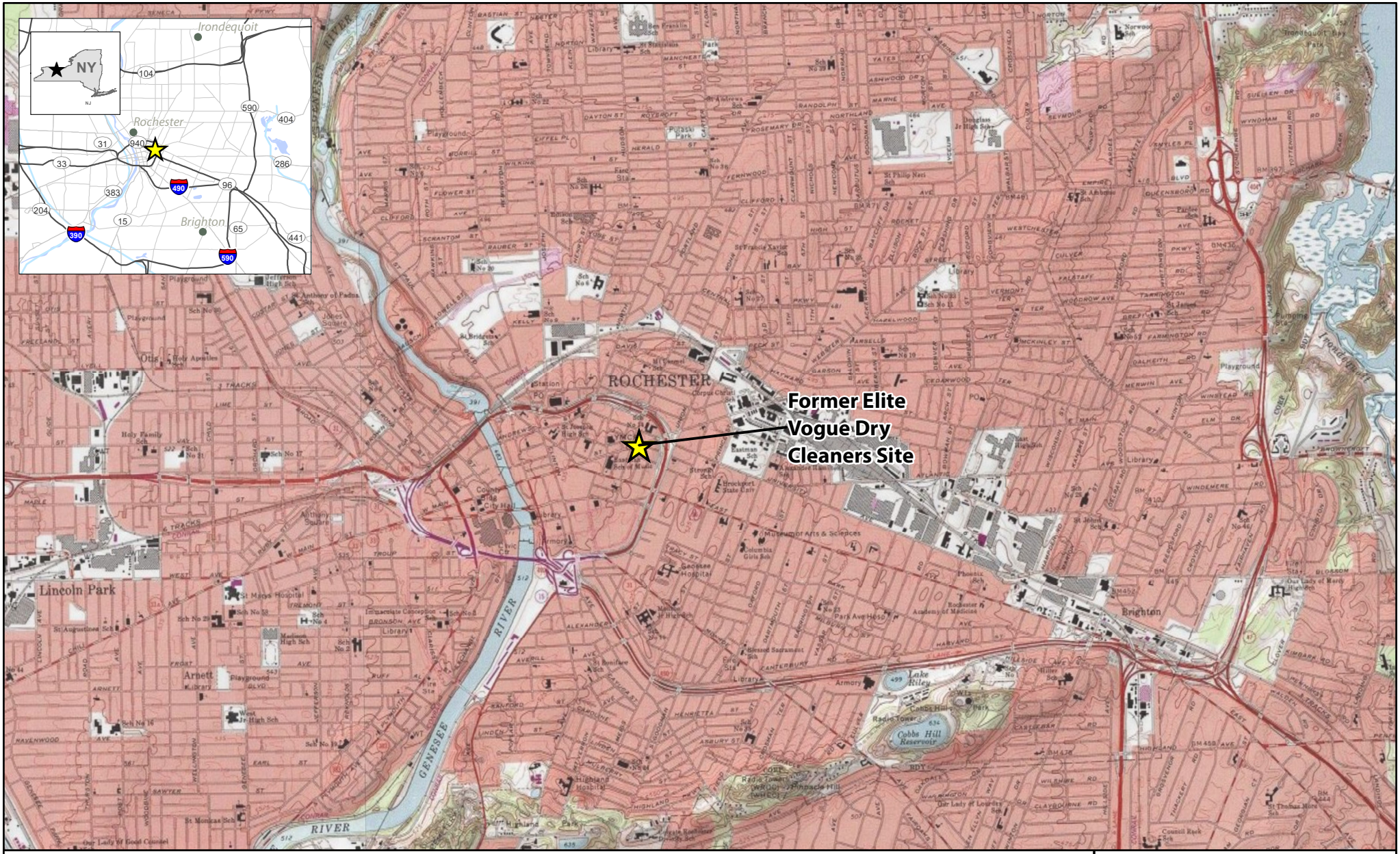
1.3.4 Qualitative Human and Ecological Health Risk Evaluation

Based on the results of the qualitative human health risk evaluation performed as part of the RI, workers, site visitors, and residents are not expected to directly contact groundwater or soils. Thus, the potential for adverse health effects due to

direct exposure to these media is eliminated from further consideration. The only complete exposure pathway at the site is the inhalation of indoor air that may contain vapors emitted from contaminated subsurface soil or groundwater.

A quantitative ecological risk evaluation for the Elite site was deemed unnecessary because the site is covered by a building and pavement and is situated in an urban setting; thus, there are no natural terrestrial habitats.

Document Path: L:\Buffalo\Elite_Vogue_Dry_Cleaners\Maps\MXD\Site_Location_Map_rev_01.mxd



Legend

Site Location

N

2,000 1,000 0 2,000 4,000 6,000 Feet

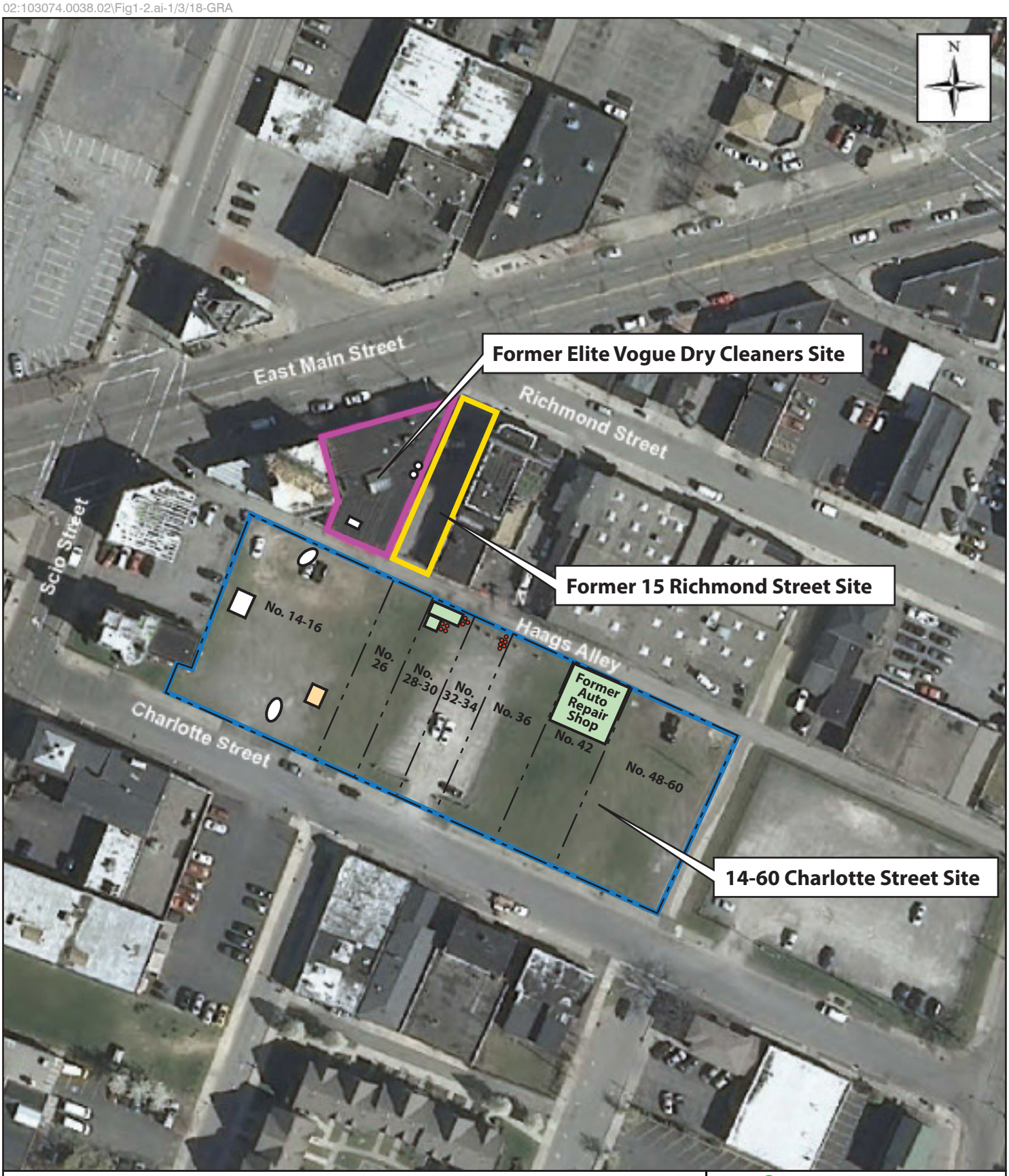
Coordinate System:
North American Datum 1983
New York State Plane West FIPS 3103
Units: Feet

Source:
ESRI 2012; ESRI 2015
Ecology and Environment, Inc. 2016

ecology and environment, inc.
Global Environmental Specialists

Site Location
Rochester, NY

Figure 1-1
Site Location Map
Former Elite Vogue Dry Cleaners Site



KEY

- Former In-ground Hydraulic Lift Location
- Former Underground Storage Tank Locations
- Former Metal Shed Locations
- Former 55 Gallon Drum Locations

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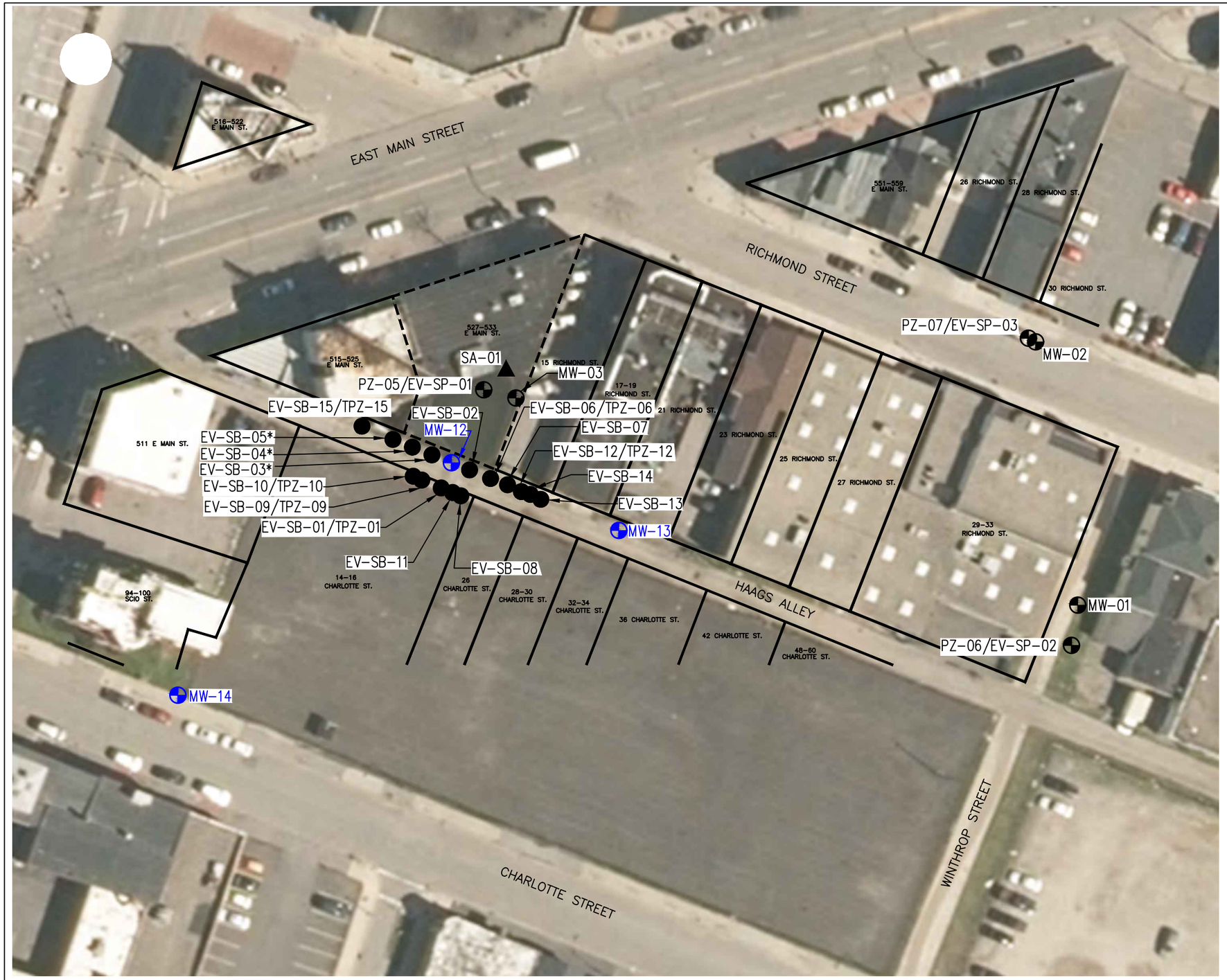
Former Elite Vogue Dry Cleaners Site
Rochester, New York

Figure 1-2
Site Plan



LEGEND

◓	EXISTING MONITORING WELL LOCATION
◔	MONITORING WELL LOCATION (EEEPC)
●	SOIL BORING LOCATION
▲	SOIL VAPOR AIR SAMPLE
———	APPROXIMATE PARCEL BOUNDARY
– – –	APPROXIMATE SITE BOUNDARY
PZ	PIEZOMETER
MW	MONITORING WELL
SP	SOIL PIEZOMETER LOCATION
TPZ	TEMPORARY PIEZOMETER
SA	SOIL VAPOR AIR
*	BORINGS ABANDONED DUE TO UNDERGROUND UTILITY OR FOUNDATION

NOTES

1. AERIAL PHOTOGRAPHY FROM NEW YORK STATE GIS CLEARINGHOUSE – 2015.

ELITE SITE PLAN

SCALE: 1" = 50'-0"

SCALE IN FEET

0 50 100 150

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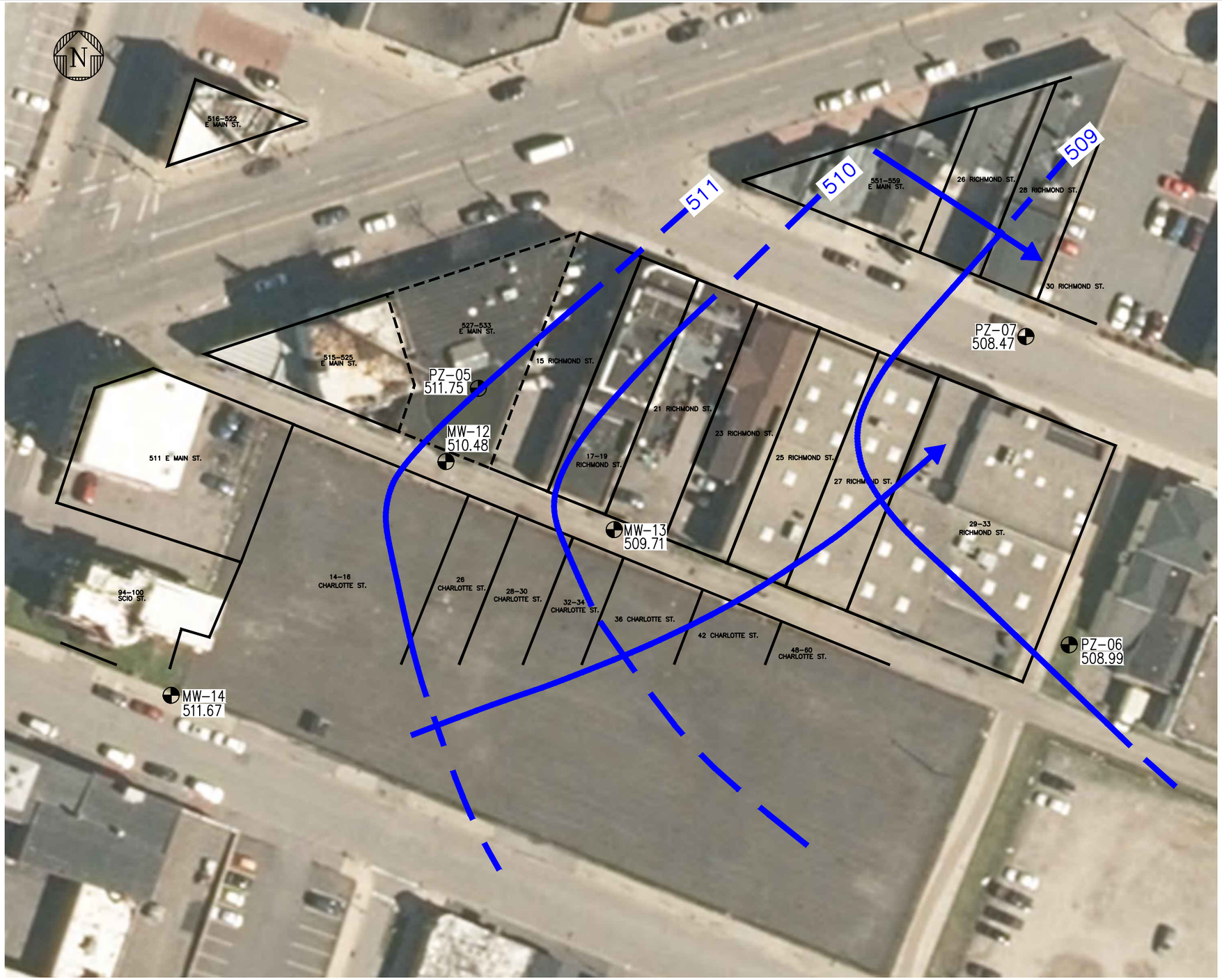
FIGURE 1-3 GROUNDWATER MONITORING WELL, PIEZOMETER WELL, AND SOIL BORING LOCATIONS
FORMER ELITE VOGUE DRY CLEANERS SITE
ROCHESTER, NEW YORK



LEGEND

MW–13	MONITORING WELL LOCATION
———	APPROXIMATE PARCEL BOUNDARY
– – – –	APPROXIMATE SITE BOUNDARY
509 ———	GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
———→	GROUNDWATER FLOW DIRECTION
508.47	GROUNDWATER ELEVATION

NOTES

1. AERIAL PHOTOGRAPHY FROM NEW YORK STATE GIS CLEARINGHOUSE – 2015.
2. GROUNDWATER ELEVATION MEASUREMENTS WERE COLLECTED BETWEEN MARCH 30 AND APRIL 6, 2016.

ELITE SITE PLAN

SCALE: 1" = 50'–0"

SCALE IN FEET

0 50 100 150

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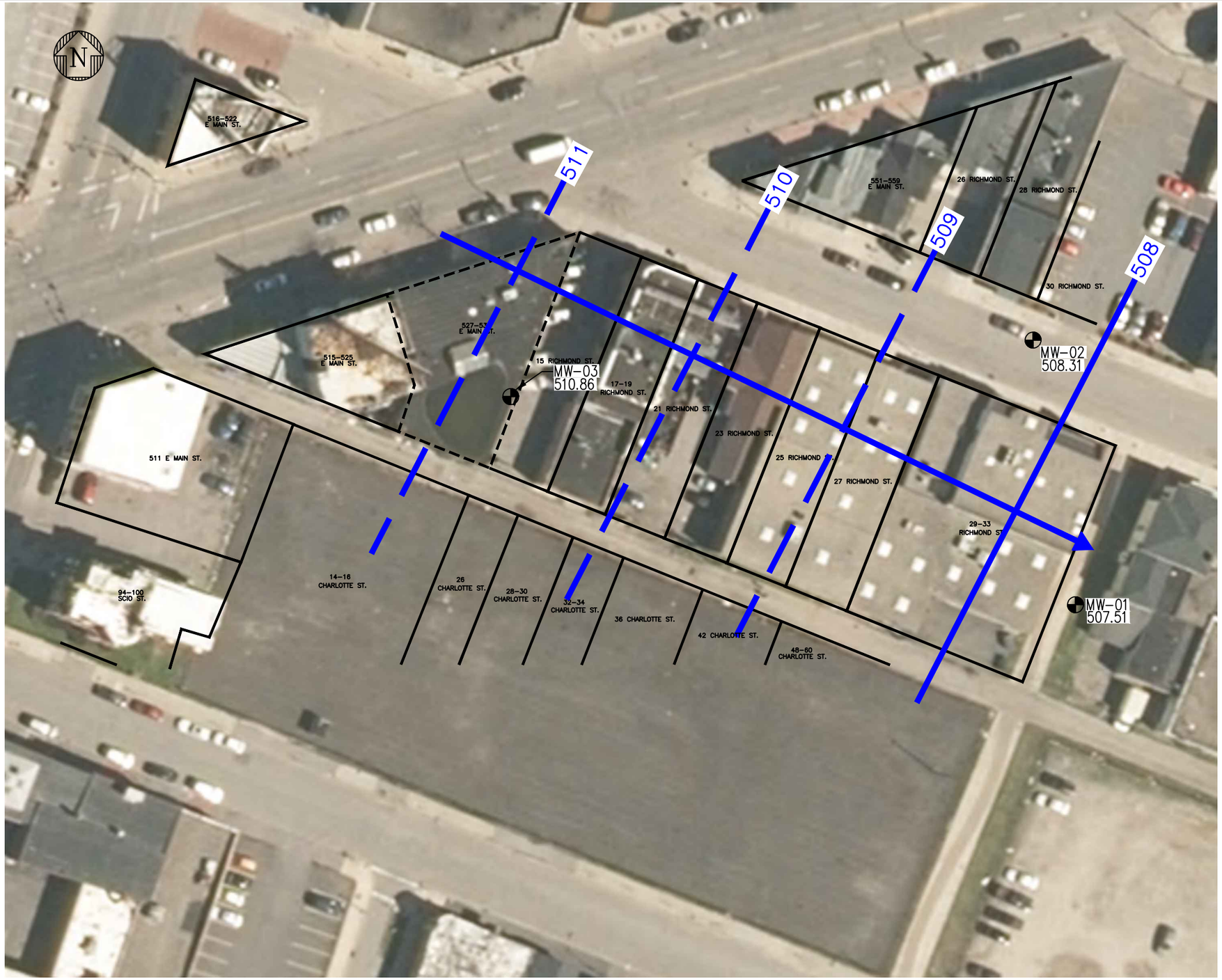
FIGURE 1–4 OVERBURDEN GROUNDWATER CONTOUR MAP
FORMER ELITE VOGUE DRY CLEANERS SITE
ROCHESTER, NEW YORK



LEGEND

MW–02	MONITORING WELL LOCATION
	APPROXIMATE PARCEL BOUNDARY
	APPROXIMATE SITE BOUNDARY
508	GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
	GROUNDWATER FLOW DIRECTION
507.51	GROUNDWATER ELEVATION

NOTES

1. AERIAL PHOTOGRAPHY FROM NEW YORK STATE GIS CLEARINGHOUSE – 2015.
2. GROUNDWATER ELEVATION MEASUREMENTS WERE COLLECTED BETWEEN MARCH 30 AND APRIL 6, 2016.

ELITE SITE PLAN

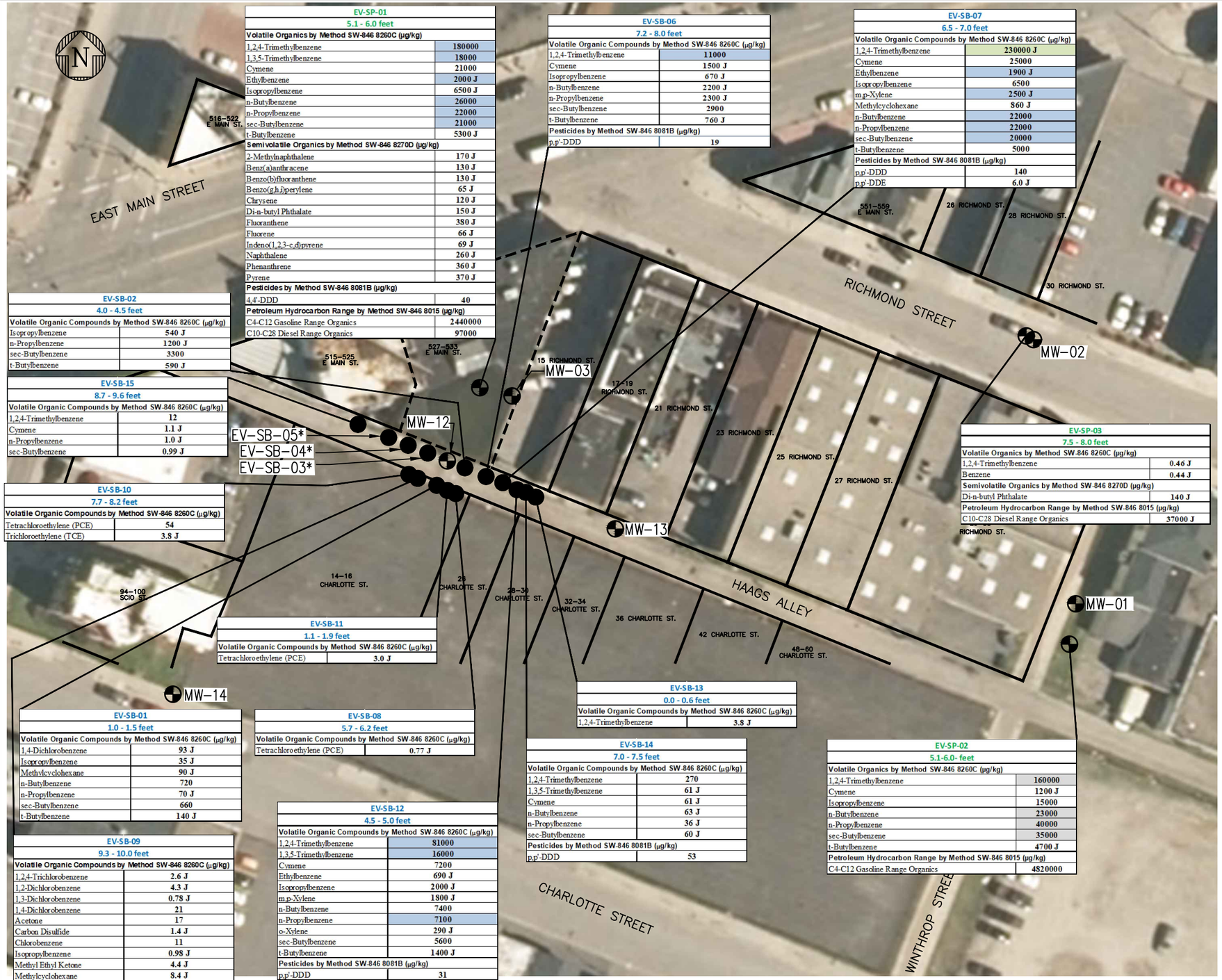
SCALE: 1" = 50'–0"

SCALE IN FEET

0 50 100 150

ecology and environment

FIGURE 1–5 BEDROCK GROUNDWATER CONTOUR MAP
FORMER ELITE VOGUE DRY CLEANERS SITE
ROCHESTER, NEW YORK



EV-SP-01	
5.1 - 6.0 feet	
Volatile Organics by Method SW-846 8260C (µg/kg)	
1,2,4-Trimethylbenzene	180000
1,3,5-Trimethylbenzene	18000
Cymene	21000
Ethylbenzene	2000 J
Isopropylbenzene	6500 J
n-Butylbenzene	26000
n-Propylbenzene	22000
sec-Butylbenzene	21000
t-Butylbenzene	5300 J
Semivolatile Organics by Method SW-846 8270D (µg/kg)	
2-Methylnaphthalene	170 J
Benz(a)anthracene	130 J
Benzo(b)fluoranthene	130 J
Benzo(g,h,i)perylene	65 J
Chrysene	120 J
Di-n-butyl Phthalate	150 J
Fluoranthene	380 J
Fluorene	66 J
Indeno(1,2,3-c,d)pyrene	69 J
Naphthalene	260 J
Phenanthrene	360 J
Pyrene	370 J
Pesticides by Method SW-846 8081B (µg/kg)	
4,4'-DDD	40
Petroleum Hydrocarbon Range by Method SW-846 8015 (µg/kg)	
C4-C12 Gasoline Range Organics	2440000
C10-C28 Diesel Range Organics	97000

EV-SB-06	
7.2 - 8.0 feet	
Volatile Organic Compounds by Method SW-846 8260C (µg/kg)	
1,2,4-Trimethylbenzene	11000
Cymene	1500 J
Isopropylbenzene	670 J
n-Butylbenzene	2200 J
n-Propylbenzene	2300 J
sec-Butylbenzene	2900
t-Butylbenzene	760 J
Pesticides by Method SW-846 8081B (µg/kg)	
p,p'-DDD	19

EV-SB-07	
6.5 - 7.0 feet	
Volatile Organic Compounds by Method SW-846 8260C (µg/kg)	
1,2,4-Trimethylbenzene	230000 J
Cymene	25000
Ethylbenzene	1900 J
Isopropylbenzene	6500
m,p-Xylene	2500 J
Methylcyclohexane	860 J
n-Butylbenzene	22000
n-Propylbenzene	22000
sec-Butylbenzene	20000
t-Butylbenzene	5000
Pesticides by Method SW-846 8081B (µg/kg)	
p,p'-DDD	140
p,p'-DDE	6.0 J

EV-SB-02	
4.0 - 4.5 feet	
Volatile Organic Compounds by Method SW-846 8260C (µg/kg)	
Isopropylbenzene	540 J
n-Propylbenzene	1200 J
sec-Butylbenzene	3300
t-Butylbenzene	590 J

EV-SB-15	
8.7 - 9.6 feet	
Volatile Organic Compounds by Method SW-846 8260C (µg/kg)	
1,2,4-Trimethylbenzene	12
Cymene	1.1 J
n-Propylbenzene	1.0 J
sec-Butylbenzene	0.99 J

EV-SB-10	
7.7 - 8.2 feet	
Volatile Organic Compounds by Method SW-846 8260C (µg/kg)	
Tetrachloroethylene (PCE)	54
Trichloroethylene (TCE)	3.8 J

EV-SB-11	
1.1 - 1.9 feet	
Volatile Organic Compounds by Method SW-846 8260C (µg/kg)	
Tetrachloroethylene (PCE)	3.0 J

EV-SB-01	
1.0 - 1.5 feet	
Volatile Organic Compounds by Method SW-846 8260C (µg/kg)	
1,4-Dichlorobenzene	93 J
Isopropylbenzene	35 J
Methylcyclohexane	90 J
n-Butylbenzene	720
n-Propylbenzene	70 J
sec-Butylbenzene	660
t-Butylbenzene	140 J

EV-SB-08	
5.7 - 6.2 feet	
Volatile Organic Compounds by Method SW-846 8260C (µg/kg)	
Tetrachloroethylene (PCE)	0.77 J

EV-SB-09	
9.3 - 10.0 feet	
Volatile Organic Compounds by Method SW-846 8260C (µg/kg)	
1,2,4-Trichlorobenzene	2.6 J
1,2-Dichlorobenzene	4.3 J
1,3-Dichlorobenzene	0.78 J
1,4-Dichlorobenzene	21
Acetone	17
Carbon Disulfide	1.4 J
Chlorobenzene	11
Isopropylbenzene	0.98 J
Methyl Ethyl Ketone	4.4 J
Methylcyclohexane	8.4 J
n-Butylbenzene	5.9
n-Propylbenzene	1.3 J
sec-Butylbenzene	11
t-Butylbenzene	3.3 J
Trichloroethylene (TCE)	2.1 J

EV-SB-12	
4.5 - 5.0 feet	
Volatile Organic Compounds by Method SW-846 8260C (µg/kg)	
1,2,4-Trimethylbenzene	81000
1,3,5-Trimethylbenzene	16000
Cymene	7200
Ethylbenzene	690 J
Isopropylbenzene	2000 J
m,p-Xylene	1800 J
n-Butylbenzene	7400
n-Propylbenzene	7100
o-Xylene	290 J
sec-Butylbenzene	5600
t-Butylbenzene	1400 J
Pesticides by Method SW-846 8081B (µg/kg)	
p,p'-DDD	31

EV-SB-13	
0.0 - 0.6 feet	
Volatile Organic Compounds by Method SW-846 8260C (µg/kg)	
1,2,4-Trimethylbenzene	3.8 J

EV-SB-14	
7.0 - 7.5 feet	
Volatile Organic Compounds by Method SW-846 8260C (µg/kg)	
1,2,4-Trimethylbenzene	270
1,3,5-Trimethylbenzene	61 J
Cymene	61 J
n-Butylbenzene	63 J
n-Propylbenzene	36 J
sec-Butylbenzene	60 J
Pesticides by Method SW-846 8081B (µg/kg)	
p,p'-DDD	53

EV-SP-03	
7.5 - 8.0 feet	
Volatile Organics by Method SW-846 8260C (µg/kg)	
1,2,4-Trimethylbenzene	0.46 J
Benzene	0.44 J
Semivolatile Organics by Method SW-846 8270D (µg/kg)	
Di-n-butyl Phthalate	140 J
Petroleum Hydrocarbon Range by Method SW-846 8015 (µg/kg)	
C10-C28 Diesel Range Organics	37000 J

EV-SP-02	
5.1-6.0- feet	
Volatile Organics by Method SW-846 8260C (µg/kg)	
1,2,4-Trimethylbenzene	160000
Cymene	1200 J
Isopropylbenzene	15000
n-Butylbenzene	23000
n-Propylbenzene	40000
sec-Butylbenzene	35000
t-Butylbenzene	4700 J
Petroleum Hydrocarbon Range by Method SW-846 8015 (µg/kg)	
C4-C12 Gasoline Range Organics	4820000

ELITE SITE PLAN

SCALE: 1" = 50'–0"

SCALE IN FEET

0 50 100 150

LEGEND

- MONITORING WELL LOCATION
- SOIL BORING LOCATION
- APPROXIMATE PARCEL BOUNDARY
- APPROXIMATE SITE BOUNDARY
- PZ — PIEZOMETER
- MW — MONITORING WELL
- SP — SOIL PIEZOMETER LOCATION
- * — BORINGS ABANDONED DUE TO UNDERGROUND UTILITY

NOTES

1. AERIAL PHOTOGRAPHY FROM NEW YORK STATE GIS CLEARINGHOUSE – 2015.
2. SOIL BORING RESULTS IN MICROGRAMS PER KILOGRAM (µG/KG).
3. BOLD VALUES DENOTE POSITIVE HITS.
4. BLUE SHADED VALUES EXCEED THE UNRESTRICTED USE SCREENING CRITERIA.
5. GREEN SHADED VALUES EXCEED THE UNRESTRICTED USE AND RESTRICTED COMMERCIAL USE SCREENING CRITERIA.

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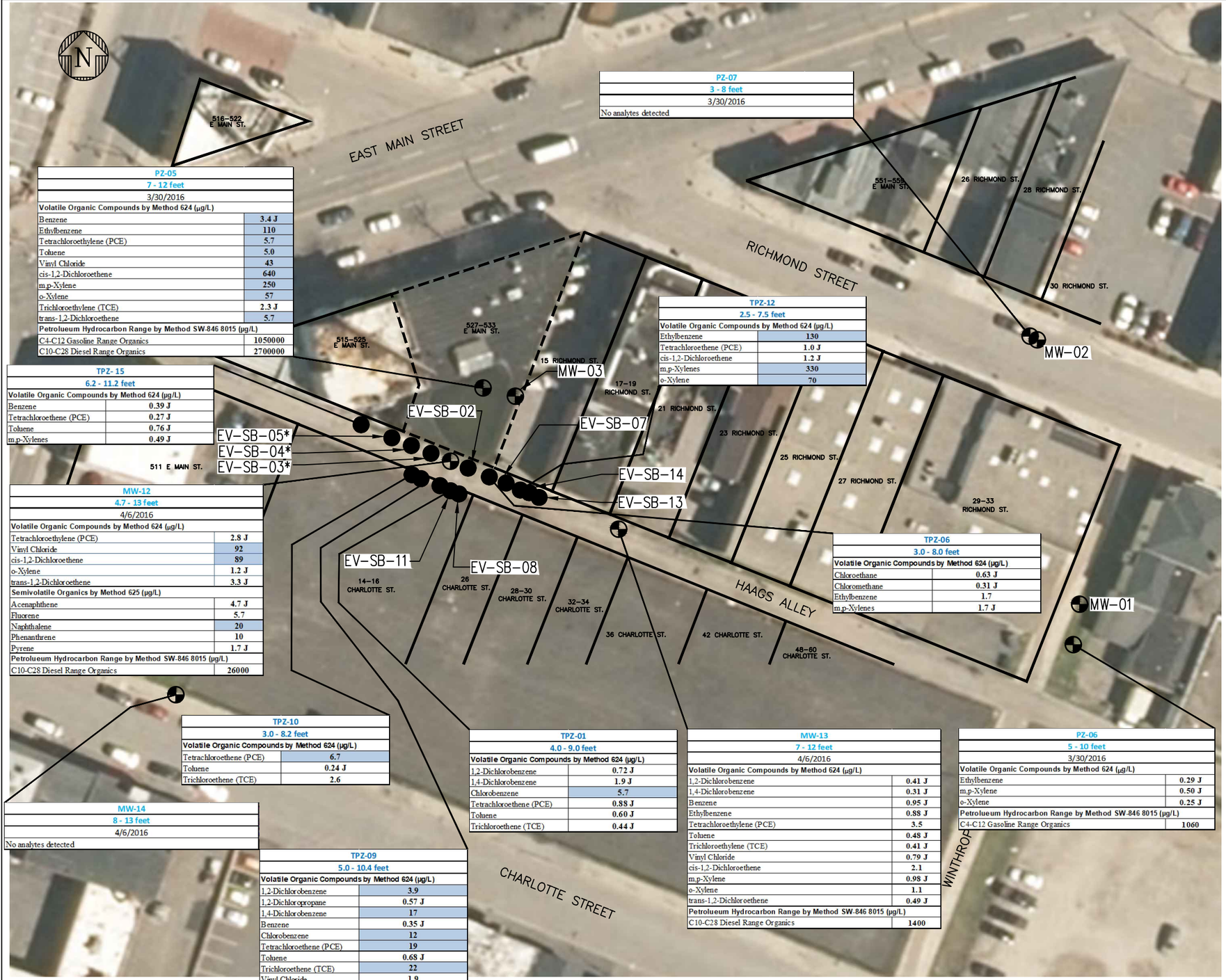
FIGURE 1–6 SOIL BORING POSITIVE SAMPLE RESULTS FORMER ELITE VOGUE DRY CLEANERS SITE ROCHESTER, NEW YORK



PZ-07	
3 - 8 feet	
3/30/2016	
No analytes detected	

PZ-05	
7 - 12 feet	
3/30/2016	
Volatile Organic Compounds by Method 624 (µg/L)	
Benzene	3.4 J
Ethylbenzene	110
Tetrachloroethylene (PCE)	5.7
Toluene	5.0
Vinyl Chloride	43
cis-1,2-Dichloroethene	640
m,p-Xylene	250
o-Xylene	57
Trichloroethylene (TCE)	2.3 J
trans-1,2-Dichloroethene	5.7
Petrolueum Hydrocarbon Range by Method SW-846 8015 (µg/L)	
C4-C12 Gasoline Range Organics	1050000
C10-C28 Diesel Range Organics	2700000

TPZ-12	
2.5 - 7.5 feet	
Volatile Organic Compounds by Method 624 (µg/L)	
Ethylbenzene	130
Tetrachloroethene (PCE)	1.0 J
cis-1,2-Dichloroethene	1.2 J
m,p-Xylenes	330
o-Xylene	70

TPZ- 15	
6.2 - 11.2 feet	
Volatile Organic Compounds by Method 624 (µg/L)	
Benzene	0.39 J
Tetrachloroethene (PCE)	0.27 J
Toluene	0.76 J
m,p-Xylenes	0.49 J

MW-12	
4.7 - 13 feet	
4/6/2016	
Volatile Organic Compounds by Method 624 (µg/L)	
Tetrachloroethylene (PCE)	2.8 J
Vinyl Chloride	92
cis-1,2-Dichloroethene	89
o-Xylene	1.2 J
trans-1,2-Dichloroethene	3.3 J
Semivolatile Organics by Method 625 (µg/L)	
Acenaphthene	4.7 J
Fluorene	5.7
Naphthalene	20
Phenanthrene	10
Pyrene	1.7 J
Petroluem Hydrocarbon Range by Method SW-846 8015 (µg/L)	
C10-C28 Diesel Range Organics	26000

TPZ-06	
3.0 - 8.0 feet	
Volatile Organic Compounds by Method 624 (µg/L)	
Chloroethane	0.63 J
Chloromethane	0.31 J
Ethylbenzene	1.7
m,p-Xylenes	1.7 J

TPZ-10	
3.0 - 8.2 feet	
Volatile Organic Compounds by Method 624 (µg/L)	
Tetrachloroethene (PCE)	6.7
Toluene	0.24 J
Trichloroethene (TCE)	2.6

TPZ-01	
4.0 - 9.0 feet	
Volatile Organic Compounds by Method 624 (µg/L)	
1,2-Dichlorobenzene	0.72 J
1,4-Dichlorobenzene	1.9 J
Chlorobenzene	5.7
Tetrachloroethene (PCE)	0.88 J
Toluene	0.60 J
Trichloroethene (TCE)	0.44 J

MW-13	
7 - 12 feet	
4/6/2016	
Volatile Organic Compounds by Method 624 (µg/L)	
1,2-Dichlorobenzene	0.41 J
1,4-Dichlorobenzene	0.31 J
Benzene	0.95 J
Ethylbenzene	0.88 J
Tetrachloroethylene (PCE)	3.5
Toluene	0.48 J
Trichloroethylene (TCE)	0.41 J
Vinyl Chloride	0.79 J
cis-1,2-Dichloroethene	2.1
m,p-Xylene	0.98 J
o-Xylene	1.1
trans-1,2-Dichloroethene	0.49 J
Petroluem Hydrocarbon Range by Method SW-846 8015 (µg/L)	
C10-C28 Diesel Range Organics	1400

PZ-06	
5 - 10 feet	
3/30/2016	
Volatile Organic Compounds by Method 624 (µg/L)	
Ethylbenzene	0.29 J
m,p-Xylene	0.50 J
o-Xylene	0.25 J
Petroluem Hydrocarbon Range by Method SW-846 8015 (µg/L)	
C4-C12 Gasoline Range Organics	1060

MW-14
8 - 13 feet
4/6/2016
No analytes detected

TPZ-09	
5.0 - 10.4 feet	
Volatile Organic Compounds by Method 624 (µg/L)	
1,2-Dichlorobenzene	3.9
1,2-Dichloropropane	0.57 J
1,4-Dichlorobenzene	17
Benzene	0.35 J
Chlorobenzene	12
Tetrachloroethene (PCE)	19
Toluene	0.68 J
Trichloroethene (TCE)	22
Vinyl Chloride	1.9
cis-1,2-Dichloroethene	9.0
m,p-Xylenes	0.46 J
o-Xylene	0.31 J
Ethylbenzene	0.27 J

ELITE SITE PLAN

SCALE: 1" = 50'–0"

SCALE IN FEET

0 50 100 150

LEGEND

- MONITORING WELL LOCATION
- SOIL BORING LOCATION
- APPROXIMATE PARCEL BOUNDARY
- APPROXIMATE SITE BOUNDARY
- PZ — PIEZOMETER
- MW — MONITORING WELL
- TPZ — TEMPORARY PIEZOMETER LOCATION
- * — BORINGS ABANDONED DUE TO UNDERGROUND UTILITY

NOTES

1. AERIAL PHOTOGRAPHY FROM NEW YORK STATE GIS CLEARINGHOUSE – 2015.
2. GROUNDWATER RESULTS IN MICROGRAMS PER LITER (µG/L).
3. BOLD VALUES DENOTE POSITIVE HITS.
4. SHADED VALUES EXCEED THE NYSDEC TOGS #1.1.1: AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES AND GROUNDWATER EFFLUENT LIMITATIONS, 1998 (WITH UPDATES), CLASS GA GROUNDWATER STANDARDS AND GUIDANCE VALUES.

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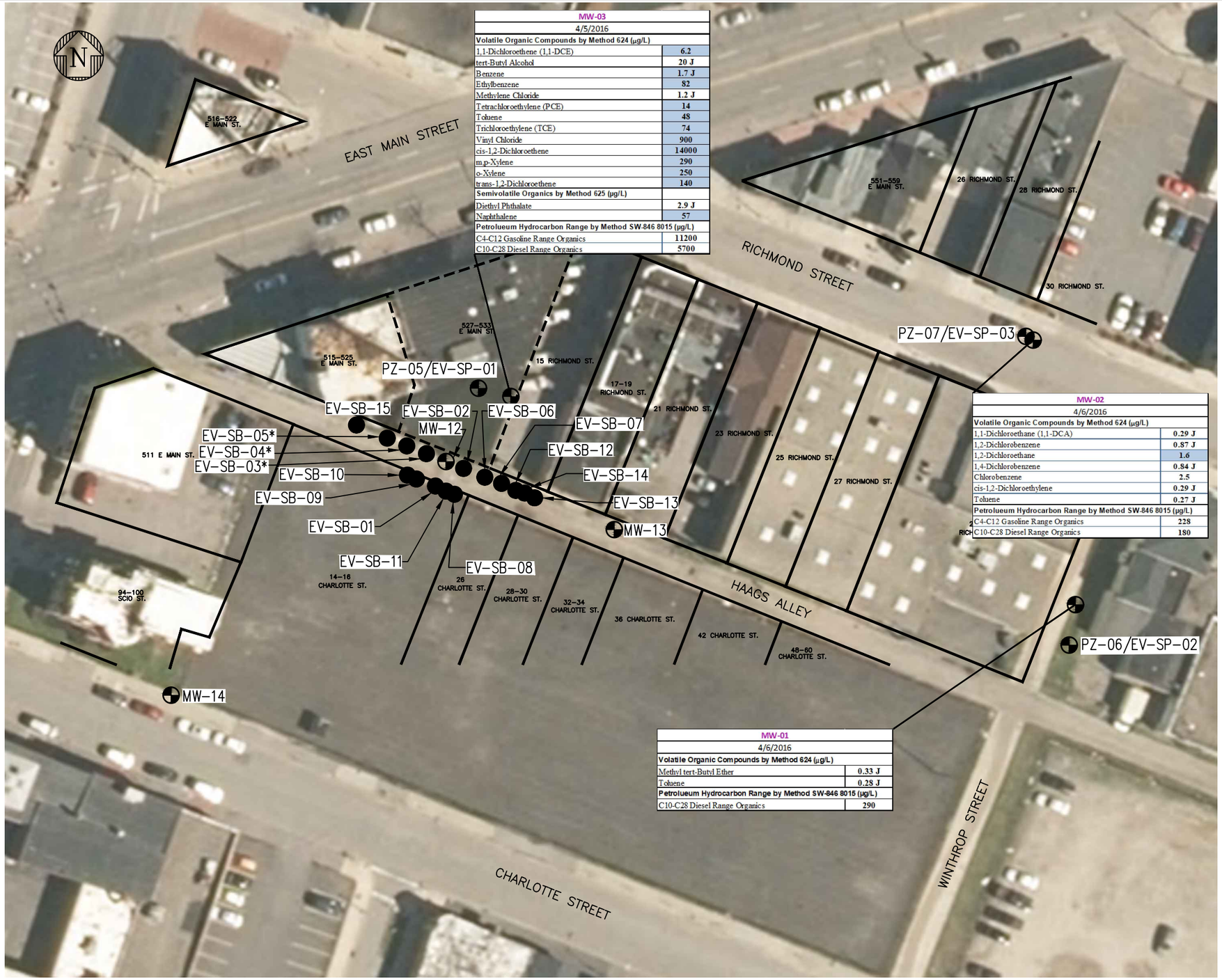
FIGURE 5–7 OVERBURDEN GROUNDWATER POSITIVE SAMPLE RESULTS
FORMER ELITE VOGUE DRY CLEANERS SITE
ROCHESTER, NEW YORK



MW-03	
4/5/2016	
Volatile Organic Compounds by Method 624 (µg/L)	
1,1-Dichloroethene (1,1-DCE)	6.2
tert-Butyl Alcohol	20 J
Benzene	1.7 J
Ethylbenzene	82
Methylene Chloride	1.2 J
Tetrachloroethylene (PCE)	14
Toluene	48
Trichloroethylene (TCE)	74
Vinyl Chloride	900
cis-1,2-Dichloroethene	14000
m,p-Xylene	290
o-Xylene	250
trans-1,2-Dichloroethene	140
Semivolatile Organics by Method 625 (µg/L)	
Diethyl Phthalate	2.9 J
Naphthalene	57
Petroluem Hydrocarbon Range by Method SW-846 8015 (µg/L)	
C4-C12 Gasoline Range Organics	11200
C10-C28 Diesel Range Organics	5700

MW-02	
4/6/2016	
Volatile Organic Compounds by Method 624 (µg/L)	
1,1-Dichloroethane (1,1-DCA)	0.29 J
1,2-Dichlorobenzene	0.87 J
1,2-Dichloroethane	1.6
1,4-Dichlorobenzene	0.84 J
Chlorobenzene	2.5
cis-1,2-Dichloroethylene	0.29 J
Toluene	0.27 J
Petroluem Hydrocarbon Range by Method SW-846 8015 (µg/L)	
C4-C12 Gasoline Range Organics	228
C10-C28 Diesel Range Organics	180

MW-01	
4/6/2016	
Volatile Organic Compounds by Method 624 (µg/L)	
Methyl tert-Butyl Ether	0.33 J
Toluene	0.28 J
Petroluem Hydrocarbon Range by Method SW-846 8015 (µg/L)	
C10-C28 Diesel Range Organics	290

LEGEND

- MONITORING WELL LOCATION
- SOIL BORING LOCATION
- APPROXIMATE PARCEL BOUNDARY
- APPROXIMATE SITE BOUNDARY
- PZ — PIEZOMETER
- MW — MONITORING WELL
- SP — SOIL PIEZOMETER LOCATION
- * — BORINGS ABANDONED DUE TO UNDERGROUND UTILITY

NOTES

1. AERIAL PHOTOGRAPHY FROM NEW YORK STATE GIS CLEARINGHOUSE – 2015.
2. GROUNDWATER RESULTS IN MICROGRAMS PER LITER (µG/L).
3. BOLD VALUES DENOTE POSITIVE HITS.
4. SHADED VALUES EXCEED THE NYSDEC TOGS #1.1.1: AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES AND GROUNDWATER EFFLUENT LIMITATIONS, 1998 (WITH UPDATES), CLASS GA GROUNDWATER STANDARDS AND GUIDANCE VALUES.

ELITE SITE PLAN

SCALE: 1" = 50'–0"

SCALE IN FEET

0 50 100 150

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FIGURE 5–14 BEDROCK GROUNDWATER POSITIVE SAMPLE RESULTS FORMER ELITE VOGUE DRY CLEANERS SITE ROCHESTER, NEW YORK

2 Identification of Standards, Criteria, Guidelines, and Remedial Action Objectives

This section identifies the site contaminants of concern (COCs) and media of interest and establishes proposed cleanup goals and specific RAOs for contaminated on-site media. Also presented are estimates of the areal extent and volumes of contaminated on-site media.

2.1 Introduction

The RI identified VOC contamination in soil, groundwater, and soil vapor at the Elite site (E & E 2018). The RI further identified potential risks posed by site contamination by evaluating contaminant concentrations and identifying potential exposure routes for human receptors. As described in Section 1.3.4, the only complete exposure pathway identified by the human health risk evaluation for current site workers and occasional visitors at the Elite site is the inhalation of vapors potentially emitted from contaminated subsurface soil and groundwater. A quantitative ecological risk evaluation for the Elite site was deemed unnecessary for the following reasons:

- The site is covered by a building and pavement and, thus, provides no natural habitats.
- Soil contamination at the site is restricted to subsurface soil beneath the building, the surrounding pavement, and the alleyway behind the building. Exposure of wildlife or other groups of ecological receptors to this subsurface soil contamination is not expected.
- Site-related chemicals are present in groundwater beneath the site; however, the extent of groundwater contamination is limited in lateral extent and there are no major water bodies or habitats immediately nearby to which contaminated groundwater could discharge.

RAOs were developed (see Section 2.3) to reduce or eliminate the potential risk of vapor inhalation by eliminating this route of exposure or reducing the contaminant concentrations in impacted media to meet applicable chemical-specific standards at the site. Chemical-specific cleanup goals were developed for each

media at the site to evaluate the areal extent or volume of each medium that must be addressed to meet the RAOs.

SCGs include state requirements used to establish cleanup goals and identify the locations where remedial actions are warranted. The following sections present potentially applicable SCGs and other standards and establish proposed cleanup goals and specific RAOs for contaminated on-site media.

2.2 Potentially Applicable Standards, Criteria, and Guidance and Other Criteria

SCGs include applicable or relevant and appropriate requirements as well as other criteria.

- **Applicable Requirements** are legally enforceable standards or regulations that have been promulgated under state law, such as groundwater standards for drinking water.
- **Applicable or Relevant and Appropriate Requirements (ARARs)** include those requirements that have been promulgated under state law that may not be "applicable" to the specific contaminant released or the remedial actions contemplated but are sufficiently similar to site conditions to be considered relevant and appropriate. If a relevant or appropriate requirement is well suited to a site, it carries the same weight as an applicable requirement during the evaluation of remedial alternatives.
- **To Be Considered Criteria (TBCs)** are non-promulgated advisories or guidance issued by state agencies that may be used to evaluate whether a remedial alternative is protective of human health and the environment in cases where there are no standards or regulations for a particular contaminant or site condition. These criteria may be considered along with SCGs when establishing cleanup goals for protection of human health and the environment.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media-specific SCGs. NYSDEC has developed SCGs for groundwater, surface water, sediments, and soil. The New York State Department of Health (NYSDOH) has developed SCGs for drinking water and soil vapor intrusion. For a full listing of all SCGs, see: http://www.dec.ny.gov/regulations/61794.html

2.3 Remedial Action Objectives

The RAOs for on-site remedial actions were developed based on information presented in the RI (E & E 2018), including the contaminants identified at the site and existing or potential exposure pathways in which the contaminants may affect human health. The identified RAOs include the following:

Groundwater

RAOs for Public Health Protection.

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards;
- Prevent contact with or inhalation of volatiles from contaminated groundwater;

RAOs for Environmental Protection.

- Restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable;
- Prevent the discharge of contaminants to surface water;
- Remove the source(s) of ground or surface water contamination;

Soil

RAOs for Public Health Protection.

- Prevent ingestion of and direct contact with contaminated soil;
- Prevent inhalation of or exposure to contaminants volatilizing from contaminants in soil and groundwater;

RAOs for Environmental Protection.

- Prevent migration of contaminants that would result in groundwater or surface water contamination; and

Soil Vapor

RAOs for Public Health Protection.

- Mitigate potential impacts on public health resulting from existing or potential soil vapor intrusion into the building at the site.

2.4 Cleanup Objectives and Volumes of Impacted Media

The following sections describe the process used to select numeric cleanup objectives and estimate the volume of impacted material.

2.4.1 Soil

2.4.1.1 Selection of Soil Cleanup Objectives

Standards

Numeric cleanup goals identified for soils at the Elite site are contained in New York Codes, Rules and Regulations (NYCRR) Part 375-6.8 (NYSDEC 2006). This regulation presents soil cleanup objectives for the protection of ecological resources, groundwater, and public health. The soil cleanup objectives for the protection of public health are based on land use criteria, which include:

- **Unrestricted use:** a use without imposed restrictions, such as environmental easements or other land use controls; or
- **Restricted use:** a use with imposed restrictions, such as environmental easements that, as part of the remedy selected for the site, require a site management plan that relies on institutional or engineering controls to manage exposure to contamination remaining at a site. Restricted use is separated into the following four categories:

  1. **Residential use** is a land use category that allows a site to be used for any use other than raising livestock or producing animal products for human consumption. Restrictions on the use of groundwater are allowed, but no other institutional or engineering controls relative to the residential soil cleanup objectives, such as a site management plan, would be allowed. This land use category will be considered for single-family housing.
  2. **Restricted-residential use** is a land use category that shall be considered only when there is common ownership or a single owner/managing entity of the site. This category permits active recreational uses, which are public uses with a reasonable potential for soil contact (e.g., parks). Restricted-residential use shall, at a minimum, include restrictions that prohibit vegetable gardens and single-family housing on the site. Community vegetable gardens may be considered with NYSDEC's approval.
  3. **Restricted-commercial use** is a land use category for the primary purpose of buying, selling, or trading of merchandise or services. Commercial use includes passive recreational uses, which are public uses with limited potential for soil contact.
  4. **Restricted-industrial use** is a land use category for the primary purpose of manufacturing, production, fabrication, or assembly processes and ancillary services. Industrial uses do not include any recreational component.

Based on the City of Rochester Zoning Map (City of Rochester 2017), the site is zoned as CCD-M, which is the Main Street District portion of the Center City District. According to the City of Rochester Chapter 120, Article XI, Section 68, Zoning Law (City of Rochester 2017), the CCD is intended to "encourage residential development while retaining and further developing a broad range of commercial, office, institutional, public, cultural and entertainment uses and activities." Additionally, the Main Street District was designed to be "the most important civic/commercial street in the CCD and should be designed as the primary public ceremonial route in the City." Assuming that the site remains commercially zoned, the 6 NYCRR Part 375-6.8 SCO selected for the site is Restricted-Commercial. This closely represents the future use of this site and is based on considerations in 6 NYCRR Part 375-1.8 (f) (9).

The SCOs presented in 6 NYCRR Subpart 375-6.8 for the protection of ecological resources were not considered, as determined in the RI and in accordance with CP-51. A quantitative ecological risk evaluation for the Elite site was deemed unnecessary, because there are no natural terrestrial habitats on-site. Exposure of

wildlife or other groups of ecological receptors to this subsurface soil contamination is not expected. Furthermore, there are no major water bodies or habitats immediately nearby to which contaminated groundwater could discharge.

Selection Process

The following were used as the basis for selecting the preliminary cleanup values:

- 6 NYCRR Part 375-6.8 SCOs for the protection of groundwater and commercial use were selected as the cleanup objectives;
- The maximum observed concentration for each compound was then compared to the selected cleanup goal in order to determine which compounds may require cleanup; and
- The contaminants identified for cleanup were reviewed to determine whether they are site-related and whether cleanup is warranted.

2.4.1.2 Selection of Contaminants of Concern

Based on historic site operations and the concentrations detected in environmental media, PCE and its associated degradation products are the primary COCs in the soil at this site.

2.4.1.3 Determination of the Extent of Contaminated Soil

A total of 15 subsurface soil samples were collected during the remedial investigation to characterize the horizontal and vertical extent of soil contamination at the site and provide lithological information. cis-1,2-DCE and xylene were detected in shallow soil within the building near the former USTs. The concentration of xylene detected on-site (68 part per million [ppm]) exceeds the SCO for unrestricted use (0.26 ppm); the concentration of cis-1,2-DCE detected on-site (16 ppm) exceeds the SCO for unrestricted use (0.25 ppm); and the concentration of PCE detected at the bottom of the tank pit in Area 1 (1,400 ppm) exceeds the SCO for unrestricted use (1.3 ppm).

2.4.2 Soil Vapor Intrusion

2.4.2.1 Selection of Soil Vapor Intrusion Cleanup Objectives

The following sections describe the process used to select cleanup objectives for soil vapor intrusion for the building at the Elite site.

Standards

According to the NYSDOH, New York State “does not have any standards, criteria or guidance values for concentrations of volatile chemicals in subsurface vapors (either soil vapor or sub-slab vapor)” (NYSDOH 2006). However, Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH 2006) and subsequent updates present air guideline values, derived by the NYSDOH, for PCE and TCE in indoor and outdoor air.

Background

Sample results were evaluated in accordance with the NYSDOH Soil Vapor Intrusion Guidance in order to determine whether actions were needed to address exposure via soil vapor intrusion. The nature and extent of the soil vapor contamination was delineated based on the findings of the soil vapor intrusion investigations and the evaluation of the groundwater plume. If the owners of properties where sampling was previously declined request to have their properties sampled in the future, NYSDEC, in consultation with the NYSDOH, shall assess the need for soil vapor intrusion sampling and take appropriate action.

2.4.2.2 Determination of the Extent of Soil Vapor Intrusion

Soil vapor samples collected off-site indicate that PCE (71.1 micrograms per cubic meter [µg/m^3]), TCE (42.7 µg/m^3), cis-1,2 DCE (23,600 µg/m^3), and vinyl chloride (6,640 µg/m^3) are present in the soil vapor. A total of 20 VOCs were detected from one sub-slab indoor air sample collected from the former soil vapor extraction system inside the former Elite building. Total chlorinated VOCs in these samples ranged from 0.28 µg/m^3 to 2,700 µg/m^3, with cis-DCE, PCE, and TCE detected at the highest concentrations. Although a majority of the total VOCs were chlorinated compounds, a few aromatic compounds were also detected. This sampling location is inside the former Elite building where the dry cleaning solvent storage tanks were located. No additional soil vapor samples were collected, but it is assumed that soil vapor intrusion can occur in the Elite building, and may be a factor in surrounding buildings.

2.4.3 Groundwater

2.4.3.1 Selection of Groundwater Cleanup Objectives

Numeric cleanup goals identified for groundwater quality at the Elite site are contained in NYSDEC's Technical and Operational Guidance Series (1.1.1) (TOGS 1.1.1) – *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations* (NYSDEC 1998). The primary purpose of TOGS 1.1.1 is to provide a compilation of ambient water quality standards and guidance values, including the standards promulgated in 6 NYCRR 703.5 and guidance values for chemicals with no promulgated standard.

Selection Process

The preliminary cleanup values were selected as follows:

- TOGS 1.1.1 – *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations* were selected as the cleanup objectives;
- The maximum observed concentration for each compound was then compared to the selected cleanup goal in order to determine which compounds may require cleanup; and
- The contaminants identified for cleanup were reviewed to determine whether they are site-related and whether cleanup is warranted.

2.4.3.2 Selection of Contaminants of Concern

Based on historic site operations and the concentrations detected in environmental media, PCE and its associated degradation products are the primary COCs in groundwater at the Elite site.

2.4.3.3 Determination of the Extent of the Contaminated Groundwater Plume

The analytical results for groundwater samples collected during the RI were used to determine the approximate lateral and vertical extent of the chlorinated VOC groundwater plume (see Figure 2-1). The following summarizes the analytical results:

- **VOCs:** Overburden groundwater beneath the site contains aromatic hydrocarbons and chlorinated solvents at concentrations above drinking water criteria, and these contaminants have migrated up to approximately 150 feet to the east of the site. These same contaminants were detected in the bedrock beneath the site. The extent of migration off-site is unknown as the closest off-site bedrock wells are located approximately 250 feet to the east-northeast.
- **SVOCs:** During the remedial investigation, one SVOC (naphthalene) was detected in the previously installed overburden monitoring well MW-12 (20 µg/L) and the newly installed bedrock monitoring well MW-03 (57 µg/L) at concentrations that exceed the NYSDEC Class GA guidance value.

Petroleum Hydrocarbons: The highest concentrations of C4-C12 GROs were detected in the overburden beneath the building slab and adjacent parking lot to the east. Additional detections occurred off-site to the east; these appear to be isolated occurrences based on elevated soil concentrations that are not believed to be site related. C10-C28 DROs were also detected in the overburden beneath the building slab and adjacent to the southeast corner of the building. Floating product was also detected in the overburden beneath the southeast corner of the building and in the bedrock in the adjacent parking lot to the east. C28-C40 oil-range organics were not detected in well or piezometer samples.

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Elite Vogue OVR CVOC Concentrations.srf-01/25/18

Notes:
1) cVOCs = sum of chlorinated volatile organic compounds.

ecology and environment engineering, p.c.
Global Environmental Specialists

Legend

ND = not detected

EV-SB-09
62
Boring ID with concentration in µg/kg

FEET
0 40 80 120

Total cVOCs in Micrograms per Liter

1 5 10 50 100 1000

Figure 2-1
Total cVOCs in Overburden Groundwater
Former Elite Vogue Dry Cleaners Site
Rochester, New York
March - April 2016

3 Identification of Alternatives

3.1 Introduction

This section identifies the alternatives that may be used at the Elite site to achieve the RAOs. At the direction of NYSDEC, this Third-Phase FS follows the streamlined format for an alternative analysis report presented in NYSDEC's DER-10. Therefore, the First-Phase FS (Development of Remedial Alternatives) and Second-Phase FS (Preliminary Screening of Alternatives) are not required. Table 3-1 presents a summary of the results of a brief preliminary screening of remedial technologies. Remedial technologies that cannot be implemented at the site or that may not be effective based on anticipated on-site conditions were not considered further in this FS.

In collaboration with NYSDEC, four alternatives were identified for the soil, groundwater, and soil vapor contamination at the Elite site. These alternatives are briefly described below, and detailed descriptions and evaluations of the alternatives are presented in Section 4.

3.2 Alternative No. 1: No Further Action

The No Further Action (NFA) alternative recognizes the remediation of the site completed by the IRM described in Section 1.2.2. This alternative has been carried through the FS for comparison purposes, as required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This alternative would be acceptable only if it is demonstrated that the contamination at the site is below the RAOs, or that natural processes will reduce the contamination to acceptable levels. This alternative does not include institutional controls.

3.3 Alternative No. 2: No Further Action with Site Management

This alternative recognizes the remediation of the site completed by the IRM described in Section 1.2.2 and includes site management and institutional and engineering controls to confirm the effectiveness of the IRM. This alternative maintains engineering controls in the form of paved areas, which were implemented as part of the IRM, and includes institutional controls in the form of an environmental easement and site management plan.

3.4 Alternative No. 3: Restoration to Pre-Disposal or Unrestricted Conditions

This alternative is intended to restore the groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable. This alternative includes the removal of the on-site building slab and excavation and off-site disposal of all waste and soil contaminated at levels above the unrestricted SCOs. The excavated area would be backfilled with clean fill material, and the building slab would be replaced. This remedy does not rely on institutional or engineering controls to prevent future exposure. No site management plan, site restrictions, or periodic reviews are included as part of this alternative.

3.5 Alternative No. 4: Soil Vapor Extraction with In Situ Chemical Oxidation

This alternative includes installation of an SVE system to remove VOCs from the vadose zone by applying a vacuum to one or more installed well points. In situ chemical oxidation (ISCO) treatment would also be implemented to treat groundwater via injection of a reactive chemical oxidant at one or more injection wells. Additionally, this alternative includes long-term monitoring and institutional controls.

Table 3-1 Summary of Remedial Technologies, Former Elite Vogue Dry Cleaners Site, Rochester, New York

General Response Actions and Remedial Technology	Brief Description	Preliminary Screening Evaluation	Feasible Technology
No Further Action			
	No further action to remedy soil conditions at the site.	Ineffective for the protection of human health and the environment.	No
Monitored Natural Attenuation (MNA)			
	Ongoing physical, chemical, and/or natural biological processes to reduce the concentrations of contaminants at the site. Includes monitoring of existing groundwater wells to provide documentation that these processes are occurring.	MNA may be appropriate if ongoing physical, chemical, and/or natural processes would achieve the RAOs in a reasonable time frame compared to active remedial measures. However, geochemical and microbiological analyses of groundwater samples at this site indicate that the potential for anaerobic biodegradation is limited and likely not occurring at a significant rate.	No
Long-Term Monitoring			
	Monitoring of existing groundwater wells to provide documentation that the remedial measure is reducing contaminants at the site.	Provides evidence regarding whether or not a remedial activity is working.	Yes
Institutional Controls			
	Includes public notification, deed restrictions, fencing, and signs.	Does not reduce contamination concentrations but can reduce potential exposure to the contaminated media.	Yes
In Situ Treatment			
Thermal			
Thermally Enhanced Soil Vapor Extraction (SVE)	Uses electrical resistance/electromagnetic/radio frequency heating, or hot-air steam injection to facilitate volatilization and extraction of the contaminant vapors.	Based on the current site conditions, this technology is likely cost prohibitive.	No

Table 3-1 Summary of Remedial Technologies, Former Elite Vogue Dry Cleaners Site, Rochester, New York

General Response Actions and Remedial Technology	Brief Description	Preliminary Screening Evaluation	Feasible Technology
Thermal Desorption (thermal blankets and wells)	Thermal blankets and thermal wells are placed on a contaminated ground surface. A majority of contaminants are vaporized out by thermal conduction. Vapors are drawn out by a vacuum system, oxidized, cooled, and passed through activated-carbon beds.	Based on the current site conditions, this technology is likely cost prohibitive.	No
Physical/Chemical			
SVE	A negative pressure gradient is created by the application of a vacuum to contaminated soils through extraction wells, which strips volatile constituents from the soil in the vadose zone, causing movement of vapors toward the wells.	This technique is not effective in the saturated zone, and would require additional remedial technologies to treat saturated zones.	Yes
Chemical Oxidation	Commonly used oxidizing agents include ozone, hydrogen peroxide, permanganate, hypochlorite, chlorine, and chlorine dioxide.	Highly permeable soil is conducive for injection due to the ability to efficiently distribute the oxidative material.	Yes
Pump-and-Treat System	Contaminated groundwater is pumped out of the ground and treated with methods such as granulated activated carbon, chemical reagents, or air stripping.	This technology involves a relatively longer remediation period compared to other treatment technologies.	No
Solidification/Stabilization	Solidification/stabilization treatment systems, sometimes referred to as fixation systems, seek to trap or immobilize contaminants within the host medium using chemical reactions instead of removing them through chemical or physical treatment.	Stabilization technologies have not been successfully demonstrated on a full-scale basis for treating organics. Solidified material may hinder future site use. Treatability studies would be required prior to implementing this technology.	No

Table 3-1 Summary of Remedial Technologies, Former Elite Vogue Dry Cleaners Site, Rochester, New York

General Response Actions and Remedial Technology	Brief Description	Preliminary Screening Evaluation	Feasible Technology
Biological			
Biological Treatment	Uses indigenous or selectively cultured microorganisms to reduce hazardous organic compounds into water, carbon dioxide, and hydrogen chloride.	This technology involves a relatively longer remediation period compared to other treatment technologies, but can enhance natural attenuation. The site does not contain sufficient quantities of native bacteria.	No
Soil Excavation			
On-Site Disposal	Requires construction of a secure landfill that meets RCRA and state requirements.	Containment of the waste material in an on-site landfill is not possible at this small commercial facility.	No
Off-Site Disposal	Involves the excavation and hauling of contaminated material to appropriate commercially licensed disposal facilities. The non-hazardous spoils would go to a non-hazardous/solid waste facility, while the hazardous spoils would go to a RCRA-permitted facility.	Due to the location of the contamination, excavation and disposal of contaminated soil at a permitted landfill is not an effective method of removing the source of site contamination.	No

Key:
MNA = Monitored Natural Attenuation
RCRA = Resource Conservation and Recovery Act.
SVE = Soil vapor extraction.

4 Detailed Analysis of Alternatives

4.1 Introduction

This detailed analysis of remedial action alternatives presents the relevant information for selecting a remedy for the site. In the detailed analysis, the alternatives identified in Section 3 are described in detail and evaluated on the basis of environmental benefits and costs using criteria established by NYSDEC in Final Commissioner Policy CP-51/Soil Cleanup Guidance (NYSDEC 2010), DER-10, and 6 NYCRR Part 375. This approach provides the information needed to compare the merits of each alternative and select an appropriate remedy that satisfies the RAOs for the site.

4.1.1 Detailed Evaluation of Criteria

This section presents a summary of the nine evaluation criteria that were used to evaluate the alternatives.

Overall Protection of Human Health and the Environment

This criterion provides an overall assessment of protection of human health and the environment and is based on a composite of factors assessed under the evaluation criteria, especially short-term effectiveness, long-term effectiveness and performance, and compliance with cleanup goals.

Compliance with SCGs

This criterion is used to evaluate the extent to which each alternative may achieve the proposed cleanup goals. The proposed cleanup goals were developed based on the SCGs presented in Section 2.

Short-Term Effectiveness and Impacts

This criterion addresses the impacts of the alternative during the construction and implementation phase until the RAOs are met. Factors to be evaluated include protection of the community during the remedial actions; protection of workers during the remedial actions; and the time required to achieve the RAOs. Several alternatives described in the following sections may not be effective in meeting the RAOs in less than 30 years. Therefore, references to short-term impacts and effectiveness may include discussions of impacts/effectiveness over a period of 30 years.

Long-Term Effectiveness and Permanence

This criterion addresses the long-term protection of human health and the environment after completion of the remedial action. It assesses the effectiveness of the remedial action to manage the risk posed by untreated wastes and/or the residual contamination remaining after treatment and the long-term reliability of the remedial action.

Reduction of Toxicity, Mobility, and Volume through Treatment

This criterion addresses NYSDEC's preference for selecting "remedial technologies that permanently and significantly reduce the toxicity, mobility, and volume" of the COCs at the site. It assesses the extent to which the treatment technology destroys toxic contaminants, reduces the mobility of the contaminants using irreversible treatment processes, and/or reduces the total volume of contaminated media.

Implementability

This criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of services and materials required during implementation. Technical feasibility refers to the ability to construct and operate a remedial action for the specific conditions at the site and the availability of the necessary equipment and technical specialists. Technical feasibility also considers construction and operation and maintenance (O&M) difficulties, reliability, ease of undertaking additional remedial action (if required), and the ability to monitor effectiveness. Administrative feasibility refers to compliance with applicable rules, regulations, and statutes and the ability to obtain permits or approvals from government agencies or offices.

Land Use

This criterion is an evaluation of the current, intended, and reasonably foreseeable use of the site and its surroundings as it relates to an alternative or remedy when unrestricted levels would not be achieved. Additionally, this evaluation must consider various land use factors, including but not limited to current and historical development patterns, consistency of proposed use, applicable zoning laws and maps, brownfield opportunity areas, proximity to other properties, environmental justice concerns, federal or state land-use designations, population growth patterns, accessibility to infrastructure, proximity to cultural and natural resources, proximity to floodplains, geography and geology, potential vulnerability of groundwater to contamination, and current institutional controls.

Cost

This criterion evaluates the estimated capital costs, long-term O&M costs, and environmental monitoring costs. The estimates included herein (unless otherwise noted) assume engineering and administrative costs would equal 15% of the capital costs and contingency costs would equal 30% of the capital costs. A present-worth analysis was completed to compare the remedial alternatives on the basis of a single dollar amount (total cost) for the base year. For the present-worth analysis, assumptions were made regarding the interest rate applicable to borrowed

funds and the average inflation rate. A discount rate of 2% before taxes and after inflation was assumed based on current economic conditions. In addition, according to the Guidance for Conducting Remedial Investigations and Feasibility Studies under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), in general, the period of performance for costing purposes should not exceed 30 years for the purpose of the detailed analysis. Therefore, the following detailed analysis of remedial alternatives follows this guidance. The comparative cost estimates are intended to reflect actual costs with an accuracy of +50% to -30%.

Community Acceptance

This criterion evaluates the issues and concerns the public may have regarding each alternative. This criterion will be addressed in the ROD once comments on the proposed plan have been received. Therefore, community acceptance will not be discussed further in this report.

Detailed descriptions of the alternatives listed in Section 3 and the evaluation criteria are described below. Cost estimates for each alternative are presented in Tables 4-1 through 4-3. Table 4-4 presents a summary of these costs.

4.2 Remedial Alternatives

4.2.1 Alternative No. 1: No Further Action

4.2.1.1 Description

The No Further Action alternative recognizes the remediation of the site completed by the IRM described in Section 1.2.2 and involves taking no further action to remedy site conditions. The NCP at 40 Code of Federal Regulations (CFR) §300.430(e) (6) provides that a No Action alternative be considered at every site as a baseline for comparison with other alternatives. This alternative does not include remedial action, institutional or engineering controls, or long-term monitoring.

4.2.1.2 Detailed Evaluation of Criteria

Overall Protection of Human Health and the Environment

This alternative is not protective of human health and the environment, because the site would remain in its present condition. VOC contamination in the soil would remain at the site and continue to be a source of soil vapor contamination in the on-site building. Uncontrolled excavations could lead to VOC exposure and, therefore, risk to human health. A quantitative ecological risk evaluation for the Elite site was deemed unnecessary because there are no natural terrestrial habitats on-site. Exposure of wildlife or other groups of ecological receptors to this subsurface soil contamination is not expected. Furthermore, there are no major water bodies or habitats immediately nearby to which contaminated groundwater could discharge.

Compliance with SCGs
Site contaminants (VOCs) are not expected to decrease appreciably over time. Therefore, this alternative would not comply with the chemical-specific SCGs for the site.

Short-Term Effectiveness and Impacts
No short-term impacts are anticipated during the implementation of this alternative since no remedial activities are involved. This alternative does not include source removal or treatment and would not meet the RAOs (as defined in Section 2.3) in a reasonable or predictable time frame.

Long-Term Effectiveness and Permanence
Because this alternative does not involve the removal or treatment of contaminated soil or a decrease in the volume of contamination, the risks associated with the migration of contaminants to groundwater and indoor air would remain essentially the same. This alternative is, therefore, not effective in the long term.

Reduction of Toxicity, Mobility, and Volume through Treatment
This alternative does not involve removal or treatment of contaminated soil. Therefore, the toxicity, mobility, and volume of contamination would not be reduced.

Implementability
There are no actions to implement under this alternative.

Land Use
The land use is not expected to change with this alternative. Furthermore, this alternative does not involve the remediation of contaminated groundwater or soil. Therefore, under this alternative, groundwater is not expected to achieve NYSDEC Class GA groundwater standards.

Cost
There are no costs associated with this alternative.

4.2.2 Alternative No. 2: No Further Action with Site Management
4.2.2.1 Description
This alternative recognizes the remediation of the site completed by the IRM described in Section 1.2.2 and includes engineering and institutional controls. Long-term monitoring of existing groundwater wells would be performed to determine whether contaminant migration is occurring. Long-term monitoring using overburden and bedrock groundwater monitoring wells would be performed to track VOC levels in groundwater. Some of these monitoring wells may be located on-site, while some may be located off-site and may be sampled to understand groundwater concentrations outside of the plume. Institutional controls would be implemented in the form of an environmental easement and site management plan. The environmental easement would include groundwater use restrictions and restricting the future use of the site to commercial use. If any unanticipated

post-remedy or long-term changes occur in the plume configuration, the installation of additional wells may be necessary to continue long-term monitoring of the contamination plume.

For costing purposes, it is assumed that the eight groundwater monitoring wells would be sampled semiannually for the first year and annually for four years thereafter. After that, the wells would be sampled every five years for a total duration of 30 years. The samples would be analyzed at an off-site laboratory for VOCs by Method SW8260. Because the migration of contamination at the site is slow (2.2 feet/year on average [E & E 2018]), more frequent groundwater monitoring is not warranted.

4.2.2.2 Detailed Evaluation of Criteria

Overall Protection of Human Health and the Environment

Under this alternative, the site would initially remain in its present condition, with the potential for natural attenuation to occur over time. VOC contamination in the soil would remain at the site and continue to be a source of soil vapor contamination in the on-site building. The implementation of institutional controls such as deed restrictions to control future use/activities at the site would provide some long-term protection of human health. A quantitative ecological risk evaluation for the Elite site was deemed unnecessary because there are no natural terrestrial habitats on site. Exposure of wildlife or other groups of ecological receptors to this subsurface soil contamination is not expected. Furthermore, there are no major water bodies or habitats immediately nearby to which contaminated groundwater could discharge.

Compliance with SCGs

Based on the results of the evaluation performed during the RI for pH and oxidation reduction potential (ORP) and the presence of PCE degradation products (e.g., TCE, cis-DCE, and vinyl chloride), oxygen, nitrate, ferrous/total iron, sulfate, sulfide, and chloride in the source area, it was determined that there is limited evidence of anaerobic biodegradation at the site. Based on the geochemical and microbiological results from the RI, reductive dechlorination of PCE and TCE is occurring; however, the process is slow, incomplete, and likely not an effective means of reducing contaminant concentrations to regulatory levels within an acceptable time frame. Therefore, this alternative would not comply with the chemical-specific SCGs for the site.

Short-term Effectiveness and Impacts

Controlling future use and activities on the site through the use of institutional controls would provide some short-term protection to current site workers and occasional visitors to the site.

Long-Term Effectiveness and Permanence

This alternative would rely on natural attenuation to provide long-term protection of human health and the environment because this alternative does not involve removal or treatment of contaminated soil. Institutional controls implemented under this alternative would be effective in the long term as long as they are interpreted correctly, not modified by future site users, and enforced.

Reduction in Toxicity, Mobility, or Volume through Treatment

This alternative does not involve the removal or treatment of contaminated soil. Therefore, the toxicity, mobility, and volume of contamination would not be expected to decrease.

Implementability

This alternative can be readily implemented on a technical and administrative basis using typical institutional control practices and procedures. Institutional controls are relatively inexpensive, and ongoing monitoring is easily implemented.

Land Use

The current land use will not change under this alternative and will remain commercial. The property will be limited in its future potential uses via implementation of a deed restriction.

Cost

The 2018 total present-worth cost of Alternative 2 based on a 30-year period is $272,300. Table 4-1 presents the quantities, unit costs, and subtotal costs for the various work items in this alternative. Cost estimating information was obtained from vendor quotes, RS Means Cost Data series, and engineering judgment. Groundwater sampling and renewal of institutional controls are assumed with this alternative.

4.2.3 Alternative No. 3: Restoration to Predisposal or Unrestricted Conditions

4.2.3.1 Description

This alternative involves the removal of the building slab, shoring of the on-site building in order to excavate all waste and soil contaminated at levels above the unrestricted soil cleanup objectives, and disposal of the contaminated waste and soil at an off-site location. The estimated volume of contaminated soil is discussed in Section 1.3.2 and is assumed to be 35,000 cubic feet (1,300 CY). The excavated area would then be backfilled with clean fill meeting the requirement of 6 NYCRR Part 375-6.7(d), and a new slab would be poured. While the contaminated soil would be removed from the site under this alternative, groundwater contamination would still exist. Therefore, long-term groundwater monitoring has been included under this alternative along with periodic reviews.

Institutional controls would also be implemented under this alternative, including an environmental easement and Site Management Plan. The environmental easement would:

- require the remedial party or 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);
- allow the use and development of the controlled property for commercial use as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- prohibit the use of groundwater as a source of potable or process water unless it is treated in a manner determined by the NYSDOH; and
- require compliance with the Department-approved Site Management Plan.

The Site Management Plan would include the following:

- an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure institutional and/or engineering controls remain in place and are effective; and
- a Monitoring Plan to assess the performance and effectiveness of the remedy.

4.2.3.2 Detailed Evaluation of Criteria

Overall Protection of Human Health and the Environment

Excavation of the subslab soil addresses the source of the contamination, which is the most significant threat to public health and the environment. Therefore, through removal and off-site disposal, exposure risks associated with the inhalation of soil vapor may be sufficiently minimized. However, this alternative does not address the groundwater plume.

The removal of contaminated material would provide long-term protection of human health. A quantitative ecological risk evaluation for the Elite site was deemed unnecessary because there are no natural terrestrial habitats on-site. Removal of the contaminated subsurface soil would preclude the exposure of wildlife and other ecological receptors to the contamination. Furthermore, there are no major water bodies or habitats immediately nearby to which any remaining contaminated groundwater could discharge.

Compliance with SCGs

This alternative would meet the SCGs since this alternative addresses the source area of contaminated site soils exceeding the restricted commercial SCOs. It also would create the conditions necessary to restore groundwater quality to the extent practicable. However, groundwater contamination above the SCGs would remain on-site until removed by natural processes.

Short-term Effectiveness and Impacts

The excavation and removal of contaminated soils would provide short-term protection to current site workers and occasional visitors to the site, and eliminate the need to further control future use and activities on the site through the use of institutional controls. During construction, a potential short-term impact includes the generation of fugitive dust during soil excavation and subsequent loading into haul trucks.

Long-term Effectiveness and Permanence

This alternative would be effective in providing long-term protection of human health and the environment because the contamination source would be removed to an off-site facility. Removal of the primary source area would decrease the levels of VOC contamination in the soil and reduce the risks associated with the inhalation of indoor air containing vapors emitted from contaminated subsurface soil. This alternative does not address groundwater, and the long-term effectiveness specific to groundwater is limited to the effectiveness of natural attenuation.

Reduction in Toxicity, Mobility, or Volume through Treatment

The toxicity of the contamination would be reduced because this alternative involves the physical removal of contaminants via soil excavation and off-site disposal.

Implementability

This alternative would require short-term direct contact with the source material during construction. The remedy would also require disposal at an appropriate disposal facility and related transportation, which could become cost prohibitive.

Land Use

This alternative would not have a large footprint, but it would require the building slab be removed during construction. This alternative would physically remove the source material to attain unrestricted conditions for soil. The current and anticipated future land use at this site is expected to remain commercial.

Cost

The cost of this alternative is limited to capital costs and is $3,107,800. Table 4-2 presents the quantities, unit costs, and subtotal costs for the various work items in this alternative. Cost estimating information was obtained from vendor quotes, RS Means Cost Data series, and engineering judgment. No institutional costs, annual costs, or periodic costs are included under this alternative.

4.2.4 Alternative No. 4: Soil Vapor Extraction (SVE) with In Situ Chemical Oxidation (ISCO)

4.2.4.1 Description

This alternative involves the treatment of soil by installing an SVE system to remove VOCs from the vadose zone. Because SVE systems are not effective below the water table, ISCO would be implemented via vertical injection wells to treat contaminated groundwater.

The SVE system would include one or more wells installed within the vadose zone under the building's slab, allowing VOCs to be physically removed by applying a vacuum to the well. Water that may be captured through the SVE system would be treated before being disposed of off-site at an approved disposal facility. The system would be designed by first implementing a pilot test based on previous similar sites and contamination levels. The pilot test would include installation of one well within the vadose zone and regular monitoring for a 1-week period. The pilot test monitoring results would be used to design a site-wide system to handle soil vapors.

Saturated soil and groundwater would be treated using ISCO through the injection of a highly reactive substance in the groundwater and vadose zone of the water table. This treatment initiates the breaking of chemical bonds and the degradation of contaminants in the soil and groundwater.

In addition to the SVE and ISCO application, long-term monitoring and institutional controls would be implemented under this alternative. For long-term monitoring, it is recommended that the six existing groundwater wells be sampled quarterly for the first year and annually for four years thereafter. Additionally, the five extraction wells installed under this alternative would be sampled with Summa Canisters. Beginning the fifth year, the wells would be sampled every five years for a total duration of 30 years. The groundwater samples would be analyzed for VOCs by Method SW8260, while the air samples would undergo a TO-15 analysis at an off-site laboratory. Because the migration of contamination at the site is slow (2.2 feet/year on average [E & E 2018]), more frequent groundwater monitoring is not warranted.

Institutional controls implemented under this alternative would include an environmental easement and Site Management Plan. The environmental easement would:

- require the remedial party or 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);
- allow the use and development of the controlled property for commercial use as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- prohibit the use of groundwater as a source of potable or process water unless it is treated in a manner determined by the NYSDOH; and
- require compliance with the Department-approved Site Management Plan.

The Site Management Plan will include the following:

- an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific

requirements necessary to ensure institutional and/or engineering controls remain in place and are effective;

- a Monitoring Plan to assess the performance and effectiveness of the remedy; and
- an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, inspection, and reporting of all mechanical or physical components of the SVE system.

4.2.4.2 Detailed Evaluation of Criteria

Overall Protection of Human Health and the Environment

Implementation of ISCO addresses the source of the contamination, which is the most significant threat to public health and the environment. Therefore, through degradation of the contaminants, exposure risks associated with the inhalation of soil vapor may be sufficiently minimized.

Furthermore, installation of an SVE in the building would provide protection of human health from the risk due to soil vapor intrusion. The implementation of institutional controls such as an environmental easement to control future use/activities at the site would provide some long-term protection of human health. A quantitative ecological risk evaluation for the Elite site was deemed unnecessary, because there are no natural terrestrial habitats on-site. Exposure of wildlife or other groups of ecological receptors to subsurface soil contamination is not expected. Furthermore, there are no major water bodies or habitats immediately nearby to which contaminated groundwater could discharge.

Compliance with SCGs

This alternative would meet the SCGs since this alternative addresses the source area of contaminated site soils exceeding the restricted commercial SCOs. It also would create the conditions necessary to restore groundwater quality to the extent practicable. However, soil and groundwater contamination above SCGs would remain on-site for many years.

Short-term Effectiveness and Impacts

The installation of an SVE in the building at the site alternative would provide some short-term protection to current site workers and occasional visitors to the site. Controlling future use and activities on the site through the use of institutional controls would ensure that the site workers' health is protected. Furthermore, short-term impacts are not anticipated through the implementation of ISCO.

Long-term Effectiveness and Permanence

This alternative would be effective in providing long-term protection of human health and the environment because ISCO involves the treatment of contaminated soil through the use of chemical reductants. The treatment of soil and groundwater in the primary source area would decrease the levels of VOC contamination in

the soil and groundwater and reduce the risks associated with the inhalation of indoor air containing vapors emitted from contaminated subsurface soil and groundwater.

In addition, installation of the SVE at the site would further minimize the risks associated with the inhalation of indoor air containing vapors emitted from contaminated subsurface soil and groundwater. An environmental easement would be effective in the long term, assuming it is interpreted correctly, not modified by future site users, and enforced.

Reduction in Toxicity, Mobility, or Volume through Treatment

The toxicity of the contamination would be reduced, because this alternative involves the treatment and degradation of contaminants in the soil and groundwater, thereby reducing the volume of contaminated soil and groundwater. Furthermore, the SVE would minimize the risks associated with the inhalation of indoor air containing vapors emitted from the soil and groundwater beneath the site.

Implementability

This alternative would require the implementation of a pilot test prior to the full-scale SVE installation and injection of oxidants. Additionally, installation of injection wells and SVE wells would be required. Given the space constraints at the site, well locations would be limited to areas a drill rig can access. However, injection wells and SVE systems are relatively inexpensive and easy to install.

Land Use

The SVE and ISCO remedies would not require large footprints; therefore, the land use is not expected to be substantial. Furthermore, the current and anticipated future land use at this site is expected to remain commercial.

Cost

The 2018 total present-worth cost of this alternative, based on a 30-year period, is $708,000. Table 4-3 presents the quantities, unit costs, and subtotal costs for the various work items in this alternative. Cost estimating information was obtained from vendor quotes, RS Means Cost Data series, and engineering judgment. Groundwater and air sampling and renewal of institutional controls are assumed with this alternative.

4.3 Comparative Evaluation of Alternatives

Overall Protection of Human Health and the Environment

Since Alternative 1 employs no action beyond the previously implemented IRM, contaminated site soils would remain on-site, and no protection would be provided to human health and the environment. Alternatives 2, 3, and 4 are more protective of human health and the environment, each at a different level.

By using only institutional controls in Alternative 2, inadequate enforcement and continued vapor intrusion could lead to potential health risks. Alternative 3

would provide a higher level of protection than Alternative 2, because the source material would be physically removed from the site, although Alternative 3 relies on natural attenuation to reduce groundwater concentrations. Alternative 4 would also provide a higher level of protection than Alternative 2 due to the direct treatment of source materials while providing for reduction of vapor intrusion. Therefore, through degradation of the contaminants, exposure risks associated with the inhalation of soil vapor may be sufficiently minimized.

Compliance with SCGs

Alternatives 1 and 2 do not comply with SCGs because the contaminated soils would remain on-site and would not be addressed. Alternative 3 would not meet groundwater SCGs but would meet soil SCGs, and Alternative 4 would comply with SCGs since it addresses the source area of contaminated site soils exceeding the restricted commercial SCOs. Alternative 4 would be less protective than Alternative 3 in the near-term since soil and groundwater contamination above SCGs would remain on-site until the ISCO treatment and SVE system reduce contamination levels.

Short-term Effectiveness and Impacts

Short-term impacts are not anticipated under Alternatives 1 or 2, since no remediation activities would occur. However, these alternatives would not be protective in the short term. Alternative 3 would have the greatest short-term impact workers would be exposed during the excavation of contaminated soils at the site and during the transport of the excavated soils to the disposal facility. Alternative 4 would have limited short-term impacts on site workers, which can be easily controlled through the on-site the SVE and the use of institutional controls.

Long-term Effectiveness and Permanence

Since Alternative 1 employs no action, contaminated soil would remain on-site, and no protection would be provided to human health and the environment. Alternative 2 would be slightly more effective in the long term provided the institutional controls are interpreted correctly; however, contaminated soils would not be addressed. Alternatives 3 and 4 have a higher level of long-term effectiveness and permanence than Alternative 2 because contaminated site soils would be treated at the source. Given that the source material would be physically removed from the site under Alternative 3, this alternative likely has the greatest potential for long-term effectiveness and permanence.

Reduction in Toxicity, Mobility, or Volume through Treatment

Alternatives 1 and 2 would not treat contaminated soils; therefore, toxicity, mobility, and volume would not be reduced. Alternative 3 would not address the toxicity, but would reduce the mobility and volume of contamination via off-site disposal. Mobility in the groundwater would not be reduced under Alternative 3. Alternative 4 would reduce the toxicity, mobility, and volume through the treatment and degradation of the contaminants in the soil and groundwater.

Implementability

No actions would be implemented under Alternative 1. Alternative 2 would be readily implemented since environmental easements are easy to implement. Alternative 3 may be difficult to implement for various reasons, including limited space for equipment to effectively excavate contaminated soil for disposal, high transportation and disposal fees for hazardous waste, and the requirement to shore up the building in order to remove the slab for excavation. Alternative 4 would be readily implemented using standard construction means and methods, but it would require a pilot test that includes installation of an SVE well. Under Alternative 4, limited space may make installation of ISCO injection wells somewhat difficult, but this would not affect implementability.

Land Use

The site and surrounding properties are currently commercially zoned and are expected to remain so regardless of which alternative is selected. Additionally, the groundwater at the site is not currently used as potable drinking water, nor is it expected to be used as potable drinking water in the foreseeable future. Alternatives 1, 2, and 3 do not remediate the site groundwater. Therefore, the land and groundwater use would not change under these alternatives. Alternatives 2 and 4 would implement an institutional controls that restrict the use of groundwater as potable water; over time, Alternative 4 may allow for the lifting of these institutional controls, but this is not expected to occur under Alternative 2. Alternative 3 would be expected to result in improved groundwater quality in the shortest timeframe.

Cost

Table 4-4 presents a summary of costs for each alternative. Alternative 1 would involve no action and thus would incur no costs. Alternative 2 has the next lowest capital cost and does not address the source area. Alternative 3 has the highest capital cost, primarily due to transportation and disposal of the excavated material, though no annual or 5-year monitoring and reporting costs are included under this alternative. Alternative 4 has the second highest capital cost, and includes annual and 5-year monitoring and reporting costs.

Table 4-1 Cost Estimate for Alternative 2: No Further Action with Site Management, Long Term Monitoring, and Institutional Controls, Former Elite Vogue Dry Cleaners Site, Rochester, NY

Item	Description	Quantity	Unit	Unit Cost	Total Cost
Capital Costs					
Institutional Controls	*Preparation of environmental easement, deed restrictions, etc.*	1	LS	$7,500	$7,500
	Development of Site Management Plan	1	LS	$10,000	$10,000
				Subtotal	*$17,500*
				Capital Cost Subtotal:	$17,500
				Location Factor Adjustment for Rochester, New York (1.049):	$18,350
				15% Project Administration:	$2,752
				30% Contingency:	$5,505
				15% Legal and Engineering Costs:	$2,752
				Total Capital Cost:	**$29,400**
Annual Groundwater Monitoring (Year 1 through 4)					
Year 1					
Groundwater Sampling (semi-annual)	*8 wells, assume 3 wells/day, 2-persons, 10 hr/day, 2 sampling events*	120	HR	$102	$12,240
Analytical Costs (VOCs)	*12 VOC samples per round including 6 wells, 1 duplicate sample, 1 MS, 1 MSD and 3 trip blanks, 2 sampling events*	24	Each	$82	$1,959
Data Evaluation and Reporting		60	HR	$105	$6,300
				Subtotal	*$20,499*
Year 2 through 4					
Groundwater Sampling	*8 wells, assume 3 wells/day, 2-persons, 10 hr/day*	60	HR	$102	$6,120
Analytical Costs (VOCs)	*12 VOC samples per round including 6 wells, 1 duplicate sample, 1 MS, 1 MSD and 3 trip blanks*	12	Each	$82	$980
Data Evaluation and Reporting		40	HR	$105	$4,200
				Subtotal	*$11,300*
				Groundwater Monitoring Subtotal:	$31,799
				Location Factor Adjustment for Rochester, New York (1.049):	$33,343
				15% Project Administration:	$5,001
				30% Contingency:	$10,003
				15% Legal and Engineering Costs:	$5,001
				Total Annual Groundwater Monitoring (Year 1) Cost:	$34,392
				Total Annual Groundwater Monitoring (Year 2 through 4) Cost:	$18,957
				Present Value of Annual Groundwater Monitoring (Year 1 through 4) Costs:	**$89,100**
5-Year Groundwater Monitoring Costs (Year 5 through 30)					
5-year Performance Review		1	LS	$5,000	$5,000
Institutional Control Administration		1	LS	$5,000	$5,000
Groundwater Sampling	*8 wells, assume 3 wells/day, 2-persons, 10 hr/day*	60	HR	$102	$6,120
Analytical Costs (VOCs)	*12 VOC samples per round including 6 wells, 1 duplicate sample, 1 MS, 1 MSD and 3 trip blanks*	12	Each	$82	$980
Data Evaluation and Reporting		40	HR	$105	$4,200
				Subtotal	*$21,300*

Table 4-1 Cost Estimate for Alternative 2: No Further Action with Site Management, Long Term Monitoring, and Institutional Controls, Former Elite Vogue Dry Cleaners Site, Rochester, NY

Item	Description	Quantity	Unit	Unit Cost	Total Cost
				Location Factor Adjustment for Rochester, New York (1.049):	$22,334
				15% Project Administration:	$3,350
				30% Contingency:	$6,700
				15% Legal and Engineering Costs:	$3,350
				Total 5-Year Costs:	$35,734
				30 Year Present Value of 5-Year Costs:	**$153,800**
				2018 Total Present Value of Recurring Costs:	**$242,900**
				Total Cost:	**$272,300**

Key:

LS: Lump Sum

SF: Square Foot

BCY: Cubic Yard

CF: Cubic Foot

Notes/Assumptions:

1. Contingency assumed at: 30%
2. Project Administration assumed at: 15%
3. Legal and Engineering Costs assumed at: 15%
4. Prime Contractor costs assumed at: 10%
5. Total Monitoring Time: 30 Years
6. Long-Term Monitoring occurs semi-annual for 1 year, annual for 4 years, and every 5 years after that.
7. Total # of groundwater monitoring wells to be sampled: 6 Wells
8. Present value costs assumes annual interest rate per "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study" (EPA 540-R-00-002 July 2000) and the Office of Management and Budget Real Discount Rates for the year 2011 (http://www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html) at Annual interest rate: 2.0 %
9. Institutional Controls include: Environmental Easements, Deed restrictions, etc.
10. Unit costs were obtained from Vendor Quotes, 2018 RS Means Cost Data, and engineering judgement.

Table 4-2 Cost Estimate for Alternative 3: Restoration to Pre-Disposal or Unrestricted Conditions, Former Elite Vogue Dry Cleaners Site, Rochester, NY

Item	Description	Quantity	Unit	Unit Cost	Total Cost
Capital Costs					
Site Preparation					
Mobilization/Demobilization		1	LS	$20,000	$20,000
Demolition	*Slab removal; assume 5,600 sq.ft. slab, 6 inches thick; dispose w/in 5 mi.*	104	CY	$346	$35,832
Shoring Building	*35 ton screw jacks with timber shoring*	32	Each	$960	$30,720
Site Work					
Excavation	*Excavate soil above unrestricted soil cleanup objectives and loading into trucks; assume 25% efficiency for small workspace and no staging area*	1300	CY	$136	$176,410
Disposal	*Transportation to CWM Chemical Services, LLC*	1560	Ton	$297	$463,320
	Hazardous waste treatment & disposal	1560	Ton	$431	$672,360
Backfill	*Material cost; account for compaction (25% swell)*	1625	CY	$20.00	$32,500
	Analysis of backfill material; assume every 50 CY	33	Each	$538	$17,770
	Hauling of backfill to site; assume within 20 miles	1625	CY	$5.35	$8,694
	Placement of backfill	1625	CY	$1.31	$2,129
	Compaction	1300	E.C.Y	$2.60	$3,380
Restoration and Oversight					
Replace Slab	*Replace concrete slab, assume 6" thick*	104	CY	$140	$14,519
Construction Oversight	*1 person, 8 hrs/day, 44 days*	44	Days	$840	$37,220
Sampling	*Analyses of excavated soil and pit; assume every 10 CY*	130	Each	$710	$92,300
Air Monitoring	*Dust Track II Monitors (3)*	44	Days	$185	$8,208
				Subtotal	*$1,607,153*
				Capital Cost Subtotal:	$1,607,153
				Location Factor Adjustment for Rochester, New York (1.049):	$1,685,201
				15% Project Administration:	$252,780
				30% Contingency:	$505,560
				15% Legal and Engineering Costs:	$252,780
				10% Prime Contractor Profit	$168,520
				Total Capital Cost:	**$2,864,900**
Annual Groundwater Monitoring (Year 1 through 4)					
Year 1					
Groundwater Sampling (semi-annual)	*8 wells, assume 3 wells/day, 2-persons, 10 hr/day, 2 sampling events*	120	HR	$102	$12,240
Analytical Costs (VOCs)	*12 VOC samples per round including 6 wells, 1 duplicate sample, 1 MS, 1 MSD and 3 trip blanks, 2 sampling events*	24	Each	$82	$1,959
Data Evaluation and Reporting		60	HR	$105	$6,300
				Subtotal	*$20,499*
Year 2 through 4					
Groundwater Sampling	*8 wells, assume 3 wells/day, 2-persons, 10 hr/day*	60	HR	$102	$6,120
Analytical Costs (VOCs)	*12 VOC samples per round including 6 wells, 1 duplicate sample, 1 MS, 1 MSD and 3 trip blanks*	12	Each	$82	$980
Data Evaluation and Reporting		40	HR	$105	$4,200

Table 4-2 Cost Estimate for Alternative 3: Restoration to Pre-Disposal or Unrestricted Conditions, Former Elite Vogue Dry Cleaners Site, Rochester, NY

Item	Description	Quantity	Unit	Unit Cost	Total Cost
				Subtotal	*$11,300*
				Groundwater Monitoring Subtotal:	$31,799
				Location Factor Adjustment for Rochester, New York (1.049):	$33,343
				15% Project Administration:	$5,001
				30% Contingency:	$10,003
				15% Legal and Engineering Costs:	$5,001
				Total Annual Groundwater Monitoring (Year 1) Cost:	$34,392
				Total Annual Groundwater Monitoring (Year 2 through 4) Cost:	$18,957
				Present Value of Annual Groundwater Monitoring (Year 1 through 4) Costs:	**$89,100**
5-Year Groundwater Monitoring Costs (Year 5 through 30)					
5-year Performance Review		1	LS	$5,000	$5,000
Institutional Control Administration		1	LS	$5,000	$5,000
Groundwater Sampling	*8 wells, assume 3 wells/day, 2-persons, 10 hr/day*	60	HR	$102	$6,120
Analytical Costs (VOCs)	*12 VOC samples per round including 6 wells, 1 duplicate sample, 1 MS, 1 MSD and 3 trip blanks*	12	Each	$82	$980
Data Evaluation and Reporting		40	HR	$105	$4,200
				Subtotal	*$21,300*
				Location Factor Adjustment for Rochester, New York (1.049):	$22,334
				15% Project Administration:	$3,350
				30% Contingency:	$6,700
				15% Legal and Engineering Costs:	$3,350
				Total 5-Year Costs:	$35,734
				30 Year Present Value of 5-Year Costs:	**$153,800**
				2018 Total Present Value of Recurring Costs:	**$242,900**
				Total Cost:	**$3,107,800**

Key:

LS: Lump Sum

SF: Square Foot

BCY: Cubic Yard

CF: Cubic Foot

Notes/Assumptions:

1. Contingency assumed at: 30%
2. Project Administration assumed at: 15%
3. Legal and Engineering Costs assumed at: 15%
4. Prime Contractor costs assumed at: 10%
5. Unit costs were obtained from Vendor Quotes, 2018 RS Means Cost Data, and engineering judgement.

Table 4-3 Cost Estimate for Alternative 4: Soil Vapor Extraction, In-situ Chemical Oxidation, Long Term Monitoring, and Institutional Controls, Former Elite Vogue Dry Cleaners Site, Rochester, NY

Item	Description	Quantity	Unit	Unit Cost	Total Cost
Capital Costs					
Institutional/Administrative Controls					
	Preparation of environmental easement, deed restrictions, etc.	1	LS	$7,500	$7,500
	Development of Site Management Plan	1	LS	$10,000	$10,000
	Development of Monitoring Plan	1	LS	$3,500	$3,500
	Development of O&M Plan	1	LS	$3,500	$3,500
				Institutional/Administrative Controls Subtotal	$24,500
SVE System					
SVE System Design	*Includes site visit for vacuum testing and design*	1	LS	$7,500	$7,500
SVE Pilot Test	*Install 1 draw point and monitor for 1 week*	1	LS	$10,000	$10,000
Install SVE System	*5 extraction wells and appurtenances*	1	LS	$85,662	$85,662
Installation Oversight	*1 person, 8 hrs/day, 5 days*	40	HR	$102	$4,080
				SVE System Subtotal	$107,242
In-situ Chemical Oxidation					
Oxidant and 3-D Microemulsion Product	*Materials*	1	LS	$33,000	$33,000
	Application via direct push	1	LS	$39,000	$39,000
Application Oversight	*1 person, 8 hrs/day, 4 days*	60	HR	$102	$6,120
Site restoration	*Installation of gravel base*	5	SY	$7	$34
Site restoration	*Replace Paving at the site*	5	SY	$20	$99
				In-situ Chemical Oxidation Subtotal	$78,253
				Capital Cost Subtotal:	$209,995
				Location Factor Adjustment for Rochester, New York (1.049):	$220,193
				15% Project Administration:	$33,029
				30% Contingency:	$66,058
				15% Legal and Engineering Costs:	$33,029
				10% Prime Contractor Profit	$22,019
				Total Capital Cost:	**$374,400**

Table 4-3 Cost Estimate for Alternative 4: Soil Vapor Extraction, In-situ Chemical Oxidation, Long Term Monitoring, and Institutional Controls, Former Elite Vogue Dry Cleaners Site, Rochester, NY

Item	Description	Quantity	Unit	Unit Cost	Total Cost
Annual Groundwater and Extraction Well Monitoring (Year 1 through 4)					
Year 1					
Groundwater Sampling (quarterly)	*8 GW wells, assume 3 wells/day, 2-persons, 10 hr/day, 4 sampling events*	240	HR	$102	$24,480
Extraction Well Sampling (monthly)	*5 Extraction wells; assume 1 suma per; 2-persons, 8 hrs total, 12/yr; These monthly visits will include maintenance of the system*	192	HR	$102	$19,584
Analytical Costs (GW VOCs)	*12 VOC samples per round including 6 wells, 1 duplicate sample, 1 MS, 1 MSD and 3 trip blanks, 2 sampling events*	48	Each	$82	$3,919
Analytical Costs (Extraction Wells)		60	Each	$145	$8,700
Data Evaluation and Reporting		120	HR	$105	$12,600
				Subtotal	$69,283
Year 2 through 4					
Groundwater Sampling	*8 GW wells, assume 3 wells/day, 2-persons, 10 hr/day*	60	HR	$102	$6,120
Analytical Costs (VOCs)	*12 VOC samples per round including 6 wells, 1 duplicate sample, 1 MS, 1 MSD and 3 trip blanks*	12	Each	$82	$980
Analytical Costs (Extraction Wells)		5	Each	$145	$725
Data Evaluation and Reporting		40	HR	$105	$4,200
				Subtotal	*$12,025*
				Monitoring Subtotal:	$81,307
				Location Factor Adjustment for Rochester, New York (1.049):	$85,256
				15% Project Administration:	$12,788
				30% Contingency:	$25,577
				15% Legal and Engineering Costs:	$12,788
				Total Annual Monitoring (Year 1) Cost:	$116,235
				Total Annual Monitoring (Year 2 through 4) Cost:	$20,174
				Present Value of Annual Monitoring (Year 1 through 4) Costs:	**$174,500**
5-Year Monitoring Costs (Year 5 through 30)					
5-year Performance Review		1	LS	$5,000	$5,000
Institutional Control Administration		1	LS	$5,000	$5,000
Groundwater Sampling	*8 wells, assume 3 wells/day, 2-persons, 10 hr/day*	60	HR	$102	$6,120
Analytical Costs (VOCs)	*12 VOC samples per round including 6 wells, 1 duplicate sample, 1 MS, 1 MSD and 3 trip blanks*	12	Each	$82	$980
Analytical Costs (Extraction Wells)		5	Each	$145	$725
Data Evaluation and Reporting		40	HR	$105	$4,200
				Subtotal	$22,025

Table 4-3 Cost Estimate for Alternative 4: Soil Vapor Extraction, In-situ Chemical Oxidation, Long Term Monitoring, and Institutional Controls, Former Elite Vogue Dry Cleaners Site, Rochester, NY

Item	Description	Quantity	Unit	Unit Cost	Total Cost
				5-Year Monitoring Cost Subtotal:	$22,025
				Location Factor Adjustment for Rochester, New York (1.049):	$23,094
				15% Project Administration:	$3,464
				30% Contingency:	$6,928
				15% Legal and Engineering Costs:	$3,464
				Total 5-Year Costs:	$36,951
				30 Year Present Value of 5-Year Costs:	**$159,100**
				2018 Total Present Value of Recurring Costs:	**$333,600**
				Total Cost:	**$708,000**

Key:

LS: Lump Sum

SF: Square Foot

BCY: Cubic Yard

CF: Cubic Foot

Notes/Assumptions:

1. Contingency assumed at: 30%
2. Project Administration assumed at: 15%
3. Legal and Engineering Costs assumed at: 15%
4. Prime Contractor costs assumed at: 10%
5. Total Monitoring Time: 30 Years
6. Long-Term Monitoring occurs quarterly for 1 year, annual for 4 years, and every 5 years after that.
7. Total # of groundwater monitoring wells to be sampled: 6 Wells
8. Present value costs assumes annual interest rate per "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study" (EPA 540-R-00-002 July 2000) and the Office of Management and Budget Real Discount Rates for the year 2011 (http://www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html) at

   Annual interest rate: 2.0 %
9. Institutional Controls include: Environmental Easements, Deed restrictions, etc.
10. Total # of extraction wells to be sampled: 5 wells
11. Unit costs were obtained from Vendor Quotes, 2018 RS Means Cost Data, and engineering judgement.

Table 4-4 Summary of Total Present Values of Remedial Alternatives at the Former Elite Vogue Dry Cleaners Site

Description	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Further Action	No Further Action with Site Management	Restoration to Pre-Disposal or Unrestricted Conditions	Soil Vapor Extraction, In-situ Chemical Oxidation, Long Term Monitoring, and Institutional Controls
Estimated Total Project Duration (Years)	0	30	30	30
Capital Cost	$0	$29,400	$2,864,900	$374,400
Annual O&M[1, 2]	$0	$34,392	$34,392	$116,235
5-Year Monitoring and Reporting[3]	$0	$35,734	$35,734	$36,951
2018 Total Present Value of Alternative[4]	**$0**	**$272,300**	**$3,107,800**	**$708,000**

Notes:

1 - Annual costs for Alternative 2 and 3 include groundwater monitoring and reporting (semi-annual for first year, annual for following 4 years).
Annual costs for Alternative 4 include groundwater well monitoring and reporting (quarterly for first year, annual for following 4 years),
and monthly extraction well monitoring for the first year to verify system performance and monitor the system.

2 - The annual cost presented is for the first year of operation, in which semi-annual or quarterly monitoring takes place. The annual cost will decrease to the following for years 2-4:
Alternative 2 and 3: $18,957
Alternative 4: $20,174

3 - Periodic Monitoring and Reporting costs incurred every 5 years. Includes costs such as Institutional Controls Administration, 5-Year Performance Reviews, and groundwater monitoring/reporting.

4 - The Total Present value of Alternative represents the estimated present value of the capital costs and 30-years of annual and periodic costs.

5 References

City of Rochester, NY. 2017, The Municipal Code of the City of Rochester. Chapter 120-68 Main Street District Zoning. Available online at: https://ecode360.com/8680426. Rochester, New York.

Day Environmental, Inc. 1997a. *Phase I Environmental Site Assessment, 14-60 Charlotte Street, Rochester, NY*. Prepared for the City of Rochester, Rochester, New York.

_____. 1997b. *Phase II Environmental Site Assessment, 14-60 Charlotte Street, Rochester, NY*. Prepared for the City of Rochester, Rochester, New York.

_____. 1997c. *Supplemental Phase II Environmental Site Assessment, 14-60 Charlotte Street, Rochester, NY*. Prepared for the City of Rochester, Rochester, New York.

_____. 2000. *Supplemental Phase II Environmental Studies, 14-60 Charlotte Street, Rochester, NY*. Prepared for the City of Rochester, Rochester, New York.

_____. 2002. *Interim Remedial Measure Report, 14-60 Charlotte Street, Rochester, NY*. Prepared for the City of Rochester, Rochester, New York.

Ecology and Environment Engineering, P.C. (E & E). 2018. *Draft Remedial Investigation Report for the Elite Vogue Dry Cleaners Site, Rochester, Monroe County, New York.* Lancaster, New York.

New York State Department of Environmental Conservation (NYSDEC). 1998. *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.* Division of Water, Albany, New York.

_____. 2006. Recommended Soil Cleanup Objectives, presented in 6 NYCRR Subpart 375-6.8.

_____. 2010a. DER-10: *Technical Guidance for Site Investigation and Remediation*. June 18, 2010.

_____. 2010b. Final Commissioner Policy CP-51/Soil Cleanup Guidance. October 21, 2010.

New York State Department of Health (NYSDOH). 2006. *Guidance for Evaluating Soil Vapor Intrusion in the State of New York.* Bureau of Environmental Exposure Investigation, Troy, New York.

Shaw Environmental & Infrastructure Engineering of New York, P.C. 2012, revised February 2014. *Final Site Characterization Report with Addendum, Former Elite Vogue Dry Cleaners, Rochester, New York.* Prepared for NYSDEC, Albany, New York.

_____. 2014. *Draft Underground Storage Tank Removal Report, Former Elite Vogue Cry Cleaners, Rochester, New York*. Prepared for NYSDEC, Albany, New York.

Stantec Consulting Services, Inc. 2010a. Phase I Environmental Site Assessment, 15 Richmond Street, City of Rochester, NY. Prepared for Richmond Street LLC, Rochester, NY.

_____. 2010b. Phase II Environmental Site Assessment, 15 Richmond Street, City of Rochester, NY. Prepared for Richmond Street LLC, Rochester, NY.