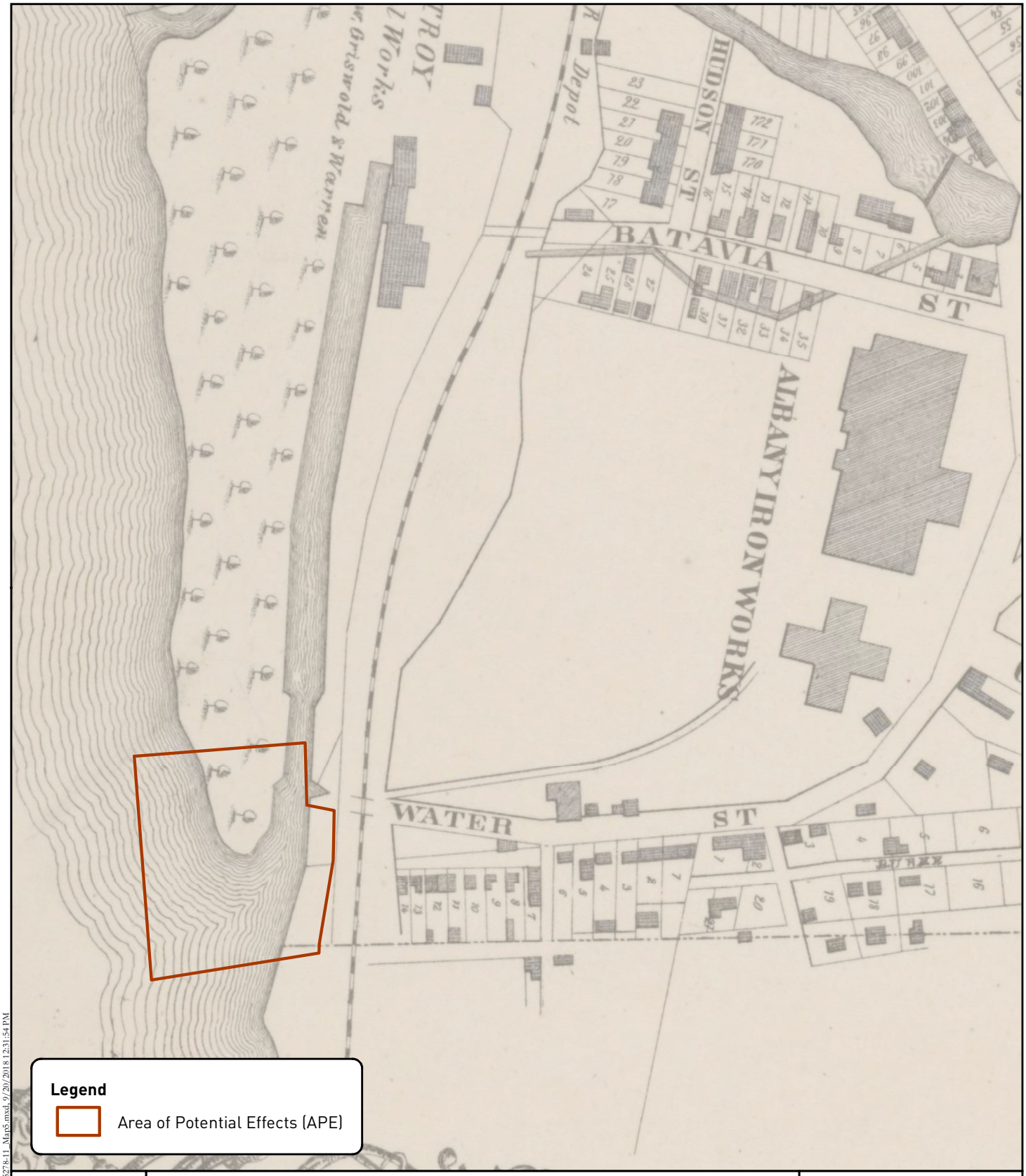


100 0 100 200 Feet

30 0 30 60 Meters

Historical Map

Barton 1869

HARTGEN archeological associates inc

Map 5

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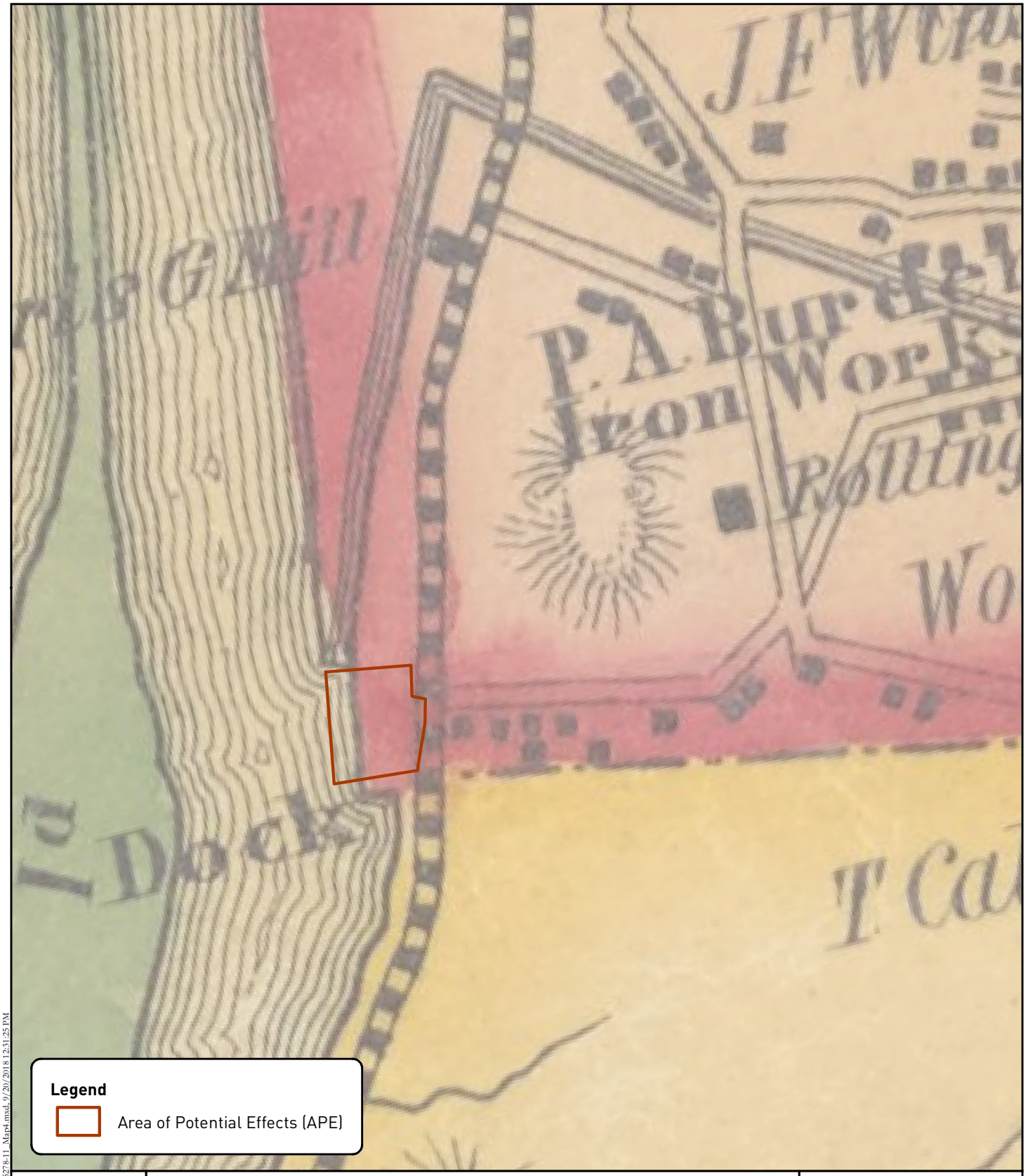


200 0 200 400 Feet

60 0 60 120 Meters

Historical Map

Sidney 1851

HARTGEN archeological associates inc

Map 4

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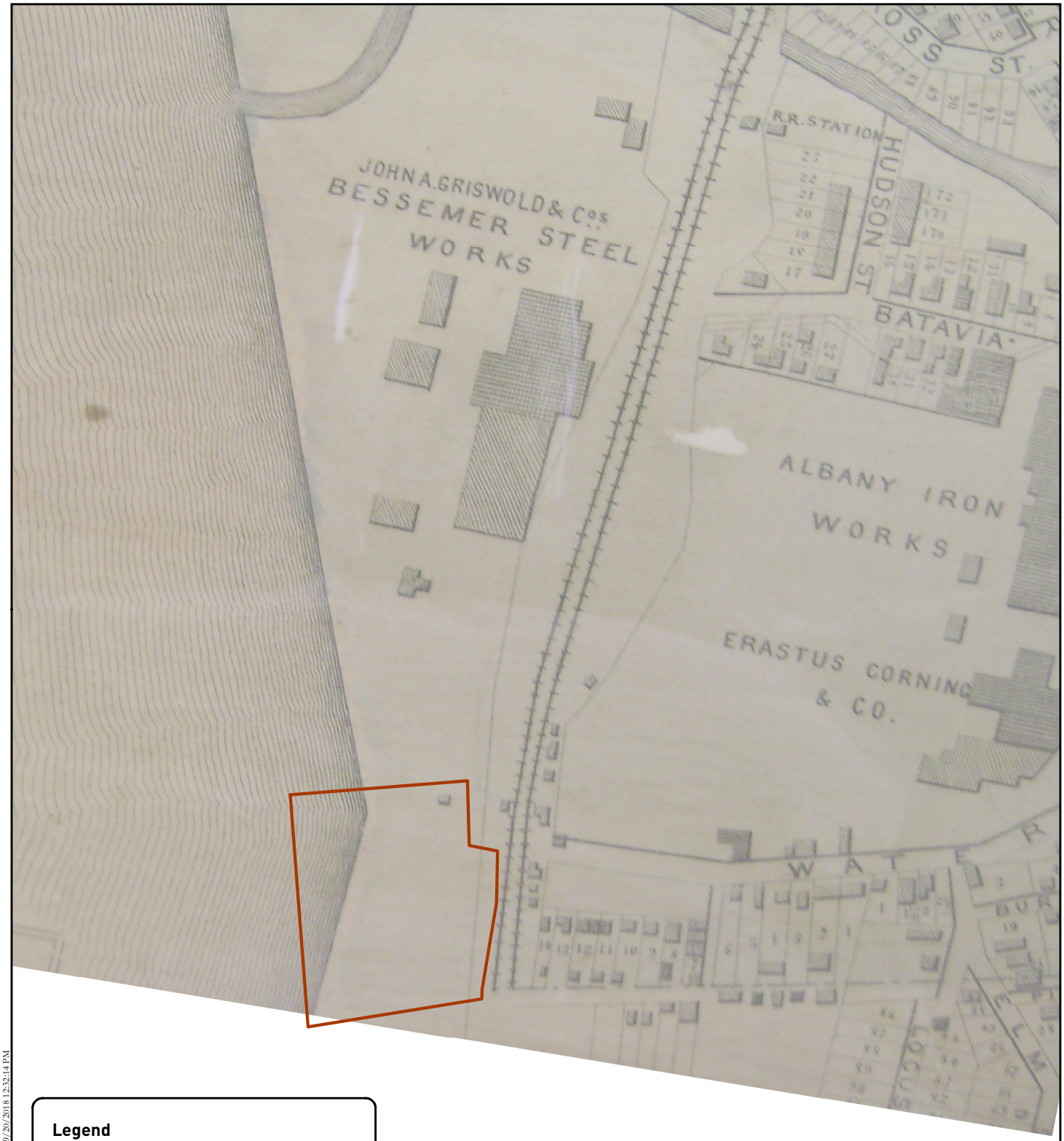


**Legend**

Area of Potential Effects (APE)

100 0 100 200 Feet

30 0 30 60 Meters

Historical Map

Young and Young 1873

HARTGEN archeological associates inc

**Map 6**

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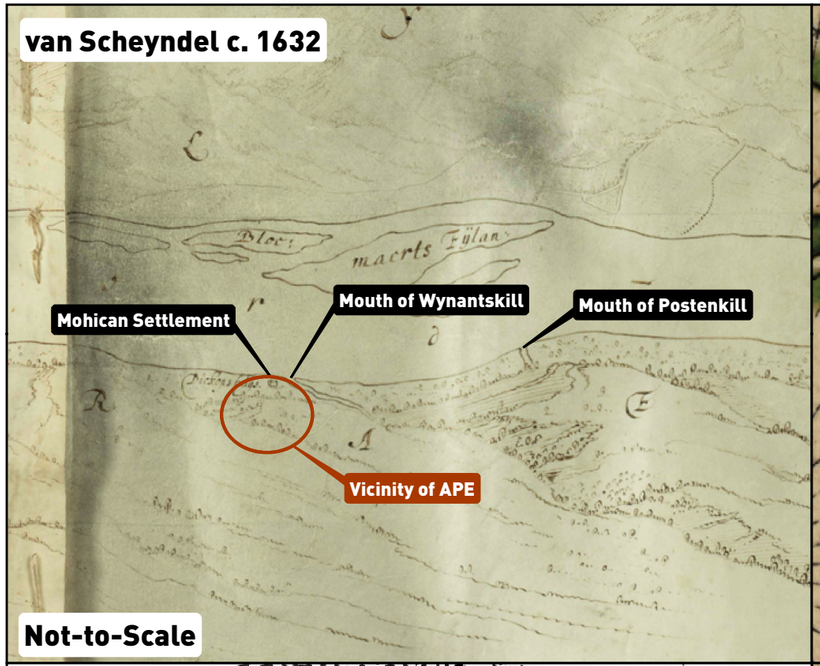


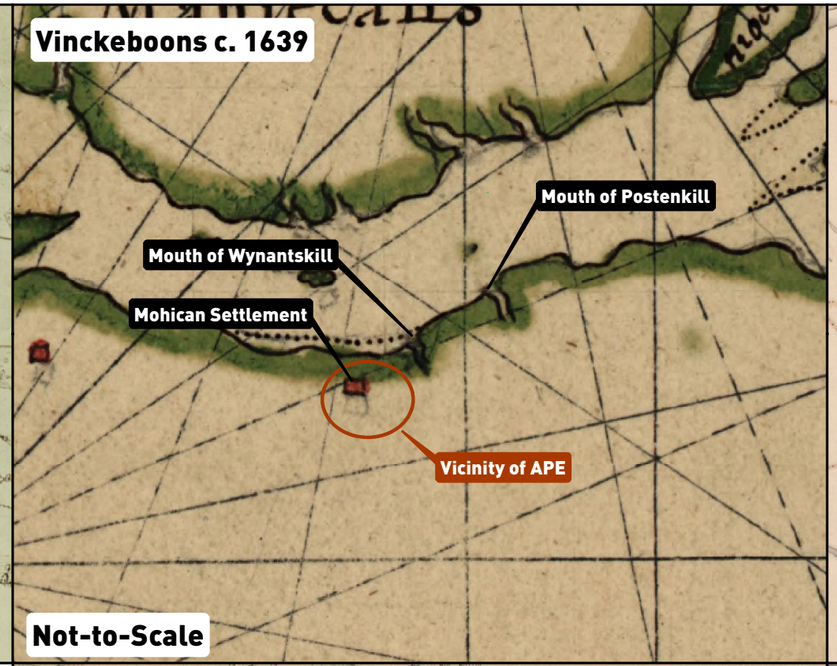


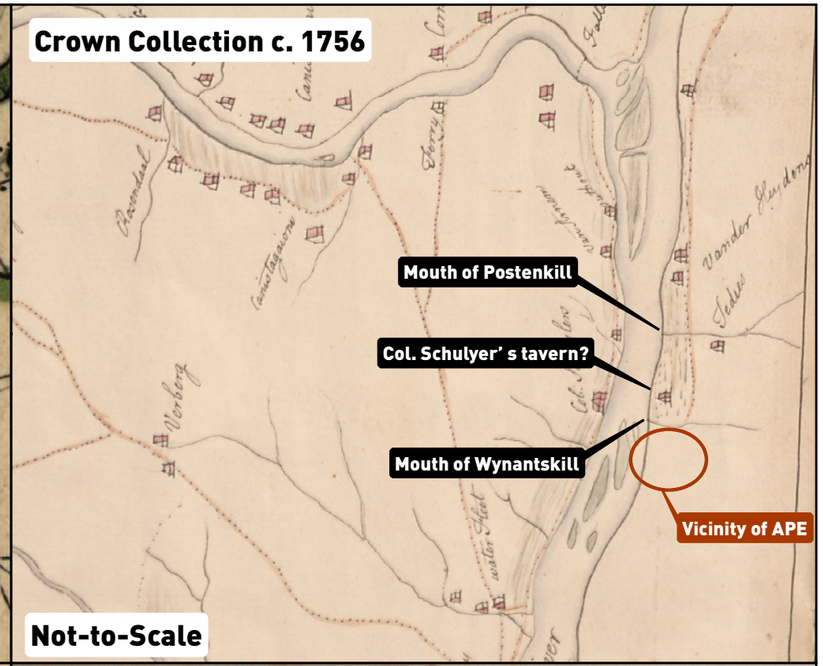


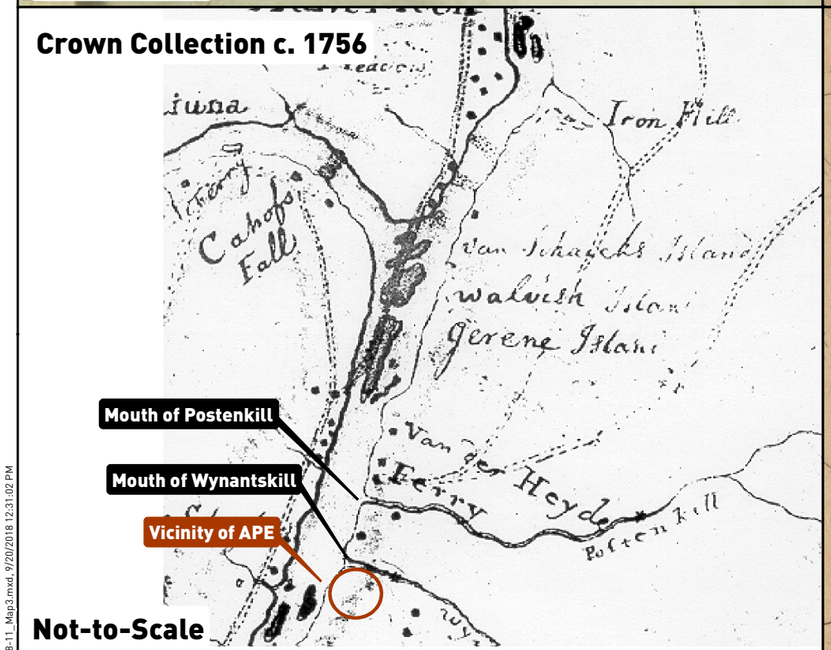


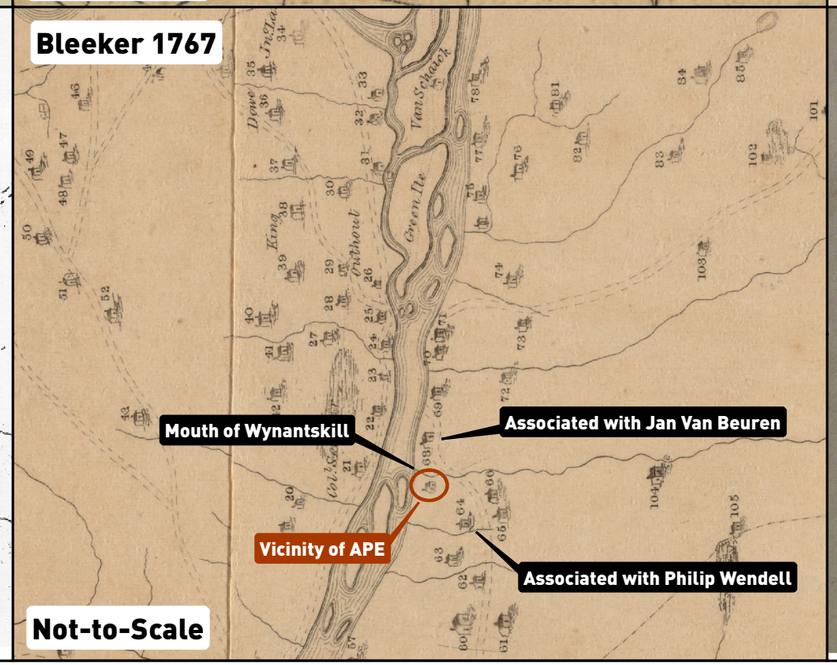


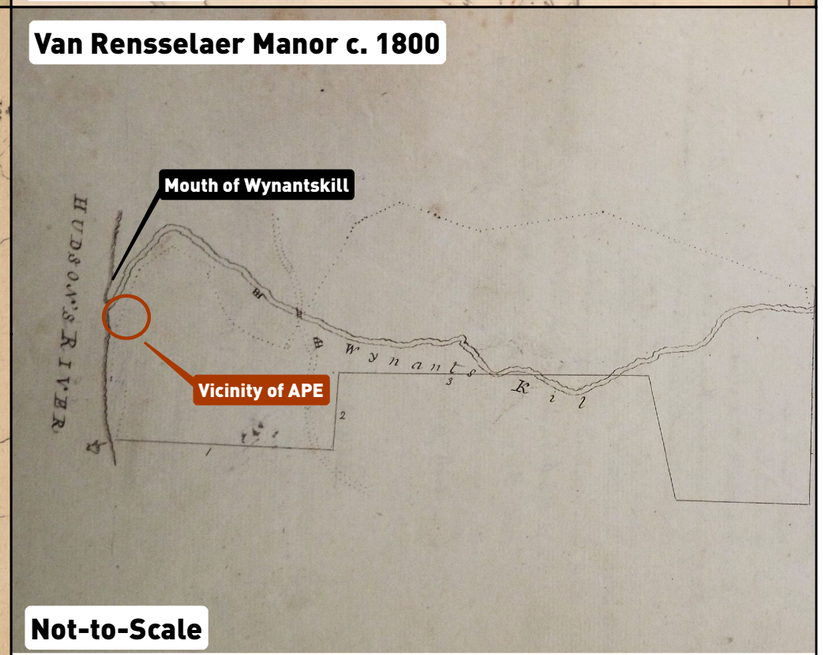


**Legend**

Area of Potential Effects (APE)

Historical Maps 1632-1800

HARTGEN archeological associates inc

**Map 3**

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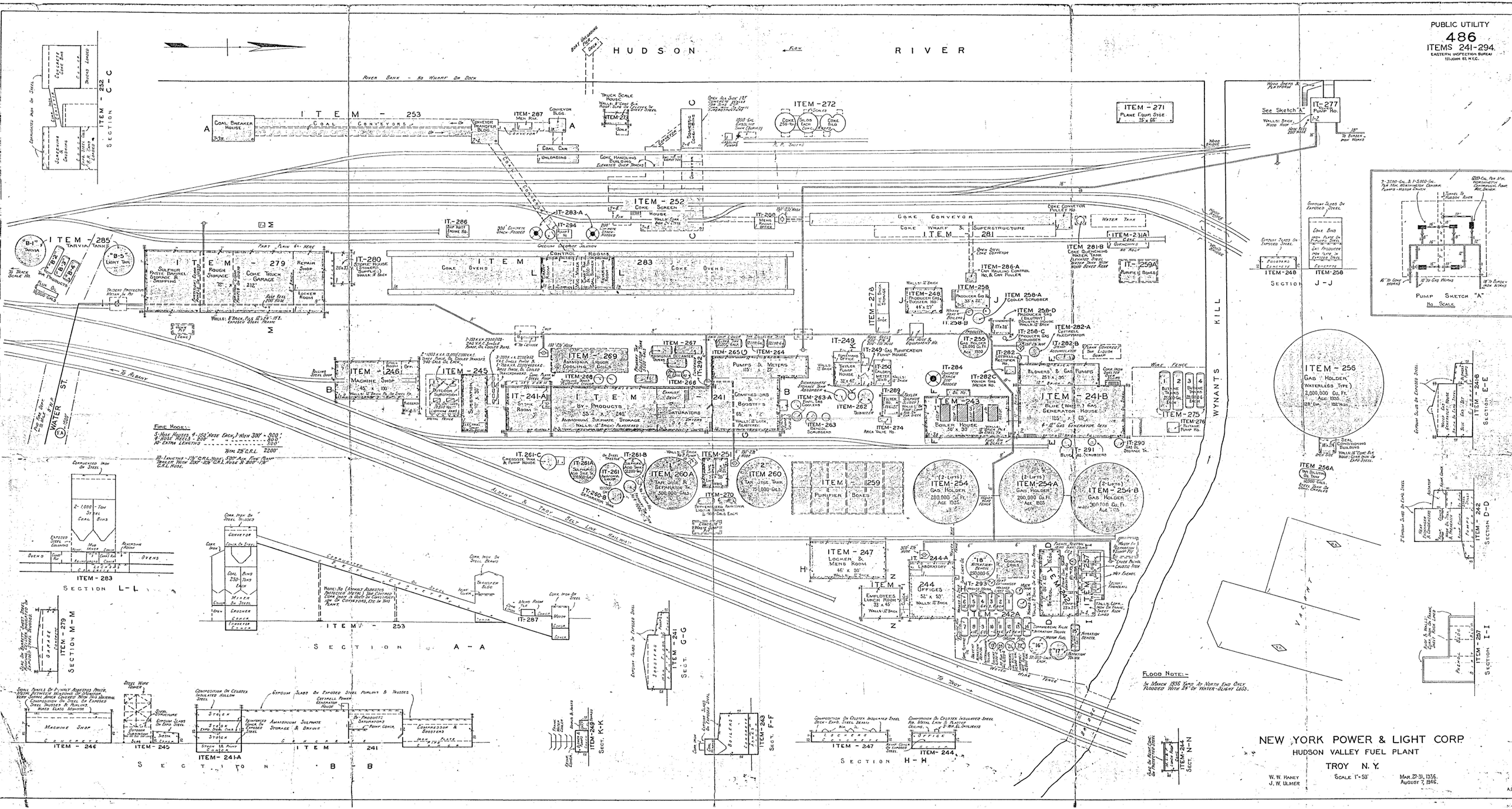
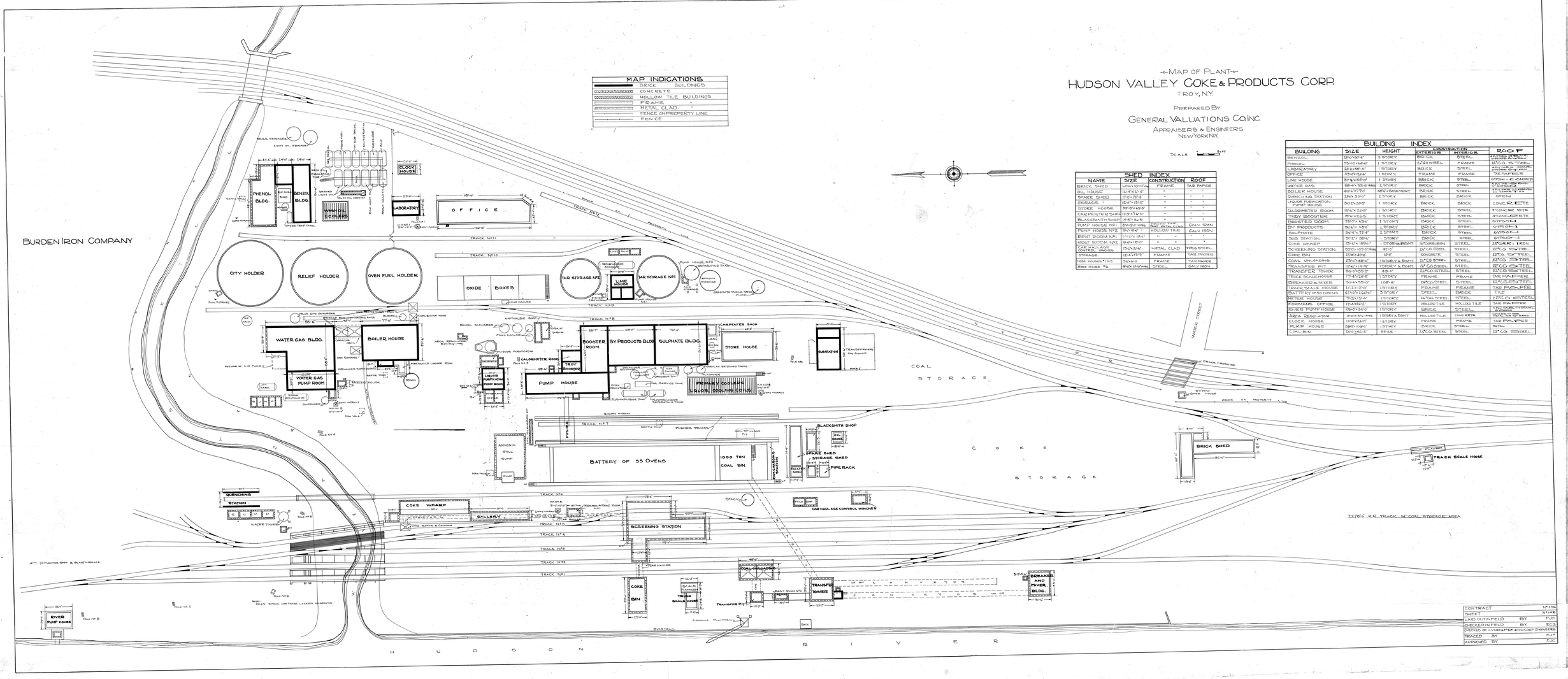
PUBLIC UTILITY
486
ITEMS 241-294.
EASTERN INSPECTION BUREAU
111 JOHN ST. N.Y.C.



# MAP OF PLANT
# HUDSON VALLEY COKE & PRODUCTS CORP.
TROY, N.Y.

PREPARED BY
GENERAL VALUATIONS CO. INC.
APPRAISERS & ENGINEERS
NEW YORK N.Y.

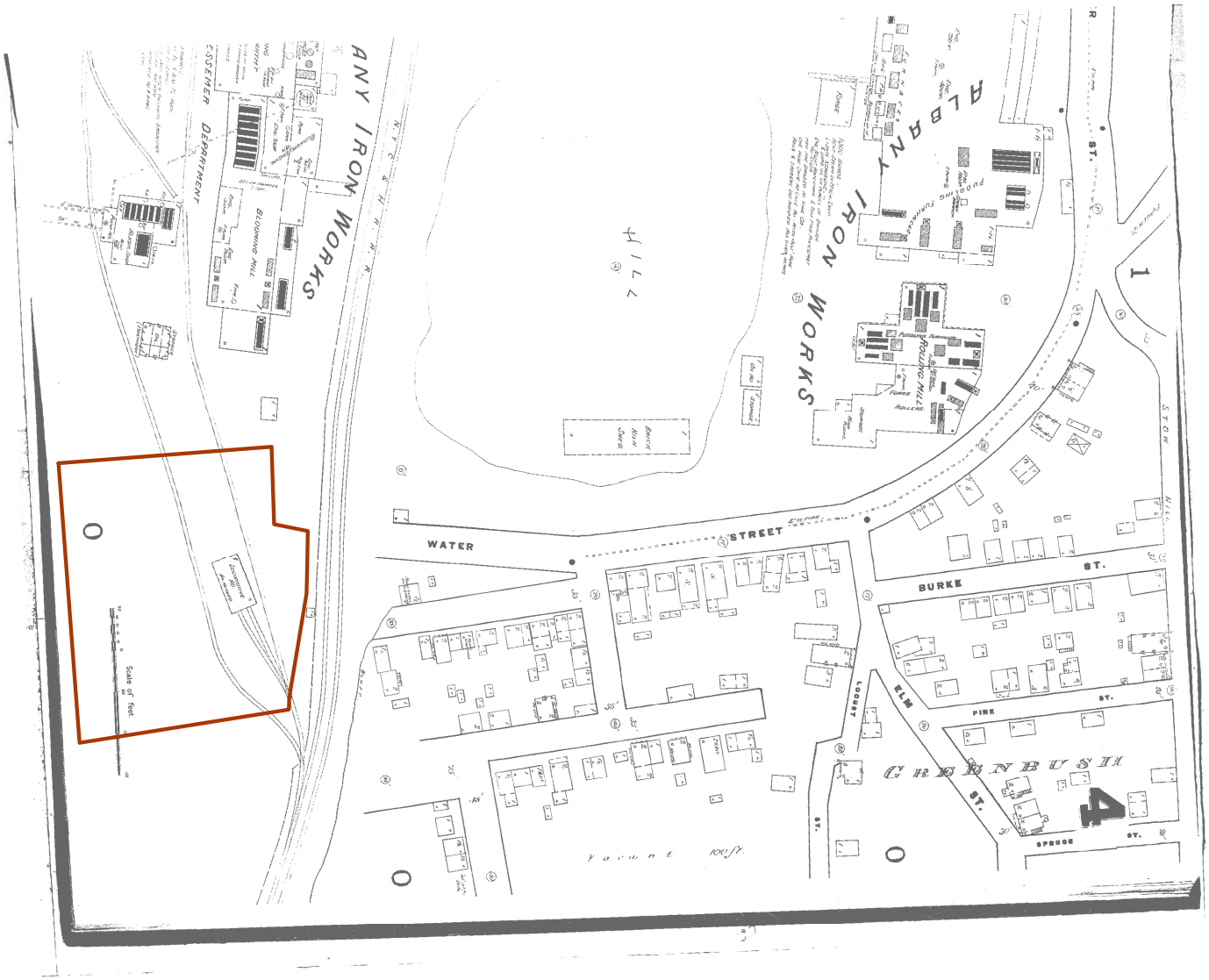
SCALE 1" = 3'-0"




| SHED INDEX | | | |
|---|---|---|---|
| NAME | SIZE | CONSTRUCTION | ROOF |
| BRICK SHED | 42'0"×80'0" | FRAME | TAR PAPER |
| OIL HOUSE | 16'4"×16'4" | " | " |
| SPARE SHED | 17'0"×70'6" | " | " |
| STORAGE " | 12'6"×17'0" | " | " |
| STORE HOUSE | 39'8"×49'8" | " | " |
| CARPENTER SHOP | 12'3"×74'6" | " | " |
| BLACKSMITH SHOP | 14'3"×24'3" | " | " |
| PUMP HOUSE NO 1 | 24'0"×0' 0" | HOLLOW TILE AND METAL CLAD | GALV IRON |
| PUMP HOUSE NO 2 | 24'0"×0' 0" | HOLLOW TILE | GALV IRON |
| RENT ROOM NO 1 | 17'10"×18'11" | " " | " " |
| RENT ROOM NO 2 | 9'0"×18'0" | " " | " " |
| CAR HAULAGE CONTROL WINCHES | 17'0"×24'0" | METAL CLAD | 1/4" STEEL |
| STORAGE | 13'4"×17'5" | FRAME | TAR PAPER |
| TOILET HOUSES "TINS | 5'6"×6'0" | FRAME | TAR PAPER |
| TOILET HOUSE "TO | 9'0"×18'0"×8'6" | STEEL | GALV IRON |

| BUILDING INDEX | | | | | |
|---|---|---|---|---|---|
| BUILDING | SIZE | HEIGHT | CONSTRUCTION EXTERIOR | CONSTRUCTION INTERIOR | ROOF |
| BENZOL | 24'0"×80'0" | 3 STORY | BRICK | STEEL | 4 PLY TAR & GRAVEL UNDER 1/4" STEEL |
| PHENOL | 53'-10"×64'0" | 1 STORY | 1/4" STEEL | FRAME | 1/4" C.O. STEEL |
| LABORATORY | 32'0"×58'0" | 1 STORY | BRICK | STEEL | 4 PLY TAR & GRAVEL UNDER 1/4" STEEL |
| OFFICE | 33'0"×112'6" | 1 STORY | FRAME | FRAME | TAR PAPER |
| LIME HOUSE | 31'9"×53'0" | 1 STORY | BRICK | STEEL | GYPSUM - CONCRETE |
| WATER GAS | 88'4"×100'4"×86' | 2 STORY | BRICK | STEEL | 4 PLY TAR & GRAVEL UNDER 1/4" STEEL |
| BOILER HOUSE | 49'6"×77'0" | 48'6"×BASEMENT | BRICK | STEEL | 4 PLY TAR & GRAVEL UNDER 1/4" STEEL |
| QUENCHING STATION | 12'6"×30'0" | 2 STORY | BRICK | BRICK | OPEN |
| LIQUOR PURIFICATION PUMP HOUSE | 30'0"×30'0" | 1 STORY | BRICK | BRICK | CONCRETE |
| CALORIMETER ROOM | 15'6"×24'0" | 1 STORY | BRICK | STEEL | 4" CONCRETE |
| TROY BOOSTER | 15'6"×24'0" | 1 STORY | BRICK | STEEL | 4" CONCRETE |
| BOOSTER ROOM | 39'0"×43'0" | 1 STORY | BRICK | STEEL | GYPSUM |
| BY PRODUCTS | 26'6"×43'0" | 2 STORY | BRICK | STEEL | GYPSUM |
| SULPHATE | 34'4"×72'4" | 2 STORY | BRICK | STEEL | GYPSUM |
| SUB STATION | 30'0"×58'4" | 1 STORY | BRICK | STEEL | GYPSUM |
| COKE WHARF | 13'6"×189'11" | 1 STORY & BSMT | 3/8" CORR. IRON | STEEL | 1/4" CORR. IRON |
| SCREENING STATION | 53'0"×107'6" max | 4 1/2" | 1/4" C.O. STEEL | STEEL | 1/4" C.O. STEEL |
| COKE BIN | 37'0"×49'0" | 18'0" | CONCRETE | STEEL | 1/4" C.O. STEEL |
| COAL UNLOADING | 23'0"×48'0" | 1 STORY & BSMT | 1/4" C.O. STEEL | STEEL | 1/4" C.O. STEEL |
| TRANSFER PIT | 12'6"×19'9" | 1 STORY & BSMT | 1/4" C.O. STEEL | STEEL | 1/4" C.O. STEEL |
| TRANSFER TOWER | 9'0"×33'0" | 4'9'0" | 1/4" C.O. STEEL | STEEL | 1/4" C.O. STEEL |
| TRUCK SCALE HOUSE | 17'4"×24'8" | 1 STORY | FRAME | FRAME | TAR PAPER |
| BREAKER & RIVER | 54'4"×55'0" | 108'8" | 1/4" C.O. STEEL | STEEL | 1/4" C.O. STEEL |
| TRACK SCALE HOUSE | 11'2"×12'0" | 1 STORY | FRAME | FRAME | TAR PAPER |
| BATTERY OF 55 OVENS | 62'0"×1,462'0" | 3 STORY | STEEL | BRICK | TILE |
| METER HOUSE | 9'3"×13'4" | 1 STORY | 1/4" C.O. STEEL | STEEL | 1/4" C.O. STEEL |
| FOREMANS OFFICE | 17'4"×24'0" | 1 STORY | HOLLOW TILE | HOLLOW TILE | TAR PAPER |
| RIVER PUMP HOUSE | 39'0"×34'0" | 1 STORY | BRICK | STEEL | 4 PLY TAR & GRAVEL UNDER 1/4" STEEL |
| AREA REGULATOR | 8'0"×10'4"×7'6" | 1 STORY & BSMT | HOLLOW TILE | CONCRETE | CONCRETE AND WOOD BEAMS |
| CLOCK HOUSE | 14'4"×24'0" | 1 STORY | FRAME | FRAME | TAR PAPER |
| PUMP HOUSE | 29'0"×29'0" | 1 STORY | BRICK | STEEL | OPEN |
| COAL BIN | 24'0"×42'0" | 8'8"×32' | 1/4" C.O. STEEL | STEEL | 1/4" C.O. STEEL |

| | | |
|---|---|---|
| CONTRACT | | N1256 |
| SHEET | | 5/1/16 |
| LAID OUT IN FIELD | BY | F.J.F. |
| CHECKED IN FIELD | BY | E.G.G. |
| CHECKED BY HUDSON VALLEY COKE & PROD. CORP. ENGINEERS | | |
| TRACED | BY | F.J.F. |
| APPROVED | BY | F.J.F. |




**Legend**

Area of Potential Effects (APE)

100 0 100 200 Feet

30 0 30 60 Meters

Historical Map

Sanborn 1885

HARTGEN archeological associates inc

**Map 7**

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# Supplemental Remedial Investigation Work Plan
# Troy (Water St.) Site – Area 3
# Troy, Rensselaer County, New York

Prepared for

Niagara Mohawk Power Corporation
d/b/a National Grid, Syracuse,
New York

August 2016

# Supplemental Remedial Investigation Work Plan
# Troy (Water St.) Site – Area 3
# Troy, Rensselaer County, New York

Prepared for

Niagara Mohawk Power Corporation d/b/a National Grid
300 Erie Boulevard West
Syracuse, New York 13202

August 2016

Project Number: 146094.300

I, James L. Marolda, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Supplemental Remedial Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

James L. Marolda, C.P.G., P.G.
Supervising Geologist/Hydrogeologist

Brown and Caldwell Associates
2 Park Way, Suite 2A
Upper Saddle River, New Jersey 07458

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Figure 3-1. Proposed Supplemental Remedial Investigation Locations

# List of Abbreviations

| | |
|---|---|
| ASP | Analytical Services Protocol |
| BC | Brown and Caldwell Associates |
| bgs | below ground surface |
| BTEX | Benzene, Toluene, Ethylbenzene, Xylene |
| CAMP | Community Air Monitoring Program |
| CLP | Contract Laboratory Program |
| DOT | Department of Transportation |
| DUSR | Data Usability Summary Report |
| ECO-SSL | Ecological Soil Screening Levels |
| EDD | Electronic Data Deliverable |
| ELAP | Environmental Laboratory Approval Program |
| FSP | Field Sampling Plan |
| FWIA | Fish and Wildlife Impact Analysis |
| FWRIA | Fish and Wildlife Resource Impact Analysis |
| ft | feet |
| GC-FID | Gas Chromatograph-Flam Ionization Detector |
| GPR | Ground-Penetrating Radar |
| HVC&PC | Hudson Valley Coke and Products Corporation |
| HVFC | Hudson Valley Fuel Corporation |
| I.D. | Inside Diameter |
| IDW | Investigation-derived Waste |
| IRM | Interim Remedial Measures |
| $K_h$ | Horizontal Hydraulic Conductivity |
| MGP | Manufactured Gas Plant |
| MW | Monitoring Well |
| NAD | North American Datum |
| NAPL | Non-Aqueous Phase Liquid |
| NGVD | National Geodetic Vertical Datum |
| NMPC | Niagara Mohawk Power Corporation |
| NOAA | National Oceanic and Atmospheric Administration |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| O.D. | Outside Diameter |
| ORP | Oxidation Reduction Potential |
| PAH | Polycyclic Aromatic Hydrocarbon |
| PCB | Polychlorinated Biphenyl |
| PER | Protection of Ecological Resources |

| | |
|---|---|
| PID | Photoionization Detector |
| PPE | Personal Protective Equipment |
| QAPP | Quality Assurance Project Plan |
| RI | Remedial Investigation |
| RIWP | Remedial Investigation Work Plan |
| SB | Soil Boring |
| SCO | Soil Cleanup Objectives (6NYCRR Part 375) |
| SRI | Supplemental Remedial Investigation |
| SS | Surface Soil |
| SV | Soil Vapor |
| SVOC | Semi Volatile Organic Compound |
| TAL | Target Analyte List |
| TCL | Target Compound List |
| TICs | Tentatively Identified Compounds |
| TOGS | Technical and Operations Guidance Series |
| TP | Test Pit |
| USCS | Unified Soil Classification System |
| USEPA | United Stated Environmental Protection Agency |
| VCO | Voluntary Consent Order |
| VOC | Volatile Organic Compound |

## Section 1

# Introduction

This document presents the Supplemental Remedial Investigation (SRI) Work Plan that is proposed to be conducted by National Grid on a portion of Area 3 of the Troy (Water St.) Site (referred to herein as "Area 3"). The New York State Department of Environmental Conservation (NYSDEC) approved the settlement agreement between Chevron USA, Inc. and National Grid, and assigned National Grid responsibility for the portion of Area 3 lying north of the centerline of the Route 378 bridge; this portion is referred to herein as the "Site".

In June 2016, National Gird submitted the "Data Summary Report, Remedial Investigation, Troy (Water St.) Site – Area 3, Troy, New York" (Brown and Caldwell Associates (BC), March 2016, Revised June 2016) (hereinafter referred to as the "RI Data Summary Report") which reported the data collected pursuant to the implementation of the NYSDEC-approved "Remedial Investigation Work Plan, Troy (Water St.) Site – Area 3, Troy, New York" (BC November 2014, Revised February 2015). In the RI Data Summary Report, National Grid recommended that additional RI activities be conducted to further evaluate the nature and extent of Manufactured Gas Plant (MGP)/asphalt related impacts at the Site. The NYSDEC provided approval of the RI Data Summary Report and the recommended additional activities in a letter dated June 21, 2016. Accordingly, this SRI Work Plan was prepared to describe the scope of work and procedures that will be used to conduct the SRI.

Area 3 (together with Area 1 and Area 2) is part of NYSDEC Site No. 4-42-029. Area 4 and the Hudson River sediments are part of NYSDEC Site No. 4-42-029A. Since the river sediments are being addressed as a separate Operable Unit of Site No. 4-42-029A, for the purposes of this RI, the Site is limited to the upland area. The RI activities are being conducted pursuant to the Administrative Order on Consent (Index# A4-0473-00001) executed in November 2003.

The specific objectives of the SRI are to:

1. Further evaluate the extent of Non-Aqueous Phase Liquid (NAPL)/tar encountered during the RI activities.
2. Further evaluate the extent of constituents in subsurface soil above applicable Soil Cleanup Objectives (SCOs) as set forth in 6 NYCRR Subpart 375-6.
3. Further evaluate the extent of dissolved-phase constituents in shallow and deep overburden groundwater above Class GA criteria.
4. Evaluate the potential for MGP-related or other residuals to be contributing Volatile Organic Compounds (VOCs) to soil vapor.

Section 2.0 provides a summary of the background, geology and history of the Site. Section 3.0 describes the scope of work, including the technical approach and the methods and materials to be used in performing the SRI. Section 4.0 provides the anticipated schedule for completion of the SRI.

## Section 2

# Background

The Site location and history described below was previously provided in the RI Data Summary report for the Site (BC, March 2016, Revised June 2016). Also provided below is a summary of the investigation findings to-date associated with the Site.

## 2.1 Site Location and Description

The Site is located in Troy, Rensselaer County, New York. Latitude and longitude coordinates for the property are approximately 42°42'06.1" north latitude and 73°42'02.2" west longitude. The location of the property is shown on Figure 2-1.

The Site is abutted to the north by Area 2 of the Troy (Water Street) Site, to the east by Water Street and a railroad spur, to the south by the remaining portion of Area 3 (which is being remediated by Chevron USA, Inc.), and to the west by the Hudson River. South of Area 3 is Area 4, which was previously remediated by National Grid. The area surrounding the Site is primarily used for industrial and commercial purposes. The topography of the Site is generally flat, with a steep bank located directly adjacent to the Hudson River to the west. The elevation of the flat portion of the property is approximately 25 to 28 feet based on National Geodetic Vertical Datum (NGVD) of 1929. A site plan is provided as Figure 2-2.

Based on the 1980 National Flood Insurance Program, Flood Insurance Rate Map the majority of the Site is designated as Zone B. Zone B indicates that the area falls between the 100-year and 500-year flood stage for the Hudson River. Directly adjacent to the river, the area is designated as Zone A12 (located within the 100-year flood stage). The 100-year flood elevation at the Site is approximately 24.5 feet, NGVD 1929.

## 2.2 Site History

The history of the Troy (Water St.) Site as a whole, including the portion of Area 3 that is the focus of this SRI is presented below. This history is based on several sources including historical maps, figures and documents provided by Niagara Mohawk Power Corporation and Chevron USA, and additional materials, including historical aerial photographs and maps, obtained by BC. A more detailed discussion of Site history was previously presented in the "Remedial Investigation Work Plan, Troy (Water St.) Site – Area 3" (BC, November 2015, Revised February 2015) (hereafter referred to as "RIWP").

Industrial operations at the Troy (Water St.) Site began in the mid-to-late-1800s with several generations of iron and steel making facilities. Manufactured gas production evolved on the Site to support the production of coke for the iron and steel industry. In 1859, portions of the Troy (Water St.) Site were granted by the State of New York to the Troy Iron and Nail Factory. By 1885 the Troy Steel and Iron Company had been incorporated and had operations occurring in the vicinity of the Site, with no record of activities directly occurring in Area 3. It is believed at this time that Area 3 was owned by the Burden Iron Company. Iron making at this time consisted of heating and melting iron ore with coal, coke or charcoal. In 1890, the Troy Steel and Iron Company had swapped the land associated with Area 3 with the Troy and Greenbush Railroad Association to be used as area for railroad tracks. Railroad easements remained on the Site during much of its history.

In 1924, the Hudson Valley Coke and Products Corporation (HVC&PC) was formed, and a brick shed, presumably used for storage, was constructed on the Site (Figure 2-2). By 1938 HVC&PC had sold the facility to the Hudson Valley Fuel Corporation (HVFC), which merged into New York Power and Light, which in turn was consolidated into Niagara Mohawk Power Corporation (NMPC) in 1951. The brick shed, previously mentioned, was demolished and the HVFC constructed two tarvia tanks of unknown capacity. Tarvia is a coal tar byproduct used for road surfacing and dust abatement. Three tar products structures and a flux oil tank (10,000 gallons) were also constructed by the HVFC. The approximate positions of the structures mentioned above are shown on Figure 2-2.

In 1955 Republic Steel Corporation sold the property to American Bitumuls & Asphalt Company, which was acquired by the Chevron Asphalt Company in 1965. The Chevron Asphalt Company constructed the asphalt plant on the land known as Area 3. In 1965, two above ground, vertical storage tanks (tank T-27 and tank T-41) were constructed. Storage tank T-27 was a 2.1 million gallon asphalt storage tank, and tank T-41 was a 210,000 gallon asphalt storage tank. Chevron ceased operations at the Site as an asphalt terminal around 1998, and the plant structures were razed in 2006, with the exception of the base of tank T-41, which, during demolition activities, tar was observed at the base of the structure. Based on gas chromatograph-flame ionization detector (GC-FID) fingerprint analysis of a sample of this material collected from the base of the structure during the 2006 demolition activities, this material has compositional characteristics indicative of coal tar.

## 2.3 Summary of Previous Site Investigations

The findings from the RI activities to-date were documented in the RI Data Summary Report (BC, March 2016, Revised June 2016) and are summarized below.

### 2.3.1 Subsurface Deposits and Stratigraphy

The following description of subsurface deposits and stratigraphy is based on data acquired during the RI activities. Boring, well construction and test pit logs are provided in Appendix B of the RI Data Summary Report. The geologic materials encountered on the Site generally consist in ascending order of dark gray shale bedrock; a sand and gravel deposit (includes minor component of silt); a sand and silt deposit with varying degree of organic matter; a silt and clay deposit (includes minor component of sand and varying amounts of organic matter); and anthropogenic fill. Refer to Figure 3 of the RI Data Summary Report (geologic cross-sections A-A' and B-B') for a depiction of the subsurface stratigraphy for the Site and to Appendix B of the RI Data Summary Report, which provides boring, well construction and test pit logs that describe the materials encountered at the locations completed during the RI activities.

Based on observations of rock fragments recovered in split spoon samples at refusal depth, the bedrock immediately underlying the Site can generally be described as grey to black weathered shale. From examination of nearby outcrops of the bedrock adjacent to the Site, it is apparent that the bedrock has undergone some degree of deformation. The surface of the bedrock underlying the Site is somewhat irregular as depicted on the top of rock surface contour map (see Figure 4 from the RI Data Summary Report). Bedrock surface elevations across the Site range from approximately -1 foot NGVD west of Water Street to approximately -11 feet NGVD east of the Hudson River. A depression is apparent in the bedrock surface beneath the Site, generally located under the location of the Former Tank T-27.

The sand and gravel deposit is comprised of coarse-grained sand, gravel and cobbles. Locally, it contains finer sands, silt and clay, but is predominantly coarser-grained. This unit overlies the bedrock throughout the Site and is thickest in the western portion of the Site, is progressively thinner toward the east, and eventually ends beneath the Site (see Figure 3 from the RI Data Summary Report [cross-section B-B']). Located above the sand and gravel deposit are deposits of primarily sand and silt with a minor component of organic matter (e.g., roots, wood) or a deposit comprised predominantly of

silt and clay and containing minor components of sand and organic matter. These deposits are generally 5 to 10 feet in thickness across the Site, however, along the eastern portion of the Site, only a thin veneer of this deposit overlies the bedrock surface.

The uppermost unconsolidated material underlying the Site is anthropogenic fill and is composed of various materials including sand, gravel, coal, cinders, ash and demolition debris (e.g., brick and concrete). Finer-grained material (silt and clay), where present in the fill, is typically not the predominant component. The fill varies in thickness across the Site ranging from approximately 17 to 28 feet.

Of note, the lateral and vertical variations in the nature and distribution of the subsurface deposits may be due to in part, to the apparent re-configuration of the shoreline's original alignment and apparent construction and subsequent backfill of an inlet channel, as evident by the historic 1855 Barton's map. For reference, a copy of the historic 1855 map along with other historic site drawings are provided in Appendix C of the RI Data Summary Report.

### 2.3.2 Hydrogeology

**Groundwater Occurrence and Flow**

The water table occurs in the fill generally about 17 to 22 feet below ground surface (bgs). As part of the RI activities, groundwater levels were measured on June 11, June 25, July 2, and September 22, 2015 (see Table 2 from the RI Data Summary Report). Surface water levels in the Hudson River were also measured from an established staff gauge on the above dates. Water table elevation contours for June 11 and September 22, 2015 (see Figures 5 and 6 of the RI Data Summary Report) indicate that the overburden groundwater in the vicinity of the Site flows generally from east to west towards the Hudson River. In the central portion of the Site, groundwater mounding is apparent based on the groundwater levels measured at MW-3S; in addition to the westerly flow towards the Hudson River, groundwater flow appears to be directed to the north and to the southeast from this area of the Site. This somewhat radial flow pattern would not be expected given the site setting; however, the backfilling of the historic channel/inlet depicted on the 1855 Barton's Map (Appendix C of the RI Data Summary Report) may have resulted in a preferential pathway for localized groundwater flow. Review of historical aerial photos of the Site prior to decommissioning of the Chevron plant revealed the presence of what appears to be a subsurface vessel that above ground piping was directed into in the vicinity of MW-3S; this feature may also influence local groundwater flow to some extent, yet additional data is needed to further evaluate this feature. The saturated thickness of the overburden deposits is approximately 29 to 30 feet.

Water level data from locations with both a shallow overburden monitoring well and a deep overburden monitoring well indicate a downward vertical hydraulic gradient (see Table 2 from the RI Data Summary Report). Accordingly, the screened intervals for the shallow and deep overburden wells intersect separate hydrostratigraphic units. Results from the continuous water level monitoring (discussed below) activities validate this conclusion.

A summary of the estimated horizontal hydraulic conductivity ($K_h$) values from slug tests conducted on monitoring wells installed during the RI and is provided in Table 3 of the RI Data Summary Report. The estimated $K_h$ values for the overburden range from $1.3 \times 10^{-4}$ to $9.9 \times 10^{-3}$ cm/sec. The saturated materials adjacent to the screens for the overburden wells are composed of a variety of subsurface deposits including: 1) fill; 2) fill and sand and silt; 3) fill and silt & clay/clay & silt; 4) sand and gravel; and 5) sand and silt. The greatest hydraulic conductivities were measured in wells screened primarily in sand and gravel (MW-2D) or primarily in coarse-grained fill material (MW-1D). In-situ hydraulic conductivity plots for the tests performed during the RI are provided in Appendix D of the RI Data Summary Report.

### Continuous Water Level Monitoring

During the RI activities, water levels in the Hudson River and monitoring wells in the overburden were monitored continuously for an approximately one-week long period to assess the degree of interaction between groundwater and surface water, evaluate the hydrogeologic characteristics and groundwater flow in the overburden deposits, and the potential for the river to serve as a discharge area for groundwater from the Site. Continuous monitoring of groundwater and river elevations was conducted for one week during the period June 25 to July 2, 2015 using data-logging pressure transducers installed in nine monitoring wells and in a staff gauge established in the adjacent channel of the Hudson River. In addition to the water level data, hourly barometric pressure data and precipitation data for this period were obtained from the National Oceanic and Atmospheric Administration (NOAA) meteorological measurement station located at Albany International Airport. This station is located approximately 6 miles from the Site, and thus, the data are considered generally representative of atmospheric conditions at the Site. Figures 7 through 9B of the RI Data Summary Report present the data collected during this monitoring period and are discussed below.

During the monitoring period (June 25 to July 02, 2015), approximately 1.3 inches of rain fell; slight decreases in barometric pressure are seen during these minor precipitation events (see Figure 7 from the RI Data Summary Report), most notably the decrease in barometric pressure late on June 28, 2015 associated with a series of precipitation events spanning from late on June 27 to late on June 28, 2015. Water levels in wells MW-1D, MW-3S, MW-4, and MW-4S do not respond to changes in barometric pressure, which is typical for an unconfined water-bearing zone. However, as depicted on Figure 7 of the RI Data Summary Report, groundwater elevations in well MW-2S did respond to changes in barometric pressure during the monitoring period, with the elevation of the water level in the well increasing as barometric pressure decreased, and vice versa (inverse relationship).

Figure 8 of the RI Data Summary Report presents hydrographs of the groundwater elevations in monitoring wells screened across the water table (MW-2S, MW-3S, and MW-4S) for the monitoring period. Precipitation for this period is also depicted on the hydrographs. Review of the data from MW-2S and MW-4S suggests that, in general, increases in groundwater levels are attributable to precipitation; however, this trend is not apparent for water table well MW-3S. Groundwater elevations steadily trend downward (by approximately 2 feet) at this location during the monitoring period.

Fluctuations in river level, due to fluctuations in tidal cycles, occurred during the week-long monitoring period. The water level in the Hudson River adjacent to the Site rises and falls over a range of approximately three to five feet approximately every six hours due to the tides. The water level changes in three of the wells monitored (MW-2D, MW-2D, and MW-4D) correlate closely with the surface water fluctuations, indicating hydraulic interaction with the river (Figure 9A of the RI Data Summary Report). The tidal efficiency, or the ratio of groundwater head change to river tidal level change, was approximated as an indicator of tidal effect for these wells. MW-2D, MW-3D, and MW-4D are located approximately 100 feet east of the Hudson River and have approximate tidal efficiencies of ± 0.18, ± 0.11 and ± 0.09, respectively.

The remainder of the wells equipped with data loggers (MW-1D, MW-2S, MW-3S, MW-4, and MW-4S) exhibited little or no response to river level fluctuations (Figure 9B of the RI Data Summary Report). A comparison between the water elevation data from the wells and the river from the staff gauge (see Figures 9A and 9B of the RI Data Summary Report) illustrates the hydraulic head in overburden is greater than the river level, thus indicating that groundwater in the overburden discharges to the river.

### 2.3.3 Visual/Olfactory Impacts

Figure 2-3 provides a plan view of locations where visual/olfactory impacts including NAPL/tar and indications of potential purifier waste material have been observed in overburden soil throughout the course of RI field activities. Table 4 of the RI Data Summary Report provides a description for these observations. The vertical positions of the observations are shown on the geologic cross sections (see Figure 3 from the RI Data Summary Report).

NAPL/tar was encountered at seven of the RI drilling locations. This includes three soil borings (SB-2, SB-5, SB-9), three soil borings intended for installation of a monitoring well (MW-2D, MW-3S, MW-3D) and one test pit excavation location (TP-3). Where present, the NAPL/tar is typically first encountered at depths of five to nine feet bgs, or deeper. However, in the vicinity of the southern former tarvia tank, NAPL/tar was encountered at shallower depths from ground surface to one foot bgs (TP-3). In general, the NAPL occurs as black viscous, tacky, stringy tar-like material or grain coatings within the overburden materials from approximately five to seventeen feet bgs. Less viscous NAPL exhibiting a more oil-like consistency occurring as blebs and grain coatings was encountered at depths below the water table. The intervals of NAPL/tar in the overburden are typically less than three-feet in thickness; however, at the boring for MW-3D, the NAPL/tar interval was substantially thicker at 15.4 feet (from approximately 17 to 32.4 feet bgs). The top of rock surface at this location is approximately 37 feet bgs and thus, the NAPL/tar observed in this area extends to approximately five feet above the top of rock surface. Most of the NAPL/tar observations exhibited tar-like odors; however, some of the NAPL encountered exhibited petroleum-like odors. A review of historic maps and documents indicated that King Fuels operated a bulk petroleum terminal and distribution center on the Troy (Water St.) – Area 2 Site. The petroleum observations and odors were primarily observed along the northern boundary of the Site directly adjacent to Area 2 (SB-2, SB-5, SB-6, MW-1S, MW-1D, MW-2S, MW-2D).

Observations of NAPL within one overburden monitoring well (MW-3D) were documented during NAPL gauging events conducted during the RI activities. The observations include black-brown NAPL adhering to the bottom two inches of an oil/water interface probe and/or a threaded rod. Consistent with the RIWP, groundwater samples were not collected from MW-3D due to the presence of NAPL during gauging events.

As part of the RI activities, a reconnaissance and demarcation of surface and shoreline tar deposits was completed. A plan view of the findings is provided as Figure 2-3. Site surficial tar was generally observed in the northeastern portion of the Site in the vicinity of the former Chevron tank T-41. This tank is observed to contain hardened tar remaining in the structure. When exposed to heat during days exhibiting warmer ambient temperatures, this hardened tar was observed to behave as a semi-solid material and becomes mobile. Shoreline hardened tar deposits were, in general encountered near the base of the riverbank; however, there were a few occurrences of the shoreline tar observed near the top of the bank.

Indications of potential purifier waste material were observed at approximately 8 feet bgs at test pit location TP-4 (pieces of white cemented lime-like material with a blue-green tinge exhibiting slight to moderate sulfur-like odor) and in the interval from approximately 3 to 7.5 feet bgs at test pit location TP-5 (ash-like material exhibiting slight to burnt/sulfur-like odor). Cyanide was not detected in the analytical soil samples collected from these test pits. TP-1, TP-1A and TP-1B were excavated in an area where surficial purifier waste had been previously observed during the 2007 Chevron asphalt plant decommissioning activities. During the RI activities, no observations of potential purifier waste materials were recorded in this area. Cyanide was detected at low level concentration (1.8 mg/kg) in the analytical soil sample collected from the 8 to 9 foot bgs interval at TP-1.

### 2.3.4 Surface Soil Analytical Results

**0- to 2-inch bgs interval**

For the purposes of evaluating concentrations and areal distribution of potentially MGP-related or other constituents in surface soil, surface soil samples from the 0- to 2-inch bgs depth interval were collected from 12 locations throughout the Site during the RI activities. The sample locations are depicted on Figures 2 and 11 of the RI Data Summary Report. The surface soil samples were analyzed for Target Compound List (TCL) semi-volatile organic compounds (SVOCs), total cyanide, TCL pesticides, polychlorinated biphenyls (PCBs) and Target Analyte List (TAL) metals.

Analytical results for the surface soil samples were compared to the applicable Subpart 375-6 SCOs (Protection of Groundwater, Protection of Ecological Resources, or Protection of Public Health for industrially zoned properties). The comparison is presented in Table 5 of the RI Data Summary Report. Also, a comparison to these criteria for constituents of concern typically associated with MGP sites [polycyclic aromatic hydrocarbons (PAHs) and cyanide] is provided on Figure 11 of the RI Data Summary Report. Concentrations shown in bold type on Figure 11 of the RI Data Summary Report indicates concentrations of one or more PAH compounds are above the applicable criteria. Concentrations of one or more PAHs were detected above applicable Subpart 375-6 SCOs in eight locations (SS-2, SS-5, SS-7, SS-8, SS-9, SS-10, SS-11, and SS-12). Total PAHs were detected at concentrations ranging from a low of 1.2 mg/kg (J qualified) to a high of 7998 mg/kg at location SS-7. Noteworthy is that, in general, the highest total PAH concentrations were observed at locations in close proximity to where surficial or shoreline tar deposits were documented (SS-3, and SS-7 through SS-10). No other SVOCs were detected above applicable SCOs at any of the sample locations.

Total cyanide was not detected above the applicable SCOs at any sample location (see Figure 11 from the RI Data Summary Report). Low-level concentrations were observed in the collected samples ranging from a low of 0.53 mg/kg (J qualified) to a high of 4.2 mg/kg at SS-5.

Exceedances of the Protection of Ecological Resources SCO for 4,4'- DDT (0.0033 mg/kg) were observed at three locations—SS-7, SS-8 and SS-10—at concentrations 0.024 mg/kg, 0.032 mg/kg and 0.04 mg/kg, respectively. Of note, the above-listed results are J qualified (i.e., estimated at low levels below reporting limits). These low-level concentrations do not exceed the SCOs for Protection of Public Health (industrial use) or Protection of Groundwater. No other pesticides were detected at concentrations exceeding applicable SCOs.

PCBs were not detected at concentrations above the applicable SCOs at any sample location.

Concentrations of one or more of the following inorganic constituents: arsenic, chromium, copper, lead, manganese, nickel, zinc and mercury; exceeded their respective applicable SCOs at the majority of the collected surface soil sample locations (11 out of 12 sample locations). Of these constituents, chromium, lead and zinc were most often detected at concentrations above the SCOs.

**0- to 6-inch bgs interval**

For the purposes of providing data for an ecological assessment (i.e., Steps 1 through 2B of a Fish and Wildlife Resources Impact Analysis (FWRIA)), surface soil samples from the 0- to 6-inch bgs depth interval were collected from 12 locations throughout the Site during RI activities. The sample locations are depicted on Figures 2 and 12 of the RI Data Summary Report. The 0- to 6-inch surface soil samples were analyzed for TCL SVOCs, total cyanide, TCL pesticides, PCBs, and TAL metals.

The analytical results from the 0- to 6-inch soil samples are provided in Table 6 of the RI Data Summary Report. The measured concentrations in the collected samples were compared to Subpart 375-6 SCOs for Protection of Ecological Resources (SCO-PER). Concentrations were also compared to the Ecological Soil Screening Levels (ECO-SSLs) developed by the United States Environmental Protection Agency

(USEPA) which are concentrations in soil that are protective of ecological receptors that commonly come into contact and/or consume biota that live in or on soil (USEPA, 2005-2008). The ECO-SSLs are not cleanup values, but are intended for use in screening sites for identifying constituents of potential concern. The comparison to the SCO-PER and ECO-SSLs criteria are provided in Table 6 of the RI Data Summary Report. Also, a comparison to these criteria for PAHs and cyanide is provided as Figure 12 of the RI Data Summary Report. Concentrations shown in bold type on Figure 12 indicate concentrations of one or more PAH compounds are above the applicable criteria.

Concentrations of one or more PAHs were detected above the SCO-PER criteria in seven locations (SS-3 and SS-7 through SS-12). Total PAHs were detected at concentrations ranging from a low of 11 mg/kg to a high of 4471 mg/kg at location SS-7. Noteworthy is that, in general, the highest total PAH concentrations were observed at locations in close proximity to where surficial or shoreline tar deposits were documented (SS-3, and SS-7 through SS-10).

Concentrations of one or one or more PAH compounds were above the ECO-SSL criterion designated to screen for potential impact to mammals in nine out of the 12 samples collected from the 0- to 6-inch bgs depth interval. In addition, concentrations of one or more PAH compounds in samples SS-7 and SS-8 also exceeded the ECO-SSL criterion designated to screen for potential impact to soil invertebrates.

Low-level concentrations of cyanide were observed in the collected samples ranging from a low of 0.51 mg/kg (J qualified) to a high of 2.8 mg/kg at SS-5. Of note, an SCO-PER criterion or ECO-SSL has not been established for total cyanide.

Exceedances of the SCO-PER criterion for 4,4'- DDT (0.0033 mg/kg) were observed at four locations—SS-1, SS-3, SS-7, and SS-10—at concentrations 0.025 mg/kg, 0.022 mg/kg, 0.022 mg/kg, and 0.051 mg/kg, respectively. Of note, the above-listed results are J qualified (i.e., estimated at low levels below reporting limits). The concentrations of 4,4'- DDT in these samples were also slightly above the ECO-SSL (Mammals) for this constituent of 0.021 mg/kg.

Low-level, J-qualified concentrations of Aroclor 1248 (a PCB mixture) were detected in samples SS-1 and SS-3. No PCBs were detected in any of the other 0- to 6-inch bgs depth interval samples.

Concentrations of one or more of the following inorganic constituents: arsenic, copper, lead, nickel, zinc and mercury; were detected above their respective SCO-PER criterion at 11 out of the 12 sampling locations.

The ECO-SSLs (Mammals) were exceeded for one or more of the following: cadmium, chromium, copper, lead, nickel, selenium, vanadium, and zinc; at 12 out of the 12 sampling locations.

The ECO-SSLs (Soil Invertebrates) were exceeded for one or more of the following: barium, copper, lead, manganese, nickel, and zinc; at 8 out of the 12 sampling locations.

### 2.3.5 Subsurface Soil Analytical Results

During the RI field activities, a total of 73 subsurface samples from 24 locations were collected and submitted for laboratory analysis of TCL VOCs TCL SVOCs, total cyanide, TCL pesticides, PCBs and TAL metals. Samples were selected based on visual observations/field screening of the soil samples (biased toward apparent impacts and/or determining the extent of impacts). The soil data collected during the RI activities were compared to the following criteria:

- NYSDEC's Remedial Program SCOs as set forth in 6 NYCRR Subpart 375-6.
- Subsurface soil cleanup guidance level for total PAHs of 500 mg/kg from Section H from NYSDEC's CP-51/Soil Cleanup Guidance (October 21, 2010). Per CP-51, the NYSDEC may apply this criteria at non-residential (i.e., commercial or industrial) sites where SCOs protective of ecological resources are not applicable.

- Table 7 of the RI Data Summary Report provides a summary of the soil quality results and a comparison to the applicable Part 375 SCOs. The applicable SCOs are identified below.

Total PAH concentrations in the collected soil samples are above 500 mg/kg at eight locations (SB-2, SB-5 through SB-7, SB-9, MW-2D, MW-3S, and MW-3D). In general, these locations fall within areas and depth intervals impacted by NAPL/tar (see Figure 2-3 presented herein and Table 4 of the RI Data Summary Report). Out of the above-referenced sample locations, total PAH concentrations ranged from a low of 515 mg/kg in the 33.5 to 34-foot sample interval from MW-3D to a high of 27,970 mg/kg in the 13 to 14.5-foot sample interval from SB-2.

As indicated above, in addition to comparing the subsurface soil data to the NYSDEC's soil cleanup guidance level for total PAHs (CP-51), the data were also compared to the New York State Subpart 375-6 SCOs for Protection of Public Health (site is zoned for industrial use), Protection of Ecological Resources, and Protection of Groundwater. A summary of this comparison is provided below.

**VOCs**

In the RI subsurface soil samples, concentrations of benzene, toluene, ethylbenzene, or isomers of xylene (BTEX) ranged from non-detect to a high of 21,200 mg/kg within the 11- to 13-foot interval sample collected from soil boring MW-3S. The distribution of total BTEX in subsurface soils is depicted in Figure 2-4. Concentrations of one or more BTEX compounds were detected at concentrations above applicable SCOs in samples collected at seven locations (MW-2S, MW-2D, MW-3S, MW-3D, SB-2, SB-5, and SB-9). In general, the soil borings where concentrations were reported above the SCOs are at locations where NAPL/tar was also observed.

**SVOCs**

A number of PAHs were detected above their corresponding SCOs (Protection of Public Health for industrial use, Protection of Ecological Resources and/or Protection of groundwater) in soil samples collected across the Site. The distribution of PAHs in soils is depicted on Figure2-4. The occurrence of these PAH concentrations, however, are generally in borings where NAPL/tar was also observed, Total PAH concentrations ranged from non-detect to 27,970 mg/kg within the 13- to 14.5-foot interval sample collected from soil boring SB-2. During the RI activities, subsurface soil samples from 17 locations contained concentrations of PAH compounds above one or more of the applicable SCOs (Figure 2-4).

Other SVOCs detected above applicable SCOs included: 2-methylphenol (o-cresol), 4-methylphenol, dibenzofuran and phenol at soil boring locations MW-3S, SB-2, SB-5, and SB-9.

**Cyanide**

Total cyanide was not detected at concentrations above applicable SCOs in any of the collected subsurface soil samples. Concentrations of total cyanide in the RI subsurface soil samples ranged from non-detect to a high of 10.3 mg/kg within the 7- to 8.6-foot interval sample collected from SB-5. Figure 2-4 depicts the results of the concentrations of total cyanide in soil from the RI activities.

As indicated in the above subsections, Figure 2-4 depicts the distribution of BTEX, PAHs and cyanide in soil from the data collected during the RI activities. At a location, if a concentration of one or more constituents exceeded any one of above noted SCOs, it is depicted with a red symbol. Locations where no exceedances were observed are depicted with a green symbol. The distribution of pesticides, PCBs and metals are not shown on Figure 2-4, however, the results are discussed below.

**Pesticides**

Concentrations of one or more of the following pesticides: 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, delta-Hexachlorocyclohexane, dieldrin, and endrin; their respective SCO-PER criterion at five of the subsurface soil sample locations (see Table 7 of the RI Data Summary Report). Of note, the

concentrations are J qualified (i.e., estimated at low levels below reporting limits). These low-level concentrations do not exceed the SCOs for Protection of Public Health (industrial use) or Protection of Groundwater. No other pesticides were detected at concentrations exceeding applicable SCOs.

**PCBs**

PCBs were not detected at concentrations above the applicable SCOs at any sample location. A single low level concentration (0.14 mg/kg, J-qualified) of Aroclor 1248 was detected in the 5- to 5.8-foot interval sample collected at SB-6.

**Metals**

Concentrations of one or more of the following inorganic constituents: arsenic, chromium, copper, lead, manganese, nickel, zinc and mercury; exceeded their respective applicable SCOs at the majority of the collected subsurface soil sample locations (20 out of 23 sample locations). Of these constituents, arsenic and chromium were most often detected at concentrations above the SCOs, with arsenic concentrations exceeding at 18 out of the 23 sample locations and chromium concentrations exceeding applicable SCOs at 15 out of the 23 subsurface soil sampling locations. Concentrations of lead, manganese and mercury exceeded their respective SCOs at approximately half of the subsurface soil sampling locations. The exceedances of metals in subsurface soils are boxed and bolded on Table 7 of the RI Data Summary Report.

### 2.3.6 Groundwater Analytical Results

Two comprehensive rounds of groundwater sampling were conducted during the RI activities (June 2015 and September 2015). The groundwater samples were analyzed for TCL VOCs, TCL SVOCs, total cyanide, pesticides, PCBs and TAL metals. Results of the analyses were compared to the 6 NYCRR Part 703 groundwater standards for Class GA water (groundwater) or, where no such standard exists, the corresponding guidance value from Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1; collectively, these are referred to herein as the Class GA criteria.

Table 8 of the RI Data Summary Report presents the groundwater quality data from June and September 2015, including a comparison to the Class GA criteria. Concentrations of total BTEX, naphthalene, phenol, and total cyanide in groundwater for the sampling rounds conducted are posted on Figure 2-5. Concentrations that are above the Class GA criteria are shown in bold type. Additionally, locations with a red symbol identify wells where one or more constituents were detected at levels above the Class GA criteria. Green symbols identify wells where no exceedances of criteria were observed, while the black symbol represents a well where NAPL was detected during the water level measurements and NAPL gauging activities conducted prior to sampling.

In accordance with the work plan for RI activities, groundwater samples were not collected from monitoring wells where NAPL was detected. Accordingly, as indicated on Figure 2-5, samples were not collected from MW-3D during the RI sampling events due to NAPL presence in this well. Additionally, samples were not collected from well MW-1S due to insufficient amount of water in the well during both sampling events.

Constituents often associated with MGP-related residuals, but can also be related to non-MGP sources that were detected at concentrations above the Class GA criteria were BTEX compounds, phenol, 2-methylphenol, 4-methylphenol, and total cyanide. These constituents are used as indicators for evaluating dissolved-phase impacts in groundwater at the Site. During the sampling rounds completed as part of the RI activities, one or more constituents in the BTEX constituent group were detected at concentrations above the Class GA criteria in samples collected from MW-2S, MW-2D, MW-3S, and MW-4S. Naphthalene, a PAH compound commonly associated with former MGP operations was not detected at concentrations above its applicable guidance value in the samples collected during the RI.

However, exceedances of one or more lower solubility PAHs, including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, and indeno(1,2,3-c,d)pyrene; were observed at MW-2S and MW-3S (see Table 8 from the RI Data Summary Report). Elevated levels of these other PAH compounds, which have very low solubilities, may be related to suspended particulates or turbidity entrained in the sample.

Total cyanide was detected above its applicable groundwater standard at MW-4S during the September 2015 sampling event, but not in the sample collected from this location during the June 2015 event.

Concentrations of one or more of the following pesticides: aldrin, alpha-Hexachlorocyclohexane, dieldrin, and heptachlor epoxide, exceeded their respective groundwater standards at MW-1D, MW-2S, MW-3S, and MW-4S (see Table 8 from the RI Data Summary Report). Of note, the majority of the concentrations are J qualified (i.e., estimated at low levels below reporting limits).

PCBs were not detected in any of the samples collected during the RI groundwater sampling events.

Several metals have been detected in groundwater at concentrations above the Class GA criteria (e.g., iron, magnesium, manganese and sodium) in the wells sampled during the RI. Typically, the concentrations of metals at locations impacted by potential MGP-residuals (e.g., MW-2S and MW-3S) are similar to the concentrations in the other locations and thus, the metals are not considered related to the former MGP operations.

## Section 3

# Scope of Work

The proposed SRI activities are described below. Specific methods and procedures associated with these RI activities will be conducted in accordance with the following plans:

- Generic Field Sampling Plan for Site Investigations at Non Owned Former MGP Sites, (Foster Wheeler, November 2002) (referred to as "FSP").
- Generic Quality Assurance Project Plan for Site Investigations at Non Owned Former MGP Sites, (Foster Wheeler, November 2002) (referred to as "QAPP").
- Generic Health & Safety Plan for Site Investigations at Non Owned Former MGP Sites (Foster Wheeler, November 2002).
- Update of "Health and Safety Plan for Remedial Investigation of Troy (Water St.) Site – Area 3" (BC, April 2015) (referred to as "Health and Safety Plan"). This plan was developed consistent with the Generic Health & Safety Plan for Site Investigations at Non Owned Former MGP Sites (Foster Wheeler, November 2002).
- DER-10/Technical Guidance for Site Investigation and Remediation (NYSDEC, May 2010).

The scope of work for the SRI is described in the subsections below.

## 3.1 Preliminary Activities

### 3.1.1 Property Access Activities

SRI activities described below are proposed to be conducted on a property not owned by National Grid. National Grid will contact Chevron USA, Inc., the current owner of the Site, to notify them of the SRI field investigation activities.

## 3.2 Field Activities

### 3.2.1 Utility Mark Outs and Clearance

Prior to conducting the intrusive activities described below, planned locations for test pits, soil borings and monitoring wells will be marked in the field. Dig Safely New York will be contacted to clear subscribed underground utilities, while the City of Troy will be contacted to clear utilities that they maintain (e.g., sewer and water). Chevron USA, Inc. will also be requested to identify and locate known on-site private utilities in areas where investigation activities are proposed.

Some of the proposed drilling and sampling locations may be adjusted to provide for adequate clearance from underground and aboveground utilities. The final locations for the test pits, soil borings and monitoring wells will be determined in the field following the mark-out of underground utilities.

At each drilling location, clearance of subsurface utilities will also be confirmed by physical means (e.g., vacuum soil extraction, hand tools, etc.). Physical clearance will be used to remove the soil at all drilling locations to a depth of approximately five feet bgs.

### 3.2.2 Test Pits

Test pits are proposed to be excavated at two (2) locations (TP-6 and TP-7) to evaluate subsurface conditions in the areas of historic structures. The approximate locations of the test pits are shown on Figure 3-1. The technical rationale for the positioning and depths of the proposed test pits is presented in Table 3-1. The planned locations of these test pits may be modified based upon the utility mark-outs.

During the excavation of any test pits, a Community Air Monitoring Plan (CAMP) will be followed that meets the requirements of the NYSDOH's Generic CAMP provided in DER-10. The test pits will be excavated to a depth of approximately 10 feet BGS if practical based on soil and/or Site conditions. The excavated material will be temporarily stockpiled on polyethylene sheeting adjacent to the test pit and water draining from the stockpiled soil, if any, will be directed back to the excavation. Materials encountered in the test pits will be described in the field to characterize soil type, including grain size, texture, and moisture content. Soil samples will be logged in accordance with the Burmister Soil Classification System and classified using the Unified Soil Classification System (USCS) as per the FSP. The samples will also be field screened for indications of MGP-related or other impacts based on appearance, odors or organic vapor concentration measurements using a photoionization detector (PID). Head-space screening will be conducted using the PID by immediately transferring a representative subsample of the soil to a clean glass jar and sealing its lid with aluminum foil, or to a sealable polyethylene plastic bag (e.g., Ziploc®). To allow the sample to equilibrate, it will remain sealed for a period of time (approximately 15 minutes) and then the tip of the PID will be inserted through the foil, or through the plastic bag, and the maximum instrument reading will be recorded.

If a test pit encounters the foundation of a subsurface structure, then an attempt will be made to continue the excavation outside of the structure to a depth sufficient to identify the base of the structure and the vertical extent of visible impacts (if any) associated with the structure. The excavation will not penetrate through the base (concrete, brick, steel, etc.) of the structure.

If the vertical extent of visible impacts cannot be determined in the test pits due to equipment capabilities or subsurface conditions within the test pits, then soil borings may be advanced in the vicinity of the test pits. In addition, if NAPL/tar is encountered within a structure during the excavation of a test pit, soil borings may be completed outside of the structures to evaluate whether potential NAPL/tar impacts have migrated outside of the structures, and if so, its extent.

Upon completion of the test pits, the excavated material will be backfilled into the excavations in the order the material was excavated (last out, first in), placing the backfill in approximately 1.5 to 2 foot lifts and tamping with the excavator bucket. The corners of the test pits will also be marked with stakes for surveying.

During the test pitting activities, the Site perimeter will be monitored for MGP-related odors (nuisance odor monitoring) using manual methods (e.g., olfactory). Mitigation measures (e.g., modification to excavation techniques, employment of odor controls, etc.) will be implemented following documentation of observed MGP-related odor or receipt of an odor complaint from the public.

Up to two (2) soil samples from each of the test pit locations (TP-6 and TP-7) will be analyzed for TCL VOCs, TCL SVOCs, TCL pesticides, and total cyanide (see Table 3-2). The depth interval(s) selected for sampling will be based on: visual observations/field screening of the soil samples (biased toward apparent impacts and/or determining the extent of impacts).

### 3.2.3 Soil Borings

Soil borings are proposed at seven (7) locations (locations SB-10 through SB-16) at the approximate positions shown on Figure 3-1. As mentioned above, the locations of these borings may be modified based on the utility mark-outs. The boring locations were selected in order to: 1) further evaluate the

extent of constituents in subsurface soil above applicable SCOs as set forth in 6 NYCRR Subpart 375-6.; and 2) further evaluate the extent of NAPL/tar encountered ruing the RI activities. Information from the borings will also be used to improve the understanding of the stratigraphy and hydrogeologic properties of the overburden. A summary of the technical rationale for locations and depths of the proposed soil borings is presented on Table 3-1.

During the advancement of the proposed soil borings, a CAMP will be followed as described in Section 3.2.2. The soil borings will be drilled using hollow stem augers and sampled with a two-foot long, two-inch inside diameter (I.D.) split-spoon sampler from ground surface to a depth to be determined in the field based on the objective of the boring location (see Table 3-1). The soil samples will be described in the field to characterize soil type, including grain size, texture, and apparent moisture content. Soil samples will be logged in accordance with the Burmister Soil Classification System and classified using the USCS as per the FSP. The samples will also be field screened for indications of MGP-related impacts or other impacts based on appearance, odors or organic vapor concentration measurements using a PID. Head-space screening will be conducted as described above in Section 3.2.2. Upon completion, the soil borings will be filled with cement/bentonite grout.

In the event that NAPL is encountered in a boring, and conditions in the boring are such that continued drilling may introduce NAPL into deeper stratigraphic intervals via the borehole (e.g., potentially mobile NAPL perched above a confining layer), measures will be taken to reduce this potential. Advancement of the augers will be suspended and temporary steel casing will be grouted into the borehole before advancing further. Alternatively, the boring will be terminated and consideration given to advancing a boring in an alternate location.

Samples will be collected every five (5) feet from each of the proposed soil borings (SB-10 through SB-16) and submitted for analysis of TCL VOCs, TCL SVOCs, TCL pesticides, and total cyanide. In the event that soils exhibiting impacts based on visual observations/field screening of the soil sample are encountered at intervals in between the planned analytical sample intervals (i.e., every 5 feet), additional samples will also be collected to characterize the observed impacts from these intervals. A summary of the planned soil analyses is provided in Table 3-2.

### 3.2.4 Overburden Evaluation and Monitoring Well Installation

Overburden monitoring wells are proposed at 10 locations at the approximate locations shown on Figure 3-1. As mentioned above, the locations of these monitoring wells may be modified based on the utility mark-outs. The selected locations are intended to: 1) further evaluate the extent of dissolved-phase constituents in overburden groundwater above Class GA criteria; and 2) further evaluate the extent of NAPL/tar encountered during the RI activities. The boring for each monitoring well will also be used to further evaluate the stratigraphic characteristics of the overburden. The intended purpose of each of the monitoring wells is summarized on Table 3-1.

#### Overburden Monitoring Well Pairs

Overburden monitoring well pairs are proposed at three (3) locations, with two monitoring wells installed at each location, for a total of six (6) monitoring wells. The approximate locations for the proposed well pairs are shown on Figure 3-1. The selected locations are intended to further evaluate the extent of dissolved-phase constituents in shallow and deep overburden groundwater above Class GA criteria and to further evaluate the extent of NAPL/tar encountered during the previous RI activities.

At each of the three proposed well locations (MW-6, MW-7, and MW-8) the initial boring will be advanced to bedrock (estimated at 33-34 feet BGS). At each location, a deep monitoring well (MW-6D, MW-7D and MW-8D) will be installed in the sand and gravel deposits identified during previous RI activities. Adjacent to each deep overburden well, a shallow overburden monitoring well (MW-6S, MW-7S, and MW-8S) will

be installed with a screen positioned to straddle the water table. Depending on the findings of the initial soil borings installed at each monitoring well location modifications to the depths and number of monitoring wells at each location may be made.

During the advancement of the proposed soil borings intended for installation of monitoring wells, a CAMP will be implemented as described in Section 3.2.2. The soil borings will be drilled using hollow-stem augers and sampled with a two-foot long, two-inch I.D. split-spoon sampler from ground surface to the target depth indicated in Table 3-1. The soil samples will be described in the field to characterize soil type, including grain size, texture, and apparent moisture content. Soil samples will be logged in accordance with the Burmister Soil Classification System and classified using the USCS per the FSP. The samples will also be field screened for indications of MGP-related impacts or other impacts based on appearance, odors or organic vapor concentration measurements using a PID. Head-space screening will be conducted as described above in Section 3.2.2. One soil sample will be collected from each soil boring intended for installation of a monitoring well from the mid-point of the proposed well screen interval. The samples will be submitted for analysis of TCL VOCs, TCL SVOCs, TCL pesticides, and total cyanide.

Monitoring well installation procedures are provided in the FSP. The monitoring wells will be constructed of two-inch diameter, Schedule 40 PVC well casing with 0.020-inch slot PVC screens and an appropriately-sized filter pack. If NAPL is encountered, a sump will be installed below the screen, if appropriate, as described in the FSP. The length of the sump will be field determined based on subsurface conditions; if conditions are suitable, it will be one or two feet in length. The base of the sump will be positioned so as not to penetrate a low permeability layer (e.g., dense glacial till), if encountered, and will not be installed below the top of bedrock surface. The annular space between the sump and formation will be filled with bentonite, cement/bentonite grout, or other suitable, relatively low permeability material.

The monitoring wells will be developed after a minimum period of 24 hours has passed following well installation to allow for the cement/bentonite grout to set. Well development will be conducted in accordance with procedures in the FSP.

**Shallow Overburden Monitoring Wells**

In addition to the shallow overburden monitoring wells proposed above, four monitoring wells with a screen positioned across the water table are also proposed at the approximate locations shown on Figure 3-1. The proposed well locations are intended to: 1) provide a replacement well for MW-1S (MW-1S-REP); 2) further evaluate groundwater flow conditions in area of MW-3 couplet (MW-5); and 3) further evaluate extent of cyanide concentrations observed in MW-4S (MW-9 and MW-10).

The soil borings advanced for the purposes of installing the shallow overburden monitoring wells will be drilled using hollow stem augers and sampled with a two-foot long, two-inch I.D. split-spoon sampler from ground surface to the target depth indicated in Table 3-1.

During the advancement of the proposed soil borings intended for installation of monitoring wells, a CAMP will be implemented as described in Section 3.2.2. The soil borings will be drilled using hollow-stem augers and sampled with a two-foot long, two-inch I.D. split-spoon sampler from ground surface to the target depth indicated in Table 3-1. The soil samples will be described in the field to characterize soil type, including grain size, texture, and apparent moisture content. Soil samples will be logged in accordance with the Burmister Soil Classification System and classified using the USCS as per the FSP. The samples will also be field screened for indications of MGP-related impacts or other impacts based on appearance, odors or organic vapor concentration measurements using a PID. Head-space

screening will be conducted as described above in Section 3.2.2. One soil sample will be collected from each soil boring intended for installation of a monitoring well from the mid-point of the proposed well screen interval. The samples will be submitted for analysis of TCL VOCs, TCL SVOCs, TCL pesticides, and total cyanide.

Monitoring well installation procedures are provided in the FSP. The monitoring wells will be constructed of two-inch diameter, Schedule 40 PVC well casing with 0.020-inch slot PVC screens and an appropriately-sized filter pack. If NAPL is encountered, a sump will be installed below the screen, if appropriate, as described in the FSP. The length of the sump will be field determined based on subsurface conditions; if conditions are suitable, it will be one or two feet in length. The base of the sump will be positioned so as not to penetrate a low permeability layer (e.g., dense glacial till), if encountered, and will not be installed below the top of bedrock surface. The annular space between the sump and formation will be filled with bentonite, cement/bentonite grout, or other suitable, relatively low permeability material.

The monitoring wells will be developed after a minimum period of 24 hours has passed following well installation to allow for the cement/bentonite grout to set. Well development will be conducted in accordance with procedures in the FSP.

### 3.2.5 Bedrock Evaluation and Bedrock Monitoring Well Installation

For this phase of RI activities, one (1) bedrock monitoring well (MW-3R) is proposed at the approximate location shown on Figure 3-1 to: 1) Determine whether or not NAPL encountered at or near the top of the bedrock surface during previous investigations has entered the bedrock; and 2) Assess groundwater quality within bedrock to evaluate the vertical extent of dissolved-phase, MGP-related or other constituents in groundwater. As mentioned in Section 3.2.2, the locations of this monitoring well may be modified based on the utility mark-outs. The intended purpose of the bedrock investigation locations is summarized on Table 3-1.

During the advancement of the proposed soil boring intended for installation of the bedrock monitoring well, a CAMP will be implemented as described in Section 3.2.2. Continuous sampling of the soil at the bedrock boring locations will be conducted using a two-foot long, two-inch O.D. split spoon sampler. Using 4.25-inch I.D. hollow-stem augers, an eight-inch diameter borehole will be drilled through the overburden and to a depth of approximately one to two feet into competent bedrock. Depending on the subsurface conditions, a temporary well casing may be installed to keep the borehole from collapsing and facilitate drilling. The soil samples will be described in the field to characterize soil type, including grain size, texture, and apparent moisture content. Soil samples will be logged in accordance with the Burmister Soil Classification System and classified using the USCS as per the FSP. The samples will also be field screened for indications of MGP-related impacts or other impacts based on appearance, odors or organic vapor concentration measurements using a PID as described above in Section 3.2.2.

A four-inch diameter steel casing will then be placed in the borehole, extending from the bottom of the borehole (seated one to two feet into competent bedrock) to the ground surface. The casing will then be grouted in place by filling the annular space between the casing and the borehole, from the bottom of the borehole to a few feet bgs, with a cement/bentonite grout using the tremie method or pressure grouting. The cement/bentonite grout in the annular space will be allowed to set for a minimum period of 12 hours before resuming drilling activities at the borehole location.

Bedrock drilling will resume by means of conventional or wire-line coring techniques using a nominal four-inch O.D. core barrel. Cores will be collected in five-foot intervals, to a depth of approximately 20 feet below the top of bedrock surface (approximately 41 to 42 feet bgs). Core samples will be described in the field to characterize: rock type; bedding thicknesses; texture; fracture type, orientation and spacing; structural features in addition to fractures; and other descriptors used to identify the

composition of the bedrock. Rock Quality Designation (RQD) will be measured in accordance with American Society for Testing and Materials (ASTM) Standard D6032-08 and recorded for each five-foot interval as an indicator of bedrock competency. The cores will be field screened for indications of MGP-related, or other, impacts based on appearance, odor and organic vapor concentrations as indicated by a PID. Additionally, drilling return water will be observed and screened with a PID for indications that NAPL or other impacts that may be encountered during the drilling process (e.g., sheens, globules of NAPL, etc.).

Packer pressure testing will be conducted at five-foot intervals following each core run to evaluate changes in hydraulic conductivity versus depth and identify potential water bearing zones. Packer pressure testing will be conducted in accordance with the procedures specified in the FSP. During packer pressure testing, in the event that the volume of water injected into the tested interval exceeds approximately five gallons over a period of five minutes, the test may be terminated so as to limit the volume of water introduced into the formation.

Coring and packer pressure testing will be used to identify the uppermost water-bearing zone in bedrock. Once this zone is identified, coring and packer testing will continue in five-foot intervals in an attempt to evaluate the thickness of the water-bearing zone, and to identify a relatively lower permeability interval directly below the water-bearing zone. Following completion of coring and packer testing, borehole geophysical logging will be conducted in the core hole. Specific geophysical parameters that will be recorded during the logging will include natural gamma, fluid temperature, fluid resistivity, spontaneous potential, single point resistance, and caliper. The geophysical data will be used to further evaluate the bedrock conditions and the vertical position of the water-bearing zone.

A two-inch diameter screen and riser casing will be installed inside the four-inch steel casing and nominally four-inch borehole. The wells will be constructed of two-inch diameter, Schedule 40 PVC casing with 0.020-inch slot PVC screens with an appropriately-sized filter pack. At well locations where NAPL is encountered, if any, a one to two-foot long sump will be installed below the screen, if appropriate, as described in the FSP. In instances where sumps are installed, the annular space between the sump and formation will be filled with bentonite, cement/bentonite grout, or other suitable, relatively low permeability material. After a minimum period of 24 hours has passed following well installation to allow for the cement/bentonite grout to set, the wells will be developed. Well development will be conducted in accordance with procedures in the FSP.

### 3.2.6 Slug Tests

In-situ hydraulic conductivity tests (i.e., slug tests) will be performed on each monitoring well installed pursuant to this work plan to evaluate the horizontal hydraulic conductivity of the adjacent formation. Rising and/or falling head slug tests will be conducted in accordance with the procedures described in the FSP and the data generated will be input into AQTESOLV® software for hydraulic conductivity calculations using analytical solutions appropriate for the hydrogeologic conditions.

### 3.2.7 Groundwater Monitoring and NAPL Gauging

Two (2) rounds of groundwater monitoring will be conducted as part of the SRI field activities. For each round, groundwater samples will be collected from the existing overburden monitoring wells and the monitoring wells installed pursuant to this SRI work plan. The first round of groundwater sampling will be initiated after at least one week has passed since completion of well development and after water levels in the wells have stabilized. The second round will be conducted approximately three months (one quarter) after the first round, preferably in a time period when groundwater elevation conditions differ seasonally from the first round. For example, if the first round is conducted during a period when the water table is relatively high, then it is preferable to schedule the second round for a period when the water table is relatively low.

Prior to groundwater sampling, depth to water measurements and NAPL gauging will be conducted on each well planned for sampling and the on-site overburden wells. In the event that NAPL is detected in a monitoring well, a groundwater sample will not be collected from that well. Groundwater samples will be collected according to the USEPA low flow sampling protocol and in accordance with procedures outlined in the FSP.

The groundwater samples will be analyzed for TCL VOCs, TCL SVOCs, TCL pesticides, PCBs, TAL metals, and total cyanide. The groundwater samples will also be analyzed in the field for pH, specific conductivity, temperature, turbidity, oxidation-reduction potential (ORP), and dissolved oxygen.

### 3.2.8 Soil Vapor Investigation

In a letter dated January 22, 2015, which provided comments on RIWP, the NYSDEC requested that "the proposed scope of work should be expanded to include environmental sampling to define the nature and extent of any soil vapor contamination". A response to comments letter was then prepared and submitted to the NYSDEC on February 18, 2015. In response to the NYSDEC request for including a soil vapor investigation in the RI scope of work, National Grid proposed that the soil vapor sampling locations be selected following receipt of subsurface soil and groundwater data collected during the RI field work in an effort to position the locations in areas where elevated constituent concentrations in soil and/or groundwater samples are observed. Accordingly, this section describes the methods and procedures associated with conducting a soil vapor investigation.

Soil vapor sampling will be conducted at the six (6) proposed soil vapor sampling probe locations shown on Figure 3-1 (SV-1 through SV-6) and listed on Table 3-1. As mentioned in Section 3.2.2, the locations of these soil vapor sampling points may be modified based on the utility mark-outs.

Samples of ambient air (outdoor air) will be collected at two (2) to three (3) locations during the soil vapor sampling. Analytical results from the ambient air samples will be used to evaluate background air concentrations and will be compared to the results of the soil vapor samples. The sampling flow rate will be calibrated to collect the ambient air samples over an eight-hour period. At least one of the outdoor air samples will be collected from an area upwind of the Site. The actual positions of the ambient air samples will be finalized on the day of the soil vapor sampling to take into account wind, weather and site conditions.

The soil vapor and ambient air samples will be collected in accordance with the draft document titled "Standard Operating Procedures for Soil Vapor Intrusion Evaluations at National Grid MGP Sites in New York State" (O'Brien & Gere, September 2007). This document was developed in consideration of NYSDOH's "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (NYSDOH, October 2006), input from NYSDEC and NYSDOH, National Grid's experience at sites in New York and New England, and the SVI experience of various environmental consulting firms. Information regarding the procedures for installation of the soil vapor sampling points and collection of soil vapor and ambient air samples is provided in Appendices A and B of the above-referenced document.

The soil vapor sampling probes will be installed by advancing a Geoprobe® Implant Anchor/Drive Point (PR-14) to the target depth indicated in Table 3-1 using a direct-push rig. Each soil vapor sampling point will consist of six-inch stainless steel screen attached to food grade tubing through which the soil vapor will be drawn. The screens will be placed at a depth comparable to the depth of foundation footings (approximately 6 to 8 feet bgs). Filter pack material (appropriately sized glass beads) will be placed in the annular space surrounding the soil vapor implant and tubing to a depth of approximately one to two feet above the top of the stainless steel screen. A two to three-foot bentonite seal will be placed in the annulus above the filter pack material followed by a flush-mounted surface completion set into concrete.

Prior to the collection of soil vapor samples, the potential for ambient air to be introduced into the soil vapor sample will be assessed using a tracer gas (helium) and a field meter capable of detecting the tracer gas. Procedures for the tracer gas evaluation are described in Appendix A of the document referenced above (O'Brien & Gere, September 2007).

The soil vapor and ambient air samples will be collected using six (6) liter Summa® passivated stainless steel canisters. The Summa® canisters will be batch certified as clean by the laboratory. Flow controllers will also be provided by the laboratory and will be pre-calibrated for the desired flow rate (approximately 0.2 liters per minute for the soil vapor samples) or duration of sample collection (approximately eight hours for the ambient air samples). The soil vapor samples will be collected within the timeframe that the ambient air samples are collected. Applicable field data including weather conditions, initial and final vacuum pressures for the Summa® canisters, purge rates and volumes, and the results of the tracer gas evaluation, will be recorded on field forms. A copy of the field forms that will be used are provided in Appendix A.

Appropriate QA/QC samples will be collected, including a duplicate sample for soil vapor. The samples will be analyzed using USEPA Method TO-15, including n-alkanes and tentatively identified compounds (TICs). The proposed analyte list is provided in Table 3-3.

To the extent feasible, the data will be used to evaluate whether VOCs (if any) detected in soil vapors are derived from MGP-related sources, non-MGP petroleum sources, or other sources, based on the compounds previously detected in the soil and groundwater and the results of the ambient air samples. Although there are several constituents on the analyte list in Table 3-3 that are common to both MGP residuals and petroleum, there are some that are indicative of one versus the other. For example, the presence of various alkanes (straight chain and/or branched chain) or methyl tertiary butyl ether (MTBE) would indicate the presence of VOCs from petroleum sources. The presence of compounds such as thiophenes, indane, or indene would indicate potential contribution from an MGP-related source. There are other compounds on the analyte list that are not indicators of MGP residuals or petroleum, for example, chlorinated VOCs.

Of note, the proposed soil vapor probes will be installed as part of this phase of investigation activities; however, the sampling of the probes and ambient air as discussed above will be conducted following implementation of an Interim Remedial Measure (IRM) to remove the above-grade remnants of the approximately 40-foot diameter former Tarvia Tank. The IRM was requested by the NYSDEC in a letter dated June 30, 2016 and thus, an IRM Work Plan is currently being developed and will be submitted under separate cover. Components of the IRM will include removal of the tank remnants as well as surface tar observed at the Site during previous investigation activities. Due to the Site's proximity to the steeply sloped river bank of the Hudson River, there is a potential for soil vapor to migrate downward, and therefore, the surface tar at the Site could potentially be acting as a source of soil vapor impacts, if any. Accordingly, in an effort to more effectively evaluate the nature and extent of potential soil vapor impacts, it is recommended that the sampling efforts associated with the soil vapor investigation be performed following completion of the planned IRM activities.

### 3.2.9 Survey

Each of the test pit, soil boring, monitoring well and soil vapor probe locations will be surveyed. The survey will include location coordinates, ground surface elevation, and in the case of the wells, top of PVC elevation data. Coordinates will be referenced to the State Plane coordinate system for New York using the North American Datum of 1983 (NAD 1983) in units of feet. Elevations will be referenced to the National Geodetic Vertical Datum (NGVD) of 1929 in units of feet. The survey will be performed by a New York State licensed surveyor.

### 3.2.10 Investigation-Derived Waste

Investigation-derived waste (IDW) generated during the SRI activities will include soil cuttings, drilling water, development water, equipment decontamination water, purge water, disposable sampling equipment, and personal protective equipment (PPE). The waste will be containerized in DOT-approved, 55 gallon drums, which will be properly labeled to identify their contents. Waste profiles will be prepared based on the analytical results of the environmental sampling. The appropriate treatment/disposal will be arranged based on the characterization of the waste streams. Treatment/disposal of the IDW will be managed by a properly licensed, permitted transportation and disposal contractor on National Grid's approved vendor list.

## 3.3 Data Management

Analysis of soil, groundwater and soil vapor samples collected during the SRI activities will be conducted by a laboratory certified under the NYSDOH Environmental Laboratory Approval Program (ELAP) to provide Analytical Services Protocol (ASP)/Contract Laboratory Program (CLP) deliverables. The analytical results from the SRI will be provided to the NYSDEC as an Electronic Data Deliverable (EDD) formatted to the NYSDEC's environmental data submission requirements that are detailed on the NYSDEC's website (http://www.dec.ny.gov/chemical/62440.html). This will include: 1) populating the NYSDEC EDD with the analytical data; 2) validating the EDD using the database software application EQuIS™ from EarthSoft®, Inc.; and 3) submitting the validated EDD to the NYSDEC.

## 3.4 Data Evaluation and Reporting

Laboratory results for the soil and groundwater samples will be forwarded to a qualified data validator for preparation of a Data Usability Summary Report (DUSR). The DUSR will present a summary of data usability, including a discussion of qualified and rejected data and provide recommendations for resampling/reanalysis, as applicable.

A SRI Data Summary Report for the Site will be prepared and submitted to the NYSDEC. The SRI Data Summary Report will include the following:

- Data generated during the field investigation in EQuIS™ compatible format;
- DUSR and tabular and graphic summaries of the analytical results;
- Maps of sampling locations;
- Maps of groundwater elevations and interpreted flow directions; and
- Hydrogeologic cross sections depicting subsurface conditions.

Accompanying the SRI Data Summary Report will be conclusions related to the objectives of the SRI, and an assessment of whether or not the data collected to-date are sufficient to meet the RI objectives for the Site. Also included will be either a recommendation that a RI Report be prepared (if the data collected to-date are sufficient), or recommendations for addressing additional data needs to complete the RI, including human and ecological exposure assessments.

In the event that preparation of a RI Report is recommended and the NYSDEC concurs with this recommendation, a RI Report will be prepared to address the following:

- The identity and characteristics of the source(s) of MGP-related or other impacts;
- The amount, concentration, phase, location, environmental fate and transport, and other significant characteristics of any MGP-related or other constituents present;
- Hydrogeologic characteristics, including grain size, hydraulic conductivity of saturated formations monitored, depth to saturated zone, nature of bedrock, hydraulic gradients, proximity to surface water, floodplains, or wetlands;

- Assessment of routes of exposure and potential human receptors via a qualitative human health exposure assessment in accordance with Section 3.1(C)17 and Appendix 3B of the May 2010 DER-10 Technical Guidance for Site Investigation and Remediation; and
- A determination as to whether or not Steps 1 through 2b of a Fish and Wildlife Resource Impact Analysis (FWRIA) are required based on Appendix 3C of the May 2010 DER 10 Technical Guidance for Site Investigation and Remediation and, if so required, conduct Steps 1 through 2b in accordance with the following NYSDEC guidance documents: 1) Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (FWIA); October 1, 1994 (Steps 1 through 2b); and 2) DER 10 Technical Guidance for Site Investigation and Remediation, May 2010.

The RI Report will include the following:

- Pertinent information obtained throughout the implementation of this work plan and previous investigations;
- Descriptions of the work done under this work plan and the results of that completed work;
- Deviations from this work plan that result from unexpected conditions encountered during the investigation;
- Summary of the overall nature and extent of contamination referencing any exceedances of applicable State standards, criteria, and guidance;
- Summary of any ecological assessments conducted;
- Summary tables of analytical data collected;
- Soil boring logs and well construction diagrams, which will include well development data and field instrument (PID) readings;
- Groundwater elevation contour maps with flow directions specified;
- Hydrogeologic cross sections of the Site;
- Figure depicting the elevation contours of the top of bedrock surface;
- Figures illustrating the distribution of constituent concentrations in soils and groundwater, including sample depths; and
- Conclusions which summarize the areas of concern, identify any potentially completed exposure pathways, and recommendations for any future work (e.g., none, additional investigation, or an evaluation of remedial alternatives).

## Section 4

# Schedule

Following NYSDEC/NYSDOH review and approval of the proposed locations and SRI Work Plan, the owner of the property (Chevron) will be contacted to discuss the planned investigation activities and receive approval to access the Site for the performance of the proposed field efforts. Field activities will be initiated after approximately two weeks following notification of the property owner of the planned RI activities.

It is anticipated that approximately four (4) to five (5) weeks will be required to conduct the field activities described in this SRI Work Plan through completion of: test pits; soil borings; monitoring well installations; well development; slug testing; soil vapor probe installations; collection of soil vapor samples; and the first round of groundwater sampling. As noted in Section 3.2.7, the second round of groundwater sampling will be conducted approximately three (3) months following the first round, preferably in an interval of hydrologic conditions that differs seasonally from the first round. Within approximately six (6) to eight (8) weeks of completion of the second round of groundwater sampling, the laboratory analyses and the DUSR are expected to be complete.

A SRI Data Summary Report will be submitted approximately 10 weeks after the DUSR for the groundwater samples for the second sampling round is received from the data validator. If following NYSDEC's review of the Data Summary Report (see Section 3.4), it is determined that the RI is complete, then a schedule for submitting the RI Report will be developed.

## Section 5

# References


Brown and Caldwell Associates, November 2015, Revised February 2015. "Remedial Investigation Work Plan, Troy (Water St.) Site – Area 3".

Brown and Caldwell Associates, April 2015. "Health and Safety Plan for Remedial Investigation of Troy (Water St.) Site – Area 3".

Brown and Caldwell Associates, March 2016, Revised June 2016. "Data Summary Report, Remedial Investigation, Troy (Water St.) Site – Area 3, Troy, New York".

NYSDEC, 2010." DER-10 / Technical Guidance for Site Investigation and Remediation. DEC Program Policy". May 3, 2010.

NYSDOH, October 2006. Guidance for Evaluating Vapor Intrusion in New York State.

O'Brien and Gere, September 2007. Standard Operating Procedures for Soil Vapor Intrusion Evaluations at National Grid MGP Sites in New York State.

# Tables

**TABLE 3-1**
**RATIONALE FOR SUPPLEMENTAL REMEDIAL INVESTIGATION LOCATIONS**
**TROY (WATER ST.) SITE - AREA 3**
**TROY, NEW YORK**

| Location ID | Objective | Target Depth[1] |
|---|---|---|
| ***SOIL BORINGS*** | | |
| SB-10 | Further evaluate the extent of constituents in subsurface soil above applicable SCOs[2]. | Advance to top of bedrock surface (estimated 30 ft bgs) |
| SB-11 and SB-12 | Further evaluate the extent of NAPL/tar encountered in area of MW-3S/3D. Further evaluate the extent of constituents in subsurface soil above applicable SCOs[2]. | Advance to top of bedrock surface (estimated 37 ft bgs) |
| SB-13 | Further evaluate the extent of constituents in subsurface soil above applicable SCOs[2]. | Advance to top of bedrock surface (estimated 37 ft bgs) |
| SB-14 | Further evaluate the extent of constituents in subsurface soil above applicable SCOs[2]. | Advance to top of bedrock surface (estimated 30 ft bgs) |
| SB-15 | Further evaluate the extent of constituents in subsurface soil above applicable SCOs[2]. | Advance to top of bedrock surface (estimated 27 ft bgs) |
| SB-16 | Further evaluate the extent of constituents in subsurface soil above applicable SCOs[2]. | Advance to top of bedrock surface (estimated 28 ft bgs) |
| ***OVERBURDEN MONITORING WELLS*** | | |
| MW-1S-REP | Further evaluate the extent of dissolved-phase constituents in shallow overburden groundwater above Class GA criteria. | *Soil Boring* - estimated 23 ft bgs. *Well* - straddle water table with screen. |
| MW-5 | Further evaluate the extent of NAPL/tar encountered in area of MW-3S/3D. Further evaluate the extent of dissolved-phase constituents in shallow overburden groundwater above Class GA criteria. Assess groundwater flow conditions in area of MW-3S. | *Soil Boring* - advance and continuously sample to top of bedrock surface (estimated 40 ft bgs). *Well* - straddle water table with screen. |
| MW-6S | Further evaluate the extent of NAPL/tar encountered in area of MW-3S/3D. Further evaluate the extent of dissolved-phase constituents in shallow overburden groundwater above Class GA criteria. | *Soil Boring* - approximately 25 ft bgs. *Well* - straddle water table with screen. |
| MW-6D | Further evaluate the extent of NAPL/tar encountered in area of MW-3S/3D. Further evaluate the extent of dissolved-phase constituents in deep overburden groundwater above Class GA criteria. | *Soil Boring* - advance and continuously sample to top of bedrock surface (estimated 40 ft bgs). *Well* - position well screen on top of bedrock. |

**TABLE 3-1**
**RATIONALE FOR SUPPLEMENTAL REMEDIAL INVESTIGATION LOCATIONS**
**TROY (WATER ST.) SITE - AREA 3**
**TROY, NEW YORK**

| Location ID | Objective | Target Depth[1] |
|---|---|---|
| MW-7S | Further evaluate the extent of dissolved-phase constituents in shallow overburden groundwater above Class GA criteria. | *Soil Boring* - approximately 23 ft bgs. *Well* - straddle water table with screen. |
| MW-7D | Further evaluate the extent of dissolved-phase constituents in deep overburden groundwater above Class GA criteria. | *Soil Boring* - advance and continuously sample to top of bedrock surface (estimated 33 ft bgs). *Well* - position well screen on top of bedrock. |
| MW-8S | Further evaluate the extent of dissolved-phase constituents in shallow overburden groundwater above Class GA criteria. | *Soil Boring* - approximately 25 ft bgs. *Well* - straddle water table with screen. |
| MW-8D | Further evaluate the extent of dissolved-phase constituents in deep overburden groundwater above Class GA criteria. | *Soil Boring* - advance and continuously sample to top of bedrock surface (estimated 34 ft bgs). *Well* - position well screen on top of bedrock. |
| MW-9 | Further evaluate the extent of dissolved-phase constituents in shallow overburden groundwater above Class GA criteria. | *Soil Boring* - approximately 25 ft bgs. *Well* - straddle water table with screen. |
| MW-10 | Further evaluate the extent of dissolved-phase constituents in shallow overburden groundwater above Class GA criteria. | *Soil Boring* - approximately 25 ft bgs. *Well* - straddle water table with screen. |
| ***BEDROCK MONITORING WELLS*** | | |
| MW-3R | Assess vertical extent of NAPL/tar encountered in soil boring for MW-3D. Evaluate groundwater quality conditions in shallow bedrock groundwater. | Pending findings from coring, packer testing and geophysical logging, complete a well with screen in shallow bedrock water-bearing zone. Total depth of bedrock well is anticipate to be less than 20 ft below the top of bedrock surface (estimated 60 ft bgs). |
| ***SOIL VAPOR MONITORING PROBES*** | | |
| SV-1 through SV-6 | Evaluate the potential for MGP-related or other residuals to be contributing VOCs to soil vapor. | Screen to be placed at a depth comparable to the depth of foundation footing (approximately 6-8 ft bgs) |
| ***TEST PITS*** | | |
| TP-6 | Evaluate subsurface conditions in area of former flux oil tank. | 10 ft or below impacts identified by field screening (if any). |
| TP-7 | Evaluate subsurface conditions in area of former tar products structures. | 10 ft or below impacts identified by field screening (if any). |

Notes:
(1) - Target depths are estimated based on data from surrounding borings. Adjustments may be required based on field observations.
(2) - Soil Cleanup Objectives (SCOs) as set forth in 6 NYCRR 375-6
NAPL - non-aqueous phase liquid
bgs - below ground surface
VOCs - volatile organic compounds

**TABLE 3-2**
**SUMMARY OF LABORATORY ANALYSES**
**TROY (WATER ST.) SITE - AREA 3**
**TROY, NEW YORK**

| Media and Sample Type | TCL VOCs Method 8260 | TCL SVOCs Method 8270 | TCL Pesticides Method 8082 | Total Cyanide | VOCs+TICs[5] Method TO-15 |
|---|---|---|---|---|---|
| Test Pit Samples (2 test pits, 1 to 2 soil samples per location) | 4 | 4 | 4 | 4 | -- |
| Duplicate[1] | 1 | 1 | 1 | 1 | -- |
| MS/MSD[1] | 1 | 1 | 1 | 1 | -- |
| Trip Blank[2] | -- | -- | -- | -- | -- |
| Equipment Blank[1] | 1 | 1 | 1 | 1 | -- |
| | | | | | |
| Soil Boring Samples (7 borings, 9 Soil samples each)[3] | 63 | 63 | 63 | 63 | -- |
| Duplicate[1] | 3 | 3 | 3 | 3 | -- |
| MS/MSD[1] | 3 | 3 | 3 | 3 | -- |
| Trip Blank[2] | -- | -- | -- | -- | -- |
| Equipment Blank[1] | 3 | 3 | 3 | 3 | -- |
| | | | | | |
| Monitoring Well Soil Boring Samples (10 Borings, 1 Soil sample each) | 10 | 10 | 10 | 10 | -- |
| Duplicate[1] | 1 | 1 | 1 | 1 | -- |
| MS/MSD[1] | 1 | 1 | 1 | 1 | -- |
| Trip Blank[2] | -- | -- | -- | -- | -- |
| Equipment Blank[1] | 1 | 1 | 1 | 1 | -- |
| | | | | | |
| Groundwater (8 wells, 2 events)[4] | 16 | 16 | 16 | 16 | -- |
| Duplicate[1] | 2 | 2 | 2 | 2 | -- |
| MS/MSD[1] | 2 | 2 | 2 | 2 | -- |
| Trip Blank[2] | ±4 | -- | -- | -- | -- |
| Equipment Blank[1] | 2 | 2 | 2 | 2 | -- |
| | | | | | |
| Soil Vapor and Ambient Air Samples (6 Soil Vapor, 3 Ambient Air) | -- | -- | -- | -- | 9 |
| Duplicate[1] | -- | -- | -- | -- | 1 |

Notes:
(1) - Per the QAPP, one duplicate sample, one MS/MSD pair, and one equipment blank will be submitted and analyzed for every Sample Delivery Group (maximum 20 samples).
(2) - Per the QAPP, one trip blank will be included in every shipment of water samples to be analyzed for VOCs, and subsequently analyzed.
(3) - Minimum of one sample collected every 5 feet and additional samples of impacted soils (if encountered based on visual observations/field screening in between planned sample intervals).
(4) - If NAPL is identified in well, groundwater samples from that well will not be analyzed.
(5) - See Table 3-3 for proposed analyte list.

**TABLE 3-3**
**SOIL VAPOR AND AMBIENT AIR ANALYTES**
**TROY (WATER ST.) SITE - AREA 3**
**TROY, NEW YORK**

| Primary Analytes | | | |
|---|---|---|---|
| | RL (µg/m$^3$)[1] | | RL (µg/m$^3$) |
| Acetone | 12 | Hexachlorobutadiene | 2.1 |
| Benzene | 0.64 | Isopropyl Alcohol | 12.5 |
| Bromodichloromethane | 13 | Isopropylbenzene | TBD |
| Bromoethene | 0.87 | Methyl Butyl Ketone | 2.05 |
| Bromoform | 2.1 | Methyl Ethyl Ketone | 1.5 |
| Bromomethane | 0.78 | Methyl Isobutyl Ketone | 2.05 |
| 1,3-Butadiene | 0.49 | Methylene chloride | 1.7 |
| Carbon disulfide | 1.6 | Methyl tert-butyl ether | 1.8 |
| Carbon tetrachloride | 1.3 | Naphthalene | 2.9 |
| Chlorobenzene | 0.92 | Styrene | 0.85 |
| Chloroethane | 0.53 | tert-Butyl Alcohol | 15 |
| Chloroform | 0.98 | 1,1,2,2-Tetrachloroethane | 1.4 |
| Cloromethane | 0.41 | Tetrachloroethene | 1.4 |
| 3-Chloropropene | 0.63 | Toluene | 0.75 |
| 2-Chlorotoluene (o-Chlorotoluene) | 1.04 | 1,2,4-Trichlorobenzene | 3.7 |
| Cyclohexane | 0.69 | 1,1,1-Trichloroethane | 1.1 |
| Dibromochloromethane | 2.0 | 1,1,2-Trichloroethane | 1.1 |
| 1,2-Dibromoethane (EDB) | 1.5 | Trichloroethene | 1.07 |
| 1,2-Dichlorobenzene | 1.2 | Trichlorofluoromethane | 1.1 |
| 1,3-Dichlorobenzene | 1.2 | 1,1,2-Trichloro-1,2,2-trifluoroethan | 1.5 |
| 1,4-Dichlorobenzene | 1.2 | 1,2,4-Trimethylbenzene | 0.98 |
| Dichlorodifluoromethane | 0.99 | 1,3,5-Trimethylbenzene | 0.98 |
| 1,1-Dichloroethane | 0.81 | Vinyl chloride | 0.51 |
| 1,2-Dichloroethane | 0.81 | m-Xylenes & p-Xylene | 0.87 |
| 1,1-Dichloroethene | 0.79 | o-Xylene | 0.87 |
| cis-1,2-Dichloroethene | 0.79 | n-Butane [2] | TBD |
| trans-1,2-Dichloroethene | 0.79 | n-Decane [2] | TBD |
| 1,2-Dichloropropane | 0.92 | n-Dodecane [2] | TBD |
| cis-1,3-Dichloropropene | 0.91 | n-Heptane [2] | 0.83 |
| trans-1,3-Dichloropropene | 0.91 | n-Hexane [2] | 0.70 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 1.4 | n-Nonane [2] | TBD |
| 1,4-Dioxane | 18 | n-Octane [2] | TBD |
| Ethylbenzene | 0.87 | n-Pentane [2] | TBD |
| 4-Ethyltoluene (p-Ethyltoluene) | 0.98 | n-Undecane [2] | TBD |

| Tentatively Identified Compounds (TICs) [3] | | | |
|---|---|---|---|
| | RL (µg/m$^3$) | | RL (µg/m$^3$) |
| Butylcyclohexane [4] | TBD | Indene | TBD |
| 2,3-Dimethylheptane [4] | TBD | Tetramethylbenzene isomers | TBD |
| 2,3-Dimethylpentane [4] | TBD | Thiophenes | TBD |
| Isopentane [4] | TBD | 1,2,3-Trimethylbenzene | 0.98 |
| 2,2,4-Trimethylpentane [4] | 1.08 | 1-Methylnaphthalene | TBD |
| Indane | TBD | 2-Methylnaphthalene | TBD |

Notes:

(1) -Actual reporting limits may be higher due to sample dilution by the laboratory to quantify compunds at elevated concentrations, if any. If diluted runs are necessary for quantifying certain compunds, the results of both the diluted and undiluted runs will be provided by the laboratory.

(2) - Noted compounds are straight-chain alkanes

(3) - Compounds will be reported as TICs if detected

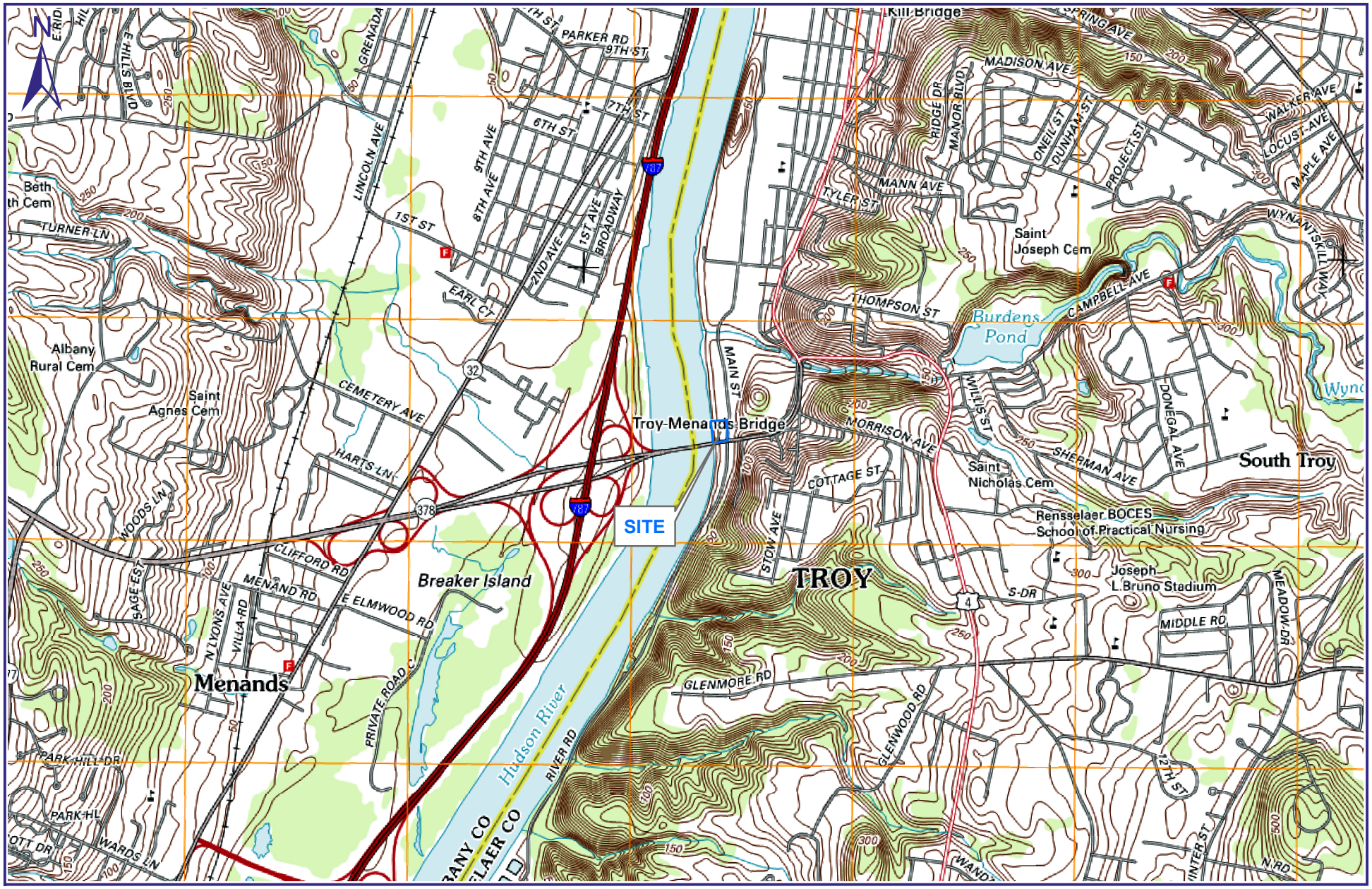
(4) - Noted compounds are branched-chain alkanes

RL - Reporting limit

TBD - To be determined

µg/m$^3$ - micrograms per cubic meter

# Figures




Source: USGS 7.5 Minute Topographic Map
Troy South Quadrangle (2013)

0 1,000 2,000
Feet

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**FIGURE 2-1**
**SITE LOCATION**
**NATIONAL GRID**
**TROY (WATER ST.) SITE - AREA 3, TROY, NEW YORK**

Author: BFTaylor Path: P:\GIS\National_Grid\Troy\Troy_Area_3\TroyArea3_SiteLoc_SRIWP.mxd 7/7/2016

7/7/2016

TROY (WATER ST.) SITE - AREA 2

LOT 111.75-1-1
TROY LOCAL DEVELOPMENT CORPORATION

N

FORMER TARVIA TANK
SB-6
CONCRETE PADS
SB-5
SS-8
SB-3
SS-7SS-7
SS-1
SS-2
MW-2D
MW-2S
TP-4
LOT 111.75-1-2
RENSSELAER COUNTY
SEWER DISTRICT NO. 1
MW-4
MW-1S
MW-1D
FORMER TAR PRODUCTS
TP-3
FORMER FLUX OIL TANK
(10,000 GALs.)
FORMER BRICK SHED
POST
SB-7
SUBSURFACE VAULT
FORMER TARVIA TANK
SB-2
SS-9
SS-10
FORMER
TANK T-41
TP-2
TP-5
WATER STREET
HUDSON RIVER
MW-3D
MW-3S
MW-1
FORMER
TANK T-27
SS-4
SS-3
CONCRETE PAD
SB-4
SB-8
SB-9
SS-11
LOT 111.83-1-1
CHEVRON USA, INC.
SS-12
MW-4S
MW-4D
SB-1
TP-1
TP-1A
TP-1B
CONCRETE BRIDGE PIER
SS-6
SS-5
BOLLARDS
NYS ROUTE 378
TROY-MENANDS BRIDGE

## Legend

- Soil Boring
- Monitoring Well
- Surface Soil Sample
- Test Pit
- Gas Line
- Sewer Line
- Suspected Utility
- Metal Anomaly
- EMI-31 Anomaly Demaracation Between Fill Types
- Road
- Property Line
- Chainlink Fence
- Site Boundary
- Historic Chevron USA, Inc. Aboveground Pipe, partially or fully demolished in 2006. Locations and dimensions are approximate; based on Figure 2 from report entitled "Facility Closure Site Investigation Report" (TRC 2005).
- Former Chevron Tank
- Historic Structures. Locations based on drawing: Map of Plant, Hudson Valley Coke & Products Corp. Troy, N.Y. (Date Unknown).
- Historic Structures. Locations based on drawing: New York Power & Light, Hudson Valley Fuel Plant, Troy, N.Y. (1946)
- Former alignment of shoreline and channel/inlet. Locations are approximate; based on 1855 Barton's Map
- Ground Surface Elevation Contour (ft., NGVD). Contour Interval = 1 ft.

Author: BFTaylor Path: P:\GIS\National_Grid\Troy\Troy_Area_3\TroyArea3_SitePlan_SRIWP.mxd

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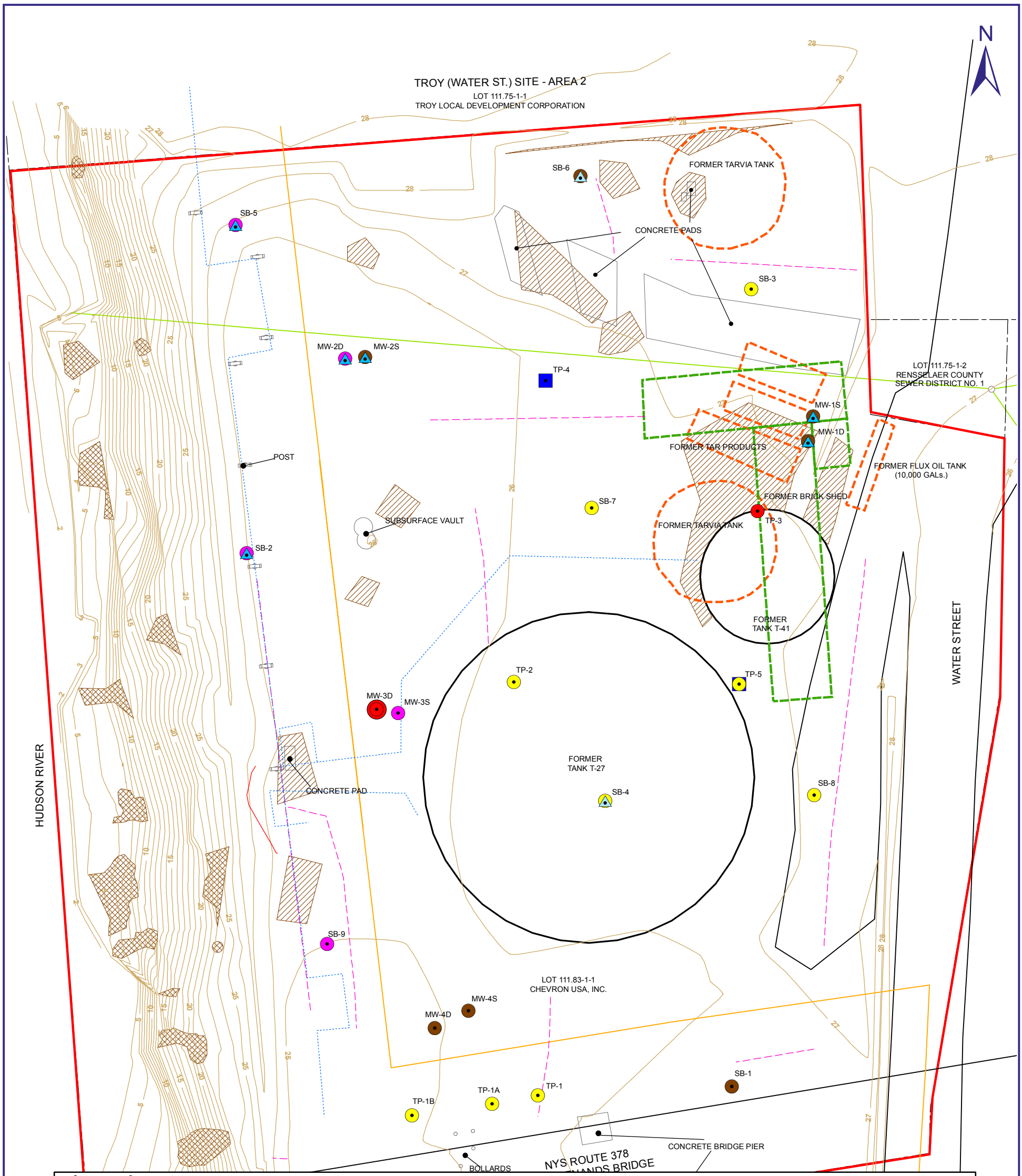
**FIGURE 2-2**
**SITE PLAN**
**NATIONAL GRID**
**TROY (WATER ST.) SITE - AREA 3, TROY, NEW YORK**

Sources: Base map developed based on drawing prepared by CT Male Associates (June 15, 2015) and based on drawing prepared by NAEVA Geophysics, Inc. (April, 2015)

0 15 30 60
Feet

7/7/2016




## Legend

**Visual/Olfactory Impacts (See Note 2)**

- Purifier Waste and Odor
- Petroleum Impacts: Staining and Odors
- Petroleum Impacts: Saturation and Sheens
- Staining, Odor
- Blebs, Globs, Sheen
- Hardened Tar
- Coated Material, Lenses
- Tar Saturated
- NAPL/Tar observed in monitoring well during gauging events
- Semi-Solid/Hardened Surficial Tar Deposit
- Hardened Shoreline Tar Deposit

Notes: 1) Refer to Table 4 for descriptions and depth intervals of NAPL/tar observations and to hydrogeologic cross-sections (Figure 3) for vertical position of observations.
2) NYSDEC's standard colors and associated descriptors for reporting MGP-related or other impacts were used to depict locations where impacts were observed

- Gas Line
- Sewer Liner
- Suspected Utility
- Road
- Property Line
- Ground Surface Elevation Contour (ft., NGVD). Contour Interval = 1 ft.
- Site Boundary
- Historic Chevron USA, Inc. Aboveground Pipe, partially or fullydemolished in 2006. Locations and dimensions are approximate; based on Figure 2 from report entitled "Facility Closure Site Investigation Report" (TRC 2005).
- Former Chevron Tank
- Historic Structures. Locations based on drawing: Map of Plant, Hudson Valley Coke & Products Corp. Troy, N.Y. (Date Unknown).
- Historic Structures. Locations based on drawing: New York Power & Light, Hudson Valley Fuel Plant, Troy, N.Y. (1946)

Author: BFTaylor Path: P:\GIS\National_Grid\Troy\Troy_Area_3\TroyArea3_Visual&Olfactory_observations_OB_SRIWP.mxd

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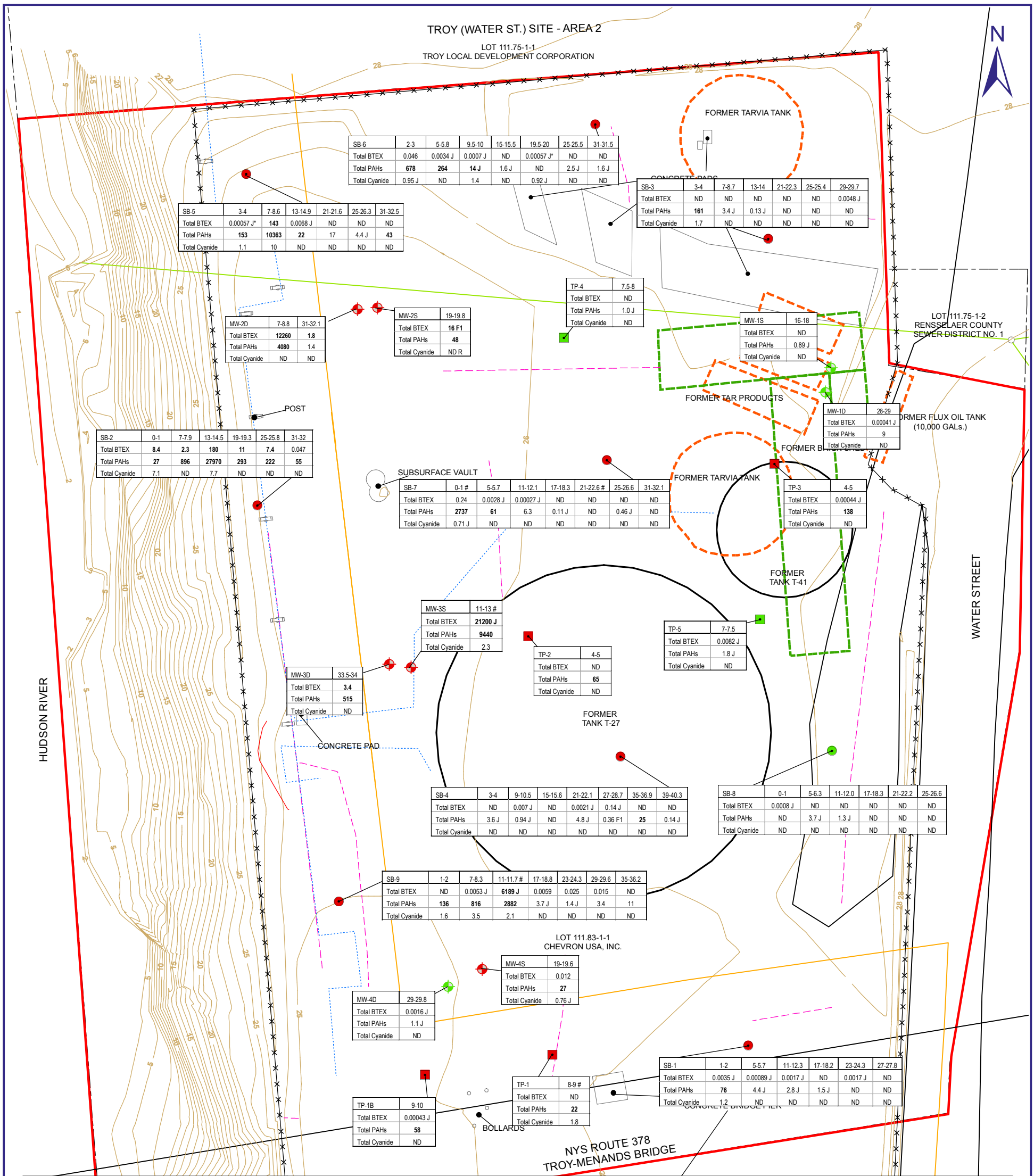
**FIGURE 2-3**
**VISIAL/OLFACTORY OBSERVATIONS**
**NATIONAL GRID**
**TROY (WATER ST.) SITE - AREA 3, TROY, NEW YORK**

Sources: Base map developed based on drawing prepared by CT Male Associates (June 15, 2015) and based on drawing prepared by NAEVA Geophysics, Inc. (April, 2015)

0 15 30 60
Feet

7/7/2016




| SB-6 | 2-3 | 5-5.8 | 9.5-10 | 15-15.5 | 19.5-20 | 25-25.5 | 31-31.5 |
|---|---|---|---|---|---|---|---|
| Total BTEX | 0.046 | 0.0034 J | 0.0007 J | ND | 0.00057 J* | ND | ND |
| Total PAHs | **678** | **264** | **14 J** | 1.6 J | ND | 2.5 J | 1.6 J |
| Total Cyanide | 0.95 J | ND | 1.4 | ND | 0.92 J | ND | ND |

| SB-3 | 3-4 | 7-8.7 | 13-14 | 21-22.3 | 25-25.4 | 29-29.7 |
|---|---|---|---|---|---|---|
| Total BTEX | ND | ND | ND | ND | ND | 0.0048 J |
| Total PAHs | **161** | 3.4 J | 0.13 J | ND | ND | ND |
| Total Cyanide | 1.7 | ND | ND | ND | ND | ND |

| SB-5 | 3-4 | 7-8.6 | 13-14.9 | 21-21.6 | 25-26.3 | 31-32.5 |
|---|---|---|---|---|---|---|
| Total BTEX | 0.00057 J* | **143** | 0.0068 J | ND | ND | ND |
| Total PAHs | **153** | **10363** | **22** | 17 | 4.4 J | **43** |
| Total Cyanide | 1.1 | 10 | ND | ND | ND | ND |

| TP-4 | 7.5-8 |
|---|---|
| Total BTEX | ND |
| Total PAHs | 1.0 J |
| Total Cyanide | ND |

| MW-2D | 7-8.8 | 31-32.1 |
|---|---|---|
| Total BTEX | **12260** | **1.8** |
| Total PAHs | **4080** | 1.4 |
| Total Cyanide | ND | ND |

| MW-2S | 19-19.8 |
|---|---|
| Total BTEX | **16 F1** |
| Total PAHs | **48** |
| Total Cyanide | ND R |

| MW-1S | 16-18 |
|---|---|
| Total BTEX | ND |
| Total PAHs | 0.89 J |
| Total Cyanide | ND |

| MW-1D | 28-29 |
|---|---|
| Total BTEX | 0.00041 J |
| Total PAHs | 9 |
| Total Cyanide | ND |

| SB-2 | 0-1 | 7-7.9 | 13-14.5 | 19-19.3 | 25-25.8 | 31-32 |
|---|---|---|---|---|---|---|
| Total BTEX | **8.4** | **2.3** | **180** | **11** | **7.4** | 0.047 |
| Total PAHs | **27** | **896** | **27970** | **293** | **222** | **55** |
| Total Cyanide | 7.1 | ND | 7.7 | ND | ND | ND |

| SB-7 | 0-1 # | 5-5.7 | 11-12.1 | 17-18.3 | 21-22.6 # | 25-26.6 | 31-32.1 |
|---|---|---|---|---|---|---|---|
| Total BTEX | 0.24 | 0.0028 J | 0.00027 J | ND | ND | ND | ND |
| Total PAHs | **2737** | **61** | 6.3 | 0.11 J | ND | 0.46 J | ND |
| Total Cyanide | 0.71 J | ND | ND | ND | ND | ND | ND |

| TP-3 | 4-5 |
|---|---|
| Total BTEX | 0.00044 J |
| Total PAHs | **138** |
| Total Cyanide | ND |

| MW-3S | 11-13 # |
|---|---|
| Total BTEX | **21200 J** |
| Total PAHs | **9440** |
| Total Cyanide | 2.3 |

| TP-5 | 7-7.5 |
|---|---|
| Total BTEX | 0.0082 J |
| Total PAHs | 1.8 J |
| Total Cyanide | ND |

| TP-2 | 4-5 |
|---|---|
| Total BTEX | ND |
| Total PAHs | **65** |
| Total Cyanide | ND |

| MW-3D | 33.5-34 |
|---|---|
| Total BTEX | **3.4** |
| Total PAHs | **515** |
| Total Cyanide | ND |

| SB-4 | 3-4 | 9-10.5 | 15-15.6 | 21-22.1 | 27-28.7 | 35-36.9 | 39-40.3 |
|---|---|---|---|---|---|---|---|
| Total BTEX | ND | 0.007 J | ND | 0.0021 J | 0.14 J | ND | ND |
| Total PAHs | 3.6 J | 0.94 J | ND | 4.8 J | 0.36 F1 | **25** | 0.14 J |
| Total Cyanide | ND | ND | ND | ND | ND | ND | ND |

| SB-8 | 0-1 | 5-6.3 | 11-12.0 | 17-18.3 | 21-22.2 | 25-26.6 |
|---|---|---|---|---|---|---|
| Total BTEX | 0.0008 J | ND | ND | ND | ND | ND |
| Total PAHs | ND | 3.7 J | 1.3 J | ND | ND | ND |
| Total Cyanide | ND | ND | ND | ND | ND | ND |

| SB-9 | 1-2 | 7-8.3 | 11-11.7 # | 17-18.8 | 23-24.3 | 29-29.6 | 35-36.2 |
|---|---|---|---|---|---|---|---|
| Total BTEX | ND | 0.0053 J | **6189 J** | 0.0059 | 0.025 | 0.015 | ND |
| Total PAHs | **136** | **816** | **2882** | 3.7 J | 1.4 J | 3.4 | 11 |
| Total Cyanide | 1.6 | 3.5 | 2.1 | ND | ND | ND | ND |

| MW-4S | 19-19.6 |
|---|---|
| Total BTEX | 0.012 |
| Total PAHs | **27** |
| Total Cyanide | 0.76 J |

| MW-4D | 29-29.8 |
|---|---|
| Total BTEX | 0.0016 J |
| Total PAHs | 1.1 J |
| Total Cyanide | ND |

| SB-1 | 1-2 | 5-5.7 | 11-12.3 | 17-18.2 | 23-24.3 | 27-27.8 |
|---|---|---|---|---|---|---|
| Total BTEX | 0.0035 J | 0.00089 J | 0.0017 J | ND | 0.0017 J | ND |
| Total PAHs | **76** | 4.4 J | 2.8 J | 1.5 J | ND | ND |
| Total Cyanide | 1.2 | ND | ND | ND | ND | ND |

| TP-1 | 8-9 # |
|---|---|
| Total BTEX | ND |
| Total PAHs | **22** |
| Total Cyanide | 1.8 |

| TP-1B | 9-10 |
|---|---|
| Total BTEX | 0.00043 J |
| Total PAHs | **58** |
| Total Cyanide | ND |

## Legend

- Soil Boring: green symbol indicates no exceedance of SCOs; red symbol indicates one or more constiuents exceed SCO(s)
- Monitoring Well: green symbol indicates no exceedance of SCOs; red symbol indicates one or more constiuents exceed SCO(s)
- Test Pit Sample: green symbol indicates no exceedance of SCOs; red symbol indicates one or more constiuents exceed SCO(s)
- Gas Line
- Sewer Line
- Suspected Utility
- Road
- Property Line
- Chainlink Fence
- Site Boundary
- Ground Surface Elevation Contour (ft., NGVD).
- Former Chevron Tank
- Historic Chevron USA, Inc. Aboveground Pipe, partially or fully demolished in 2006. Locations and dimensions are approximate; based on Figure 2 from report entitled "Facility Closure Site Investigation Report" (TRC 2005).
- Historic Structures. Locations based on drawing: New York Power & Light, Hudson Valley Fuel Plant, Troy, N.Y. (1946)
- Historic Structures. Locations based on drawing: Map of Plant, Hudson Valley Coke & Products Corp. Troy, N.Y.(Date Unknown).

Explanation of terms and abbreviations:

BTEX - Benzene, Toluene, Ethylbenzene, Xylenes
PAHs - Polycyclic Aromatic Hydrocarbons
J - Estimated Concentration
B - Constituent was found in the blank and the sample.
F1 - MS and/or MSD Recovery is outside acceptance limits.
ND - Not Detected
* - Laboratory Control Sample (LCS) or Laboratory Control Sample Duplicate (LCSD) is outside acceptance limits
R - The data are unusable. The results are rejected due to serious deficiencies in meeting quality control limits.

Bold Value - Indicates concentration of one or more constituents in a consituent group are above NYS PART 375 SCOs (Protection of Public Health for Industrial Zoned Properties; Protection of Ecological Resources; and/or Protection of Groundwater)

Results are reported in milligrams per kilogram (mg/kg)

# - Table lists the highest concentration from original and duplicate sample.

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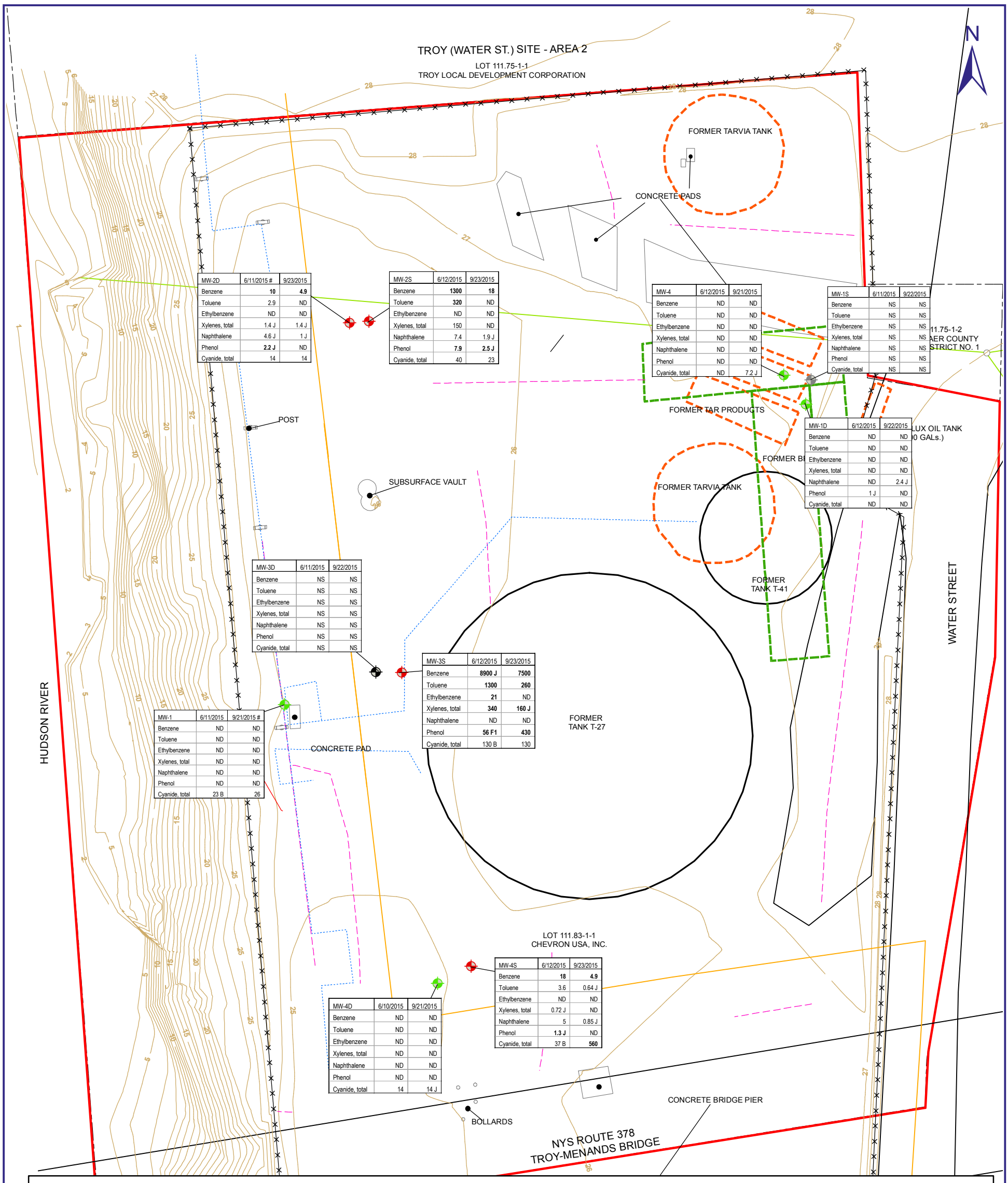
**FIGURE 2-4**
**BTEX, PAHs AND CYANIDE IN SUBSURFACE SOIL**
**NATIONAL GRID**
**TROY (WATER ST.) SITE - AREA 3, TROY, NEW YORK**

Sources: Base map developed based on drawing prepared by CT Male Associates (June 15, 2015) and based on drawing prepared by NAEVA Geophysics, Inc. (April, 2015)

0 15 30 60
Feet

Author: BFTaylor Path: P:\GIS\National_Grid\Troy\Troy_Area_3\TroyArea3_SubSurfaceSoils_SRIWP.mxd

7/7/2016




| MW-2D | 6/11/2015 # | 9/23/2015 |
|---|---|---|
| Benzene | **10** | **4.9** |
| Toluene | 2.9 | ND |
| Ethylbenzene | ND | ND |
| Xylenes, total | 1.4 J | 1.4 J |
| Naphthalene | 4.6 J | 1 J |
| Phenol | **2.2 J** | ND |
| Cyanide, total | 14 | 14 |

| MW-2S | 6/12/2015 | 9/23/2015 |
|---|---|---|
| Benzene | **1300** | **18** |
| Toluene | **320** | ND |
| Ethylbenzene | ND | ND |
| Xylenes, total | 150 | ND |
| Naphthalene | 7.4 | 1.9 J |
| Phenol | **7.9** | **2.5 J** |
| Cyanide, total | 40 | 23 |

| MW-4 | 6/12/2015 | 9/21/2015 |
|---|---|---|
| Benzene | ND | ND |
| Toluene | ND | ND |
| Ethylbenzene | ND | ND |
| Xylenes, total | ND | ND |
| Naphthalene | ND | ND |
| Phenol | ND | ND |
| Cyanide, total | ND | 7.2 J |

| MW-1S | 6/11/2015 | 9/22/2015 |
|---|---|---|
| Benzene | NS | NS |
| Toluene | NS | NS |
| Ethylbenzene | NS | NS |
| Xylenes, total | NS | NS |
| Naphthalene | NS | NS |
| Phenol | NS | NS |
| Cyanide, total | NS | NS |

| MW-1D | 6/12/2015 | 9/22/2015 |
|---|---|---|
| Benzene | ND | ND |
| Toluene | ND | ND |
| Ethylbenzene | ND | ND |
| Xylenes, total | ND | ND |
| Naphthalene | ND | 2.4 J |
| Phenol | 1 J | ND |
| Cyanide, total | ND | ND |

| MW-3D | 6/11/2015 | 9/22/2015 |
|---|---|---|
| Benzene | NS | NS |
| Toluene | NS | NS |
| Ethylbenzene | NS | NS |
| Xylenes, total | NS | NS |
| Naphthalene | NS | NS |
| Phenol | NS | NS |
| Cyanide, total | NS | NS |

| MW-3S | 6/12/2015 | 9/23/2015 |
|---|---|---|
| Benzene | **8900 J** | **7500** |
| Toluene | **1300** | **260** |
| Ethylbenzene | **21** | ND |
| Xylenes, total | **340** | **160 J** |
| Naphthalene | ND | ND |
| Phenol | **56 F1** | **430** |
| Cyanide, total | 130 B | 130 |

| MW-1 | 6/11/2015 | 9/21/2015 # |
|---|---|---|
| Benzene | ND | ND |
| Toluene | ND | ND |
| Ethylbenzene | ND | ND |
| Xylenes, total | ND | ND |
| Naphthalene | ND | ND |
| Phenol | ND | ND |
| Cyanide, total | 23 B | 26 |

| MW-4S | 6/12/2015 | 9/23/2015 |
|---|---|---|
| Benzene | **18** | **4.9** |
| Toluene | 3.6 | 0.64 J |
| Ethylbenzene | ND | ND |
| Xylenes, total | 0.72 J | ND |
| Naphthalene | 5 | 0.85 J |
| Phenol | **1.3 J** | ND |
| Cyanide, total | 37 B | **560** |

| MW-4D | 6/10/2015 | 9/21/2015 |
|---|---|---|
| Benzene | ND | ND |
| Toluene | ND | ND |
| Ethylbenzene | ND | ND |
| Xylenes, total | ND | ND |
| Naphthalene | ND | ND |
| Phenol | ND | ND |
| Cyanide, total | 14 | 14 J |

## Legend

- Monitoring Well: green symbol indicates no exceedance of constituent above Class GA Criteria; red symbol indicates one or more exceedance of constituent above Class GA Criteria
- Monitoring Well w/ NAPL
- Monitoring Well
- Gas Line
- Sewer Line
- Suspected Utility
- Road
- Property Line
- Chainlink Fence
- Site Boundary
- Ground Surface Elevation Contour (ft., NGVD).
- Historic Chevron USA, Inc. Aboveground Pipe, partially or fully demolished in 2006. Locations and dimensions are approximate; based on Figure 2 from report entitled "Facility Closure Site Investigation Report" (TRC 2005).
- Former Chevron Tank
- Historic Structures. Locations based on drawing: New York Power & Light, Hudson Valley Fuel Plant, Troy, N.Y. (1946)
- Historic Structures. Locations based on drawing: Map of Plant, Hudson Valley Coke & Products Corp. Troy, N.Y. (Date Unknown).

Explanation of terms and abbreviations:

BTEX - Benzene, Toluene, Ethylbenzene, Xylenes
ND - Not Detected
NS - Not Sampled (MW-1S - dry well, MW-3D - NAPL present in well)
J - Result is less than the reportling limit, but greater than or equal to the minimum detection limit and the concentration is an approximate value.
B - Compound was found in the blank and sample.
F1 - Matrix Spike (MS) and/or Matrix Spike Duplicate (MSD) Recovery is outside acceptance limits.
Bold Value - Indicates constituent concentration above Class GA Criterion
Results are reported in milligrams per kilogram (ug/l)
# - Table lists the highest concentration from original and duplicate sample.

Brown AND Caldwell

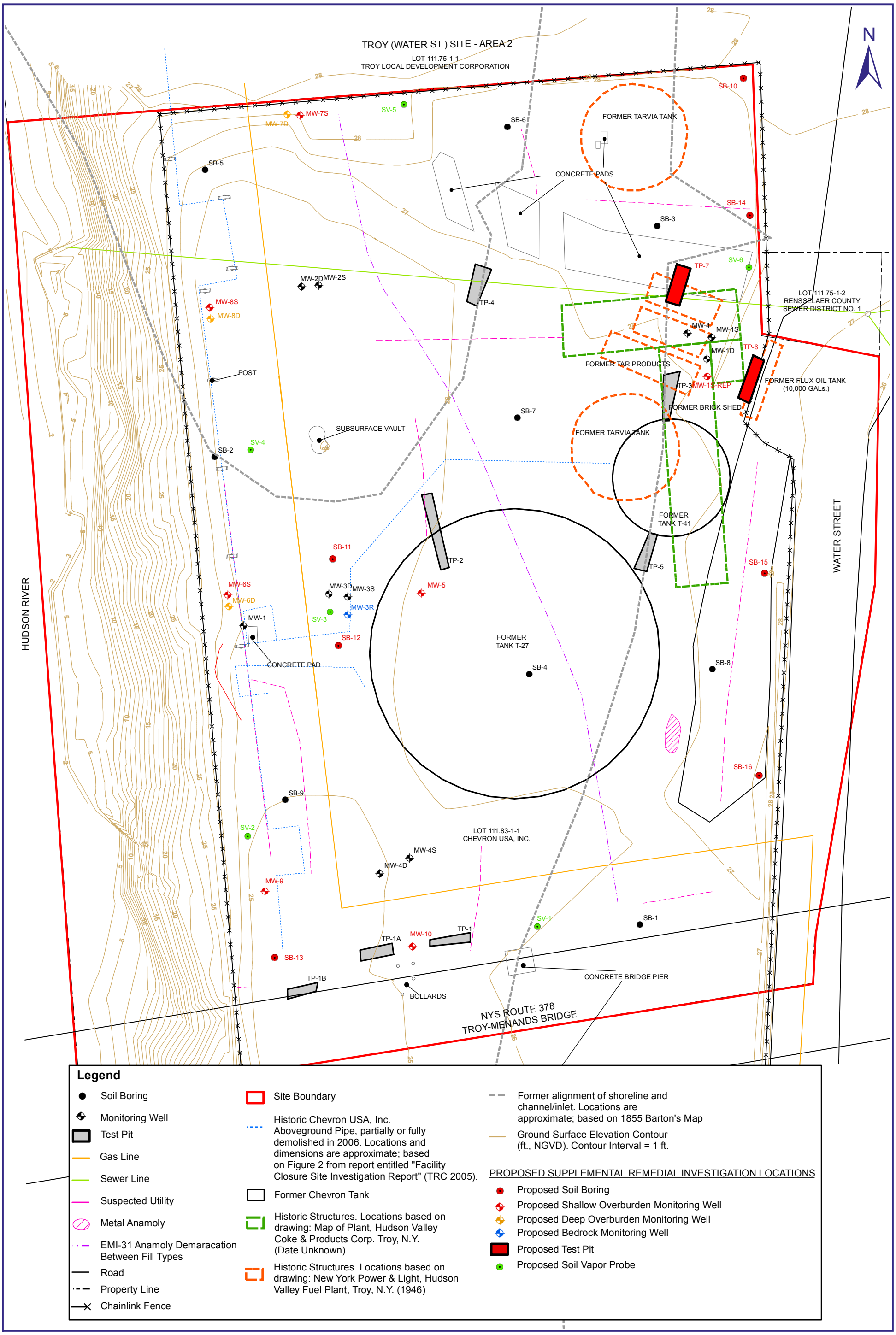
**FIGURE 2-5**
**BTEX, NAPHTHALENE, PHENOL AND CYANIDE IN GROUNDWATER**
**NATIONAL GRID**
**TROY (WATER ST.) SITE - AREA 3, TROY, NEW YORK**

Sources: Base map developed based on drawing prepared by CT Male Associates (June 15, 2015) and based on drawing prepared by NAEVA Geophysics, Inc. (April, 2015)

0 15 30 60
Feet

Author: BFTaylor Path: P:\GIS\National_Grid\Troy\Troy_Area_3\TroyArea3_GW_SRIWP.mxd

8/15/2016




Author: JMarolda Path: P:\GIS\National_Grid\Troy\Troy_Area_3\TroyArea3_SRIWP_Proposed_Locations.mxd

Brown AND Caldwell

**FIGURE 3-1**
**PROPOSED SUPPLEMENTAL REMEDIAL INVESTIGATION LOCATIONS**
**NATIONAL GRID**
**TROY (WATER ST.) SITE - AREA 3, TROY, NEW YORK**

Sources: Base map developed based on drawing prepared by CT Male Associates (June 15, 2015) and based on drawing prepared by NAEVA Geophysics, Inc. (April, 2015)

0 15 30 60
Feet

# Appendix A: SVI Sampling Field Forms

nationalgrid

# Ambient Air (Canister) Sample Collection Field Form

Project # _____ Consultant _____

Project Name _____ Collector _____

**Sample ID** _____

Vacuum gauge "zero" ("Hg) _____

Start Date/Time _____ Start Pressure ("Hg) _____

End Date/Time _____ End Pressure ("Hg) _____

Canister ID _____ End pressure > "zero"? _____

Flow controller ID _____ Sampling duration (intended) _____

Tubing type used _____ Length of tubing _____ cm Tubing volume _____ cc

Volume purged _____ cc @ _____ min 1 to 3 volumes purged @ < 200cc/min? _____

Weather Conditions at Start of Sampling:

Air temperature ($^{o}$F) _____ Rainfall _____ Wind direction _____

Barometric pressure _____ Relative humidity _____ Wind speed (mph) _____

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

_____

_____

**Site Plan** showing sample location, building(s) being sampled, building HVAC inlet, outdoor air sources, wind direction

Comments: _____

_____

_____

_____

_____

nationalgrid

# Soil Vapor (Canister) Sample Collection Field Form

Project # _____ Consultant _____

Project Name _____ Collector _____

**Sample ID** _____

Vacuum gauge "zero" ("Hg) _____

Start Date/Time _____ Start Pressure ("Hg) _____

End Date/Time _____ End Pressure ("Hg) _____

Canister ID _____ End pressure > "zero"? _____

Flow controller ID _____ Sampling duration (intended) _____

Associated ambient air sample ID _____ Depth of sample point below grade _____

Tubing type used _____ Length of tubing _____ cm Tubing volume _____ cc

Volume purged _____ cc @ _____ min 1 to 3 volumes purged @ < 200cc/min? _____

Chamber tracer gas conc. _____ Tracer gas conc. during purging _____

Weather Conditions during Probe Installation:

Air temperature ($^{o}$F) _____ Rainfall _____ Wind direction _____

Barometric pressure _____ Wind speed (mph) _____

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

_____

_____

Weather Conditions at Start of Sampling:

Air temperature ($^{o}$F) _____ Rainfall _____ Wind direction _____

Barometric pressure _____ Wind speed (mph) _____

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

_____

_____

**Site Plan** showing sample location, buildings, landmarks, potential soil vapor and outdoor air sources, preferential pathways

Comments: _____

_____

_____

_____

122 South Swan Street
Albany, New York 12210

T: 518.560.5910
F: 518.560.5920

February 18, 2015

John Spellman, P.E.
New York State Department of Environmental Conservation
625 Broadway, 11th Floor
Albany, NY 12233-7014 146094.001.004

Subject: Response to Comments and Revised Remedial Investigation Work Plan
Troy (Water Street) Site – Area 3
City of Troy, Rensselaer County, New York

Dear Mr. Spellman:

On January 22, 2015, National Grid received your letter which provided comments from the New York State Department of Environmental Conservation (NYSDEC) on the Remedial Investigation Work Plan, Troy (Water Street) Site - Area 3, Troy, New York (Brown and Caldwell Associates, November 2014). This letter has been prepared by Brown and Caldwell Associates (BC), on behalf of National Grid, to provide responses to the NYSDEC's comments and a revised Remedial Investigation (RI) Work Plan. A hard copy and electronic copy (CD-ROM) of the revised RI Work Plan are enclosed. For ease of review, the NYSDEC comment is provided in bold, italic typeface followed by National Grid's response.

**Comment 1**

***Section 3. The site was previously used as a terminal for loading trucks with asphalt. Also, MGP waste reputedly passed through Area 3 for disposal south to the site. There is a strong likelihood that spills resulted from these former operations. Therefore, a reconnaissance of surface tar throughout the entire site must be made in a manner similar to the demarcation of shoreline tar deposits.***

**Response:** Agreed. Additional discussion has been added to Section 3.12 of the RI Work Plan to include procedures associated with demarcation of surficial tar deposits across the Site. A qualified field geologist or engineer will mark surficial tar deposits with survey flags or paint, followed by surveying in accordance with Section 3.14.

**Comment 2**

***The proposed scope of work should be expanded to include environmental sampling to define the nature and extent of any soil vapor contamination.***

**Response:** Agreed. A subsection has been added to the scope of work in Section 3 of the RI Work Plan, which provides a proposed approach for evaluating the soil vapor medium at the Site. Of note, however, is that proposed soil vapor sampling locations are not included in the revised Work Plan. Rather, proposed soil vapor sampling locations will be provided under separate cover following receipt of subsurface soil and

groundwater analytical data collected as part of the scope of work in Section 3 in an effort to position the locations in areas where elevated constituent concentrations in soil and/or groundwater samples are observed, if any.

**Comment 3**

*Section 2.2. The Work Plan states "...there is no evidence of the use of chlorinated solvents at the Troy (Water St.) Site." What documents were used to draw the conclusion of there being no evidence of chlorinated solvent use?*

**Response:** Based on the analytical data collected to date on the portion of the Area 3 Site that is subject to the proposed RI (e.g., the 2005 investigation of Chevron's asphalt operations on Area 3 [TRC, 2005]), no chlorinated volatile organic compounds (CVOCs) were detected in any of the samples, with the exception of methylene chloride, a common laboratory contaminant. The proposed RI scope of work, however, includes collection of soil and groundwater samples that will be analyzed for Target Compound List (TCL) volatile organic compounds (VOCs) and thus, results from the proposed assessment of soil and groundwater as specified in the RI Work Plan will allow for a determination as to whether or not CVOCs are a concern at this Site. Modifications to the text in Section 2.2 have been made to address the above comment.

**Comment 4**

*Section 2.3. Please provide analytical summary tables from the two previous Area 3 investigations. Also, please depict the investigations' sampling locations on a figure to ensure the entire extent of the site is adequately investigated.*

**Response:** An appendix has been added (Appendix A) to the RI Work Plan, which includes analytical summary tables and a figure depicting sampling locations from the "Phase I Site History and Limited Phase II, Environmental Assessment Report, Chevron Asphalt Plant, Water Street, Troy, Rensselaer County, New York" (Ecology and Environment Inc. 1993) and "Facility Closure, Site Investigation Report, Chevron Products USA, Troy Asphalt Facility, 7 Water Street, Troy, New York" (TRC Raviv Associated, Inc. 2005) for the portion of Area 3 north of the centerline of the Troy-Menands Bridge. This data is being provided as background information only; we have not evaluated the reliability of the data or its usability for defining the nature or extent of any potential contamination.

**Comment 5**

*Section 3.5. When conducting test pitting to delineate purifier waste and/or subsurface structures and their contents, measures should be in place to minimize any potential nuisance odors from migrating from the site.*

**Response:** Additional text has been added to Section 3.5 of the RI Work Plan to include procedures associated with monitoring the Site perimeter for MGP-related odors (nuisance odor monitoring). National Grid will utilize a process to monitor for nuisance odors that is consistent with monitoring that has been employed at other National Grid former MGP sites. Manual methods (e.g., olfactory) for documenting perimeter

monitoring observations and procedures for implementing mitigation measures (e.g., modification to construction techniques, employment of odor controls, etc.) following documentation of observed MGP-related odors or receipt of an odor complaint from the public, have been added to the section.

The responses provided above along with the revised RI Work Plan, attached hereto, constitute the Final RI Work Plan for the Site.

If you should have any questions, comments or require any additional information, please do not hesitate to contact me.

Very truly yours,

**Brown and Caldwell**

Adam R. Sherman, P.E.
Supervising Engineer

cc: Mark Sergott, NYSDOH
Michael Donegan, National Grid

Attachments

# Remedial Investigation Work Plan
# Troy (Water Street) Site – Area 3
# Troy, New York

Prepared for

Niagara Mohawk Power Corporation
d/b/a National Grid

November 2014

Revised February 2015

# Remedial Investigation Work Plan
# Troy (Water Street) Site – Area 3
# Troy, New York

Prepared for
Niagara Mohawk Power Corporation d/b/a National Grid
300 Erie Boulevard West
Syracuse, New York 13202

November 2014

Revised February 2015

Project Number: 146094.001.002

I, James L. Marolda, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Remedial Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

James L. Marolda, C.P.G., P.G.
Supervising Geologist/Hydrogeologist

Brown and Caldwell Associates
2 Park Way, Suite 2A
Upper Saddle River, New Jersey 07458

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Table 3-2. Summary of Laboratory Analyses

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Figure 2-1. Site Location

Figure 2-2. Existing Site Plan

Figure 3-1. Proposed Remedial Investigation Locations

# List of Abbreviations

| | |
|---|---|
| ASP | Analytical Services Protocol |
| BC | Brown and Caldwell Associates |
| BGS | below ground surface |
| BTEX | Benzene, Toluene, Ethylbenzene, Xylene |
| CAMP | Community Air Monitoring Program |
| CLP | Contract Laboratory Program |
| DEC | New York State Department of Environmental Conservation |
| DOH | New York State Department of Health |
| DOT | Department of Transportation |
| DUSR | Data Usability Summary Report |
| EDD | Electronic Data Deliverable |
| E&E | Ecology and Environment, Inc. |
| ELAP | Environmental Laboratory Approval Program |
| EM | Electromagnetics |
| FSP | Field Sampling Plan |
| FWIA | Fish and Wildlife Impact Analysis |
| FWRIA | Fish and Wildlife Resource Impact Analysis |
| ft | feet |
| GPR | Ground-Penetrating Radar |
| HVC&PC | Hudson Valley Coke and Products Corporation |
| HVFC | Hudson Valley Fuel Corporation |
| IDW | Investigation-derived Waste |
| LSG | Lower Sand and Gravel |
| MGP | Manufactured Gas Plant |
| MW | Monitoring Well |
| NAD | North American Datum |
| NAPL | Non-Aqueous Phase Liquid |
| NGVD | National Geodetic Vertical Datum |
| NMPC | Niagara Mohawk Power Corporation |
| NOAA | National Oceanic and Atmospheric Administration |
| PAH | Polycyclic Aromatic Hydrocarbon |
| PCB | Polychlorinated Biphenyl |
| PID | Photoionization Detector |
| PPE | Personal Protective Equipment |
| QAPP | Quality Assurance Project Plan |
| RI | Remedial Investigation |
| SB | Soil Boring |

| | |
|---|---|
| SCO | Soil Cleanup Objectives (6NYCRR Part 375) |
| SS | Surface Soil |
| SVOC | Semi Volatile Organic Compound |
| TAL | Target Analyte List |
| TCL | Target Compound List |
| TP | Test Pit |
| TRC | TRC Raviv |
| USCS | Unified Soil Classification System |
| USEPA | United Stated Environmental Protection Agency |
| USGS | United States Geological Survey |
| VCO | Voluntary Consent Order |
| VOC | Volatile Organic Compound |

## Section 1

# Introduction

This Remedial Investigation (RI) Work Plan describes activities to be conducted by National Grid on a portion of Area 3 of the Troy (Water St.) Site (referred to herein as "Area 3"). The New York State Department of Environmental Conservation (DEC) recently approved a settlement agreement between Chevron USA, Inc. and National Grid, which assigns to National Grid responsibility for the portion of Area 3 lying north of the centerline of the Route 378 bridge; this portion is referred to herein as the "Site" herein.

Area 3 (together with Area 1 and Area 2) is part of DEC Site No. 4-42-029. Area 4 and the Hudson River sediments are part of DEC Site No. 4-42-029A. Since the river sediments are being addressed as a separate Operable Unit of Site No. 4-42-029A, for the purposes of this RI, the Site is limited to the upland area. The RI activities are being conducted pursuant to the Administrative Order on Consent (Index# A4-0473-00001) executed in November 2003.

The specific objectives of the RI are to:

1. Evaluate subsurface characteristics of the Site, including the nature of the subsurface materials and groundwater occurrence and flow.
2. Evaluate the configuration and nature of subsurface remnants of structures related to former manufactured gas plant (MGP) or and asphalt facility operations.
3. Evaluate extent of non-aqueous phase liquid (NAPL) in overburden soils, including NAPL associated with subsurface remnants of former MGP and asphalt plant structures.
4. Evaluate the extent of MGP-related and asphalt-plant-related constituents in soil above applicable Soil Cleanup Objectives (SCOs) as set forth in 6 NYCRR Subpart 375-6.
5. Evaluate the lateral and vertical extent of MGP-related and asphalt-related dissolved-phase constituents in overburden groundwater.
6. Identify potential pathways by which human or ecological receptors could be exposed to Site-related constituents, if any.
7. Delineate shoreline deposits of hardened tar (if any), and evaluate whether overland flow and/or underground seepage created the deposits.
8. Delineate surface tar deposits.
9. Delineate purifier wastes (which have been observed on the surface, under the bridge).
10. Collect data necessary for evaluating the feasibility of potential remedial action alternatives.

Section 2.0 provides a summary of the background, geology and history of the Site. Section 3.0 describes the scope of work, including the technical approach and the methods and materials to be used in performing the RI. Section 4.0 provides the anticipated schedule for completion of the RI.

## Section 2

# Background

## 2.1 Site Location and Description

The Site is located in Troy, Rensselaer County, New York. Latitude and longitude coordinates for the property are approximately 42°42'06.1" north latitude and 73°42'02.2" west longitude. The location of the property is shown on Figure 2-1. A Site plan is provided on Figure 2-2.

The Site is abutted to the north by Area 2 of the Troy (Water Street) Site, to the east by Water Street and a railroad spur, to the south by the rest of Area 3 (which is being remediated by Chevron USA, Inc.), and to the west by the Hudson River. South of Area 3 is Area 4, which was previously remediated by National Grid. The area surrounding the Site is primarily used for industrial and commercial purposes.

The topography of the Site is generally flat, with a steep bank located directly adjacent to the Hudson River to the west. The elevation of the flat portion of the property is approximately 25 to 27 feet, 1929 National Geodetic Vertical Datum (NGVD).

Based on the 1980 National Flood Insurance Program, Flood Insurance Rate Map the majority of the Site is designated as Zone B. Zone B indicates that the area falls between the 100-yr and 500-yr flood stage for the Hudson River. Directly adjacent to the river the area is designated as Zone A12 (located within the 100 yr flood stage). The 100-year flood elevation at the Site is approximately El. 24.5 feet, 1929 NGVD.

The Hudson River adjacent to the Site is tidal; the level in the river fluctuates approximately four to five feet twice per day. Surface water gauging data for the Hudson River obtained from the USGS Station 01359139 (Hudson River at Albany, NY), which is located approximately 4.5 miles down river (i.e., south), indicate the following typical water elevations (elevations reported relative to NGVD 1929)[1] :

- Mean High-High Water (MHHW): El. 4.9 feet (annual average MHHW ranged from El. 4.67 to 5.09 ft)[2]
- Mean High Water (MHW): El. 4.5 feet (annual average MHW ranged from El. 4.32 to 4.69 ft)[3]
- Mean Water Level (MWL): El. 2.2 feet (annual average MWL ranged from El. 2.06 to 2.34 ft)[4]
- Mean Low-Low Water (MLLW): El. -0.7 feet (annual average MLLW ranged from El. -0.82 to -0.46 ft)[5]

---

[1] The reported water elevations represent the average values at USGS Station 01359139 for "water years" (water years span from October of the previous year to September of the water year, i.e., Water Year 2009 spans from October 2008 to September 2009), with readily available data from USGS website (http://wdr.water.usgs.gov/). Data from the following "water years" was used to generate the average values: 1996, 2003, 2006, 2007, 2008, 2009, and 2010.

[2] MHHW represents the average water level for the higher of the two high tides in a day.

[3] MHW represents the average of the two high tides that occur in a day.

[4] MWL represents the average water level, including low and high tides.

[5] MLLW represents the average water level for the lower of the two low tides in a day.

## 2.2 Site History

The history of the Troy (Water Street) Site as a whole, including the portion of Area 3 that is the focus of this RI Work Plan is presented below. This history is based on several sources including historical maps, figures and documents provided by Niagara Mohawk Power Corporation and Chevron USA, and additional materials, including historical aerial photographs and maps, obtained by Brown and Caldwell Associates (BC).

Industrial operations at the Troy (Water St.) Site began in the mid-to-late-1800s with several generations of iron and steel making facilities. Manufactured gas production evolved on the Site to support the production of coke for the iron and steel industry.

In 1859, portions of the Troy (Water St.) Site were granted by the State of New York to the Troy Iron and Nail Factory. By 1885 the Troy Steel and Iron Company had been incorporated and had operations occurring in the vicinity of the Site, with no record of activities directly occurring in Area 3. It is believed at this time that Area 3 was owned by the Burden Iron Company. Iron making at this time consisted of heating and melting iron ore with coal, coke or charcoal. The primary waste associated with the iron and steel industry is slag. Constituents in slag include a variety of metals, such as iron, manganese, lead, chromium, nickel, copper and zinc. The production of coke for use in iron and steel production results in residual tar, which contains organic constituents such as BTEX (benzene, toluene, ethylbenzene, and xylene) compounds and PAH (polycyclic aromatic hydrocarbon) compounds. BTEX and PAH compounds are also associated with the water gas production process, as they are constituents of the oils used to enhance the illuminating properties of the water gas as well as the byproduct tars produced in the gas refining process. Chlorinated solvents such as trichloroethene, dichloromethane, and 1,1,1-trichloroethane are potential constituents of concern in steel rolling and milling operations (cutting oils). Based on the analytical data collected to date on the portion of the Area 3 Site that is subject to this work plan, no chlorinated volatile organic compounds (CVOCs) were detected in any of the samples, with the exception of methylene chloride, a common laboratory contaminant. Analytical data from previous investigations conducted on the Site are provided in Appendix A for reference. Additional analytical data will be collected during the proposed RI activities that will allow for a determination as to whether or not CVOCs are a concern associated with the Area 3 Site (see Section 3). Cyanide compounds (principally iron-cyanide complexes) are frequently associated with the spent purifier wastes generated during refinement of coal gas and water gas.

In 1890, the Troy Steel and Iron Company had swapped the land associated with Area 3 with the Troy and Greenbush Railroad Association to be used as area for railroad tracks. Railroad easements remained on the Site during much of its history. Coal ash, which may include bottom ash, fly ash, partially burned coal, and cinders, is most likely to be deposited along side rail beds during routine railroad operations. In addition to atmospheric deposition of the coal ash, it was also commonly used as fill material for rail bed construction. Primary constituents of concern in coal ash are PAHs and various trace metals (e.g., arsenic, barium, beryllium and selenium). Oil and coolant releases are also common from routine railroad operations and are associated with PAHs and BTEX. Polychlorinated biphenyls (PCBs) are a constituent of concern associated with diesel/electric locomotives in service prior to PCB use being banned in the mid 1970s.

In 1924, the Hudson Valley Coke and Products Corporation (HVC&PC) was formed, and a brick shed, presumably used for storage, was constructed on the Site (Figure 2-2). By 1938 HVC&PC had sold the facility to the Hudson Valley Fuel Corporation (HVFC), which merged into New York Power and Light, which in turn was consolidated into Niagara Mohawk Power Corporation (NMPC) in 1951. The brick shed, previously mentioned, was demolished and the HVFC built a Tarvia tank of unknown capacity (Figure 2-2). Tarvia is referenced in literature as a combination of coal tar and petroleum tar designed to penetrate the surface to which it is applied and then harden quickly. Three unknown rectangular

structures, presumably used for storage were also built by the HVFC. During the time NMPC owned the land, MGP operations were not conducted on-site, and the area was used for storage. NMPC disposed of MGP waste south of Area 3, on Area 4. These wastes would have passed through or near the Site via railroad or other vehicles before being disposed of in lagoons in Area 4. In 1951, NMPC sold the Site to Republic Steel Corporation, however remained in operation of the MGP facility, in Area 2, until it was retired in 1956. The primary waste materials in the manufactured gas and by-products industry are coal tar residuals (BTEX and PAH compounds) and spent oxide box purifier wastes (cyanide). During the operation of the MGP, coal tar was sold to the Barrett Company and its successors. This resulted in most of the coal tar that was produced on-Site being shipped off-Site.

In 1955 Republic Steel Corporation sold the Site to American Bitumuls & Asphalt Company, which in 1965 became Chevron Asphalt Company. The Chevron Asphalt Company built the asphalt plant on the land known as Area 3. In 1965 two above ground, vertical storage tanks (tank T-27 and tank T-41) were built. Storage tank T-27 was a 2.1 million gallon asphalt storage tank, and tank T-41 was a 210 thousand gallon asphalt storage tank. During the time of operation aboveground pipes leading to and leaving these tanks, as well as a "meltdown pit", west of the storage tanks (between the storage tanks and the river) could be found on the Site. Materials received and/or stored at the asphalt facility included (but were not limited to) asphalt, emulsified asphalt, naphtha, hydrochloric acid, sodium hydroxide, and (up to 1992) trichloroethene. Organic constituents of concern associated with asphaltic materials include PAHs (naphthalene and anthracene) and BTEX. Chevron ceased using the Site as an asphalt terminal around 1998, and the plant was broken down and demolished in 2006.

## 2.3 Previous Site Investigations

Existing information pertaining to the environmental, stratigraphic and hydrogeologic characterization of the Site is limited to two Area 3 investigations completed by others and the more extensive findings of the Area 2 investigations conducted by BC to the north of the Site. The following information is based on "Phase I Site History and Limited Phase II Environmental Assessment Report, Chevron Asphalt Plant, Water Street, Troy, Rensselaer County, New York" (Ecology and Environment (E&E), Inc., 1993), "Facility Closure Site Investigation Report, Chevron Products USA, Troy Asphalt Facility, 7 Water Street, Troy, New York" (TRC Raviv Associates, Inc. (TRC), 2005) and "Supplemental Investigation Report, Troy (Water Street) Site – Area 2, Troy, New York" (BC, 2008). The following information may be revised based on the findings of this proposed RI. Soil and groundwater analytical results from samples collected north of the centerline of the Troy-Menands bridge in Area 3, which were reported in the 1993 E&E report and the 2005 TRC report, are included provided in Appendix A. These data are provided as background information only; BC has not evaluated the reliability of the data or its usability for defining the nature or extent of any potential contamination. The analytical data provided in the Tables A-1 through A-4 are presented as they are in their respective reports, and the sample locations on Figure A-1 should be considered approximate.

### 2.3.1 Geologic Setting

As indicated by the boring logs contained in the 2005 TRC report, the subsurface in Area 3, north of the Troy-Menands bridge, is composed of brown-black fine to coarse sand, with ash, cinders and slag. This fill material extends to a depth of 6-10 feet BGS, overlying black-brown silty clay, 2-3 feet thick. The silty clay layer sits on top of more fill material, black fine to coarse sand, with ash, cinders and slag throughout. The layer of black sand extends to a minimum depth of 16 feet BGS. Based on the presence of anthropogenic materials, the entire sequence to 16 feet BGS is considered fill material. No soil borings or well logs for the Site were completed deeper than 16 feet BGS. Monitoring wells installed on the Site in 1987 (MW-1, MW-4) were completed to depths of 25.63 and 26.92 feet BGS respectively. The subsurface materials at these well locations are unknown as the boring logs were unavailable for

review. The 1993 E&E report states that unconsolidated soils in the area of the Site are underlain by bedrock made up of Germantown, Poultney, Hatch Hill and West Castleton Formations. These particular formations, consisting primarily of shale, conglomerate, limestone, and dolostone, are of Cambrian through Middle Ordovician age. It should be noted that more recent geological mapping and the investigations conducted on Area 2 (see below) indicate the bedrock beneath Area 3 is likely to be a component of the Cohoes Melange (Troy Frontal Zone).

BC has conducted extensive investigations north of the Site in Area 2. These investigations included the advancement of soil and bedrock borings, installation of monitoring wells, and hydrogeologic characterization. Borings advanced in Area 2 confirm the presence of fill consisting of generally coarse-grained material including slag, cinders and demolition debris. There is a minor component of finer materials (silt and clay) that appears locally. As seen in Area 2, the fill layer thickens towards the west (towards the Hudson River). The TRC reports indicate no Area 3 borings were advanced past the fill unit.

In Area 2, finer grained alluvial deposits underlie the fill material. The alluvial deposits consist of layered organics, peat, silt, clay and fine sand. Locally, the alluvial deposits contain discontinuous lenses of coarse sand and gravel (closer to the Hudson River). The Lower Sand and Gravel (LSG) unit is positioned below the alluvial deposits, and becomes thinner and ends towards the eastern portion of Area 2. The transition from the LSG to the overlying alluvial deposits appears to be gradational. This LSG unit is composed predominantly of coarse grained sand and gravel with some cobbles. Glacial deposits are present below the LSG and are locally discontinuous. These deposits include glacial till and lacustrine deposits. Where they occur at the same location the lacustrine deposits are above the till. The glacial till consists of poorly sorted mixtures of sand and gravel with varying amounts of silt and clay, and is typically dense and cohesive, but can be loose. The lacustrine deposits are typically fine grained, ranging from silty clays to clayey silt, with trace amounts of fine sand. The lacustrine deposits are usually very thinly bedded (varved), and are typically cohesive. The glacial deposits are underlain by bedrock, which is black shale with pervasive, closely-spaced, scaly and planar cleavage surfaces. Cleavage surfaces and quartz veins that cut through the shale dip steeply to the east. The top of bedrock is weathered to varying degrees, and slopes to the west and north with local irregularities. Area 2 borings advanced closest to Area 3 (MW-5, MW-16, and SB-20) show fill to a depth of 25-30 feet BGS, which is underlain by silt/clay and fine sand with little coarse gravel and trace organics (alluvial deposits/LSG). The overburden deposits are on top of gray shale, approximately 34-35 feet BGS.

As indicated in the TRC and E&E reports, the water table is encountered on the Site approximately 20 feet BGS (El. 6 to 7 feet, NGVD 1929), generally located in what the authors indicated to be fill. As discussed in Section, 2.1, the adjacent Hudson River in this area is tidal; the level in the river fluctuates approximately four to five feet twice per day with typical water elevation fluctuating between El. -0.7 feet and El. 4.9 feet (NGVD 1929). Groundwater elevations indicate a general flow direction of shallow groundwater to the west. Based on BC's Area 2 investigations the tidal fluctuations in the Hudson River cause pronounced fluctuation of groundwater level (head) in the LSG and bedrock units. The water table in the fill unit at Area 2 also fluctuates with the tide, but only in areas proximal to the river; the degree of water table fluctuation decreases rapidly within a short distance from the river. Based on an evaluation of groundwater elevation data, there is a net flow of groundwater from east to west across the Site toward the river.

### 2.3.2 Soil and Groundwater Quality

The scope of TRC's 2005 Facility Closure Site Investigation included five soil borings and two monitoring wells installed in the portion of Area 3 lying north of the Rt. 378 Bridge. The soil borings were advanced adjacent to Tank 41 (an asphalt tank) and Tank 27 (the former "Tarvia" tank). According to the logs for these borings, no tar, asphalt or other NAPLs were encountered. Soil samples were collected from

0-0.5 feet BGS from all five soil borings and analyzed for semi-volatile organic compounds (SVOCs) by USEPA Method 8270. The analytical results were compared to the DEC's Recommended Soil Cleanup Objectives (RSCOs) found in the guidance document Technical and Administrative Guidance Memorandum (TAGM) #4046 (now obsolete). The RSCOs were intended for residential exposure scenarios. Several PAH compounds were detected in the shallow soil samples, with some concentrations exceeding the respective RSCO value. Deeper soil samples were also collected from one of the five borings (AST34) and analyzed for volatile organic compounds (VOCs) by USEPA Method 8260 and SVOCs. The VOCs benzene, ethylbenzene, toluene and xylene isomers (BTEX) were detected in the sample from 9.5-10.0 feet BGS at concentrations up to 580 ppm. Various PAH compounds were detected in the sample from 9.0-9.5 feet at concentrations up to 1100 ppm. The boring log for AST24 indicates these samples were collected from the base of the fill zone, immediately above a stiff clay layer.

One round of groundwater samples was collected from the two monitoring wells installed by TRC on the portion of Area 3 lying north of the bridge. The samples were analyzed for VOCs by USEPA Method 8260 and SVOCs by Method 8270. All results were non-detect or below the groundwater standards/guidance values in effect at the time.

## Section 3

# Scope of Work

The proposed RI activities are described below. Specific methods and procedures associated with these RI activities will be conducted in accordance with the following plans:

- Generic Field Sampling Plan for Site Investigations at Non Owned Former MGP Sites, (Foster Wheeler, November 2002) (referred to as "FSP").
- Generic Quality Assurance Project Plan for Site Investigations at Non Owned Former MGP Sites, (Foster Wheeler, November 2002) (referred to as "QAPP").
- Generic Health & Safety Plan for Site Investigations at Non Owned Former MGP Sites (Foster Wheeler, November 2002).
- Health and Safety Plan for Remedial Investigation of Troy (Water Street) Site – Area 3 (referred to as "Health and Safety Plan"). This plan will be developed consistent with the Generic Health & Safety Plan for Site Investigations at Non Owned Former MGP Sites (Foster Wheeler, November 2002).
- DER-10/Technical Guidance for Site Investigation and Remediation (DEC, May 2010).

The scope of work for the RI is described in the subsections below.

## 3.1 Site Meeting

A Site meeting with the DEC, New York State Department of Health (DOH), National Grid, and BC will be scheduled prior to the initiation of field activities to review investigation locations described in Sections 3.4 through 3.6 and to select locations for collection of surface soil samples intended to represent background conditions, as described in Section 3.11.

## 3.2 Property Access Activities

National Grid will contact Chevron USA, Inc., the current owner of the Site, to secure written permission to access the Site for the purpose of conducting the RI field investigation activities. If field investigation activities are anticipated to extend to adjoining properties (e.g., the railroad tracks or the City of Troy's right of way along Water Street), National Grid will attempt to secure access agreements from the owners of those properties.

## 3.3 Utility Mark Outs and Clearance

Prior to conducting the intrusive activities described below, planned locations for test pits, soil borings and monitoring wells will be marked in the field. Dig Safely New York will be contacted to clear subscribed underground utilities, while the City of Troy will be contacted to clear utilities that they maintain (e.g., sewer and water). Chevron USA, Inc. will also be requested to identify and locate known on-site private utilities in areas where investigation activities are proposed.

Some of the proposed drilling and sampling locations may be adjusted to provide for adequate clearance from underground and aboveground utilities. The final locations for the test pits, soil borings and monitoring wells will be determined in the field following the mark-out of underground utilities.

At some locations, particularly those located within or near the City roadways, National Grid may opt to confirm clearance of subsurface utilities at a location by physical means. For example, vacuum soil extraction may be used to remove the soil at a drilling location to a depth below where utilities would be expected to be encountered.

## 3.4 Subsurface Obstruction Survey

A non-intrusive subsurface obstruction survey will be performed to identify potential utilities and other obstructions (i.e., former structures, foundations, etc.). The findings of the subsurface obstruction survey will be used to assess the presence/absence of potential subsurface structures, piping, and utilities and to determine locations for these features, which will be plotted and identified on Site drawings.

The subsurface obstruction survey will utilize magnetometer, ground-penetrating radar (GPR), electromagnetics (EM) and/or other potential subsurface obstruction identification methods. Once identified, the subsurface obstructions will be surveyed and plotted on a Site plan.

## 3.5 Test Pits

Test pits are proposed to be excavated at four (4) locations (TP-1 through -4) to delineate purifier waste (visible on surface) under the bridge and to evaluate potential remnants of subsurface structures and their contents. The locations of the test pits are shown on Figure 3-1. The technical rationale for the positioning and depths of the proposed test pits is presented in Table 3-1. The planned locations of these test pits may be modified based upon the Site meeting, utility mark-outs, and the subsurface obstruction survey.

During the excavation of any test pits, a Community Air Monitoring Plan (CAMP) will be followed that meets the requirements of the DOH's Generic CAMP provided in DER-10. The test pits will be excavated to a depth of approximately 10 feet BGS if practical based on soil and/or Site conditions. The excavated material will be temporarily stockpiled on polyethylene sheeting adjacent to the test pit and water draining from the stockpiled soil, if any, will be directed back to the excavation. Materials encountered in the test pits will be described in the field to characterize soil type, including grain size, texture, and moisture content. Soil samples will be logged in accordance with the Burmister Soil Classification System and classified using the Unified Soil Classification System (USCS) as per the FSP. The samples will also be field screened for indications of MGP-related and asphalt-related impacts or other impacts based on appearance, odors or organic vapor concentration measurements using a photoionization detector (PID). Head-space screening will be conducted using the PID by immediately transferring a representative subsample of the soil to a clean glass jar and sealing its lid with aluminum foil. To allow the sample to equilibrate, it will remain sealed for a period of time (approximately 15 minutes) and then the tip of the PID will be inserted through the foil and the maximum instrument reading will be recorded.

If a test pit encounters the foundation of a subsurface structure (potential MGP-related and/or asphalt-related structures or structures of unknown origin), then an attempt will be made to continue the excavation outside the structure to a depth sufficient to identify the base of structure and the vertical extent of visible impacts (if any) associated with the structure. The excavation will not penetrate through the base (concrete, brick, steel, etc.) of the structure.

For TP-2, located partially within the base of the current remnants of tank T-27, an attempt will be made to ascertain the depth of the hard, apparently asphaltic material remaining in the tank and the presence (if any) of an earlier tank foundation beneath the most recent tank bottom. The most recent tank bottom will not be breached, and no excavation of liquid or semi-liquid materials (if encountered) will be attempted.

If the vertical extent of visible impacts cannot be determined in the test pits due to equipment capabilities or subsurface conditions within the test pits, then soil borings may be advanced in the vicinity of the test pits. In addition, if NAPL is encountered within a structure during the excavation of a test pit, soil borings may be completed outside of the structures to evaluate whether potential NAPL impacts have migrated outside of the structures, and if so, its extent.

Upon completion of the test pits, the excavated material will be backfilled into the excavations in the order the material was excavated (last out, first in), placing the backfill in approximately 1.5 to 2 foot lifts and tamping with the excavator bucket. The corners of the test pits will also be marked with stakes for surveying.

During the test pitting activities, the Site perimeter will be monitored for MGP-related odors (nuisance odor monitoring) using manual methods (e.g., olfactory). Mitigation measures (e.g., modification to excavation techniques, employment of odor controls, etc.) will be implemented following documentation of observed MGP-related odor or receipt of an odor complaint from the public.

Up to two (2) soil samples from each of the test pit locations (TP-1, through TP-4) will be analyzed for Target Compound List (TCL) Volatile Organic Compounds (VOCs), TCL Semi Volatile Organic Compounds (SVOCs), TCL pesticides, PCBs, Target Analyte List (TAL) metals, and total cyanide (Table 3-2). The depth interval(s) selected for sampling will be based on: visual observations/field screening of the soil samples (biased toward apparent impacts and/or determining the extent of impacts).

Analysis of soil samples will be conducted by a laboratory certified under the DOH Environmental Laboratory Approval Program (ELAP) to provide Analytical Services Protocol (ASP)/Contract Laboratory Program (CLP) deliverables. The analytical results will be provided to the DEC as an Electronic Data Deliverable (EDD) formatted to the DEC's required specifications. This will include: 1) populating the DEC EDD with the analytical data; 2) validating the EDD using the database software application EQuIS™ from EarthSoft®, Inc.; and 3) submitting the validated EDD to the DEC.

## 3.6 Soil Borings

Soil borings are proposed at nine (9) locations (locations SB-1 through SB-9) at the approximate positions shown on Figure 3-1. As mentioned above, the locations of these borings may be modified based on the Site meeting and utility mark-outs. The boring locations were selected in order to: 1) evaluate the potential presence of NAPL occurrences; 2) assess the configuration of the former T-27 foundation; and 3) evaluate the extent of MGP-related or asphaltic-related constituents in soils above applicable SCOs. Information from the borings will also be used to improve the understanding of the stratigraphy and hydrogeologic properties of the overburden. A summary of the technical rationale for locations and depths of the proposed soil borings is presented on Table 3-1.

During the advancement of the proposed soil borings, a CAMP will be followed as described in Section 3.5. The soil borings will be drilled using hollow stem augers and sampled with a two foot long, two-inch inside diameter (I.D.) split-spoon sampler from ground surface to a depth to be determined in the field based on the objective of the boring location (see Table 3-1). The soil samples will be described in the field to characterize soil type, including grain size, texture, and apparent moisture content. Soil samples will be logged in accordance with the Burmister Soil Classification System and classified using the USCS as per the FSP. The samples will also be field screened for indications of MGP-related impacts or other impacts based on appearance, odors or organic vapor concentration measurements using a PID. Head-space screening will be conducted as described above in Section 3.5. Upon completion, the soil borings will be filled with cement/bentonite grout.

In the event that NAPL is encountered in a boring, and conditions in the boring are such that continued drilling may introduce NAPL into deeper stratigraphic intervals via the borehole (e.g., potentially mobile NAPL perched above a confining layer), measures will be taken to reduce this potential. Advancement of the augers will be suspended and temporary steel casing will be grouted into the borehole before advancing further. Alternatively, the boring will be terminated and consideration given to advancing a boring in an alternate location.

Samples will be collected every five (5) feet from each of the proposed soil borings (SB-1 through SB-9) and submitted for analysis of TCL VOCs, TCL SVOCs, TCL pesticides, PCBs, TAL metals, and total cyanide. In the event that soils exhibiting impacts based on visual observations/field screening of the soil sample are encountered at intervals in between the planned analytical sample intervals (i.e., every 5 feet), additional samples will also be collected to characterize the observed impacts from these intervals. A summary of the planned soil analyses is provided in Table 3-2.

Analysis of soil samples will be conducted by a laboratory certified under the DOH ELAP to provide ASP/CLP deliverables. As described above in Section 3.5, the analytical results will be provided to the DEC as an EDD formatted to the DEC's required specifications.

## 3.7 Subsurface Evaluation and Monitoring Well Installation

Overburden monitoring well pairs are proposed at four locations, with two monitoring wells installed at each location, for a total of eight monitoring wells (Figure 3-1). The selected locations are intended to aid in the understanding of groundwater flow and evaluate the lateral and vertical extent of dissolved-phase, MGP-related and asphaltic-related constituents in overburden groundwater. The boring for each monitoring well will also be used to further evaluate the stratigraphic characteristics of the overburden. The intended purpose of each of the monitoring wells is summarized on Table 3-2.

At each of the four proposed well locations (MW-1, MW-2, MW-3, MW-4) the initial boring will be advanced to bedrock (estimated at 40 feet BGS). At each location a deep monitoring well (MW-1D, MW-2D, MW-3D, MW-4D) will be installed in the LSG unit identified during previous BC investigations at the Troy (Water Street) Site – Area 2. Adjacent to each deep well, a shallow monitoring well (MW-1S, MW-2S, MW-3S, MW-4S) will be installed in the fill above the "fine grained alluvial deposits" (estimated at 20 feet BGS) identified during previous BC investigations at Area 2. Depending on the findings of the initial soil borings installed at each monitoring well location modifications to the depths and number of monitoring wells at each location may be made.

During the advancement of the proposed soil borings intended for installation of monitoring wells, a CAMP will be implemented as described in Section 3.5. The soil borings will be drilled using hollow-stem augers and sampled with a two foot long, two-inch I.D. split-spoon sampler from ground surface to the target depth indicated in Table 3-1. The soil samples will be described in the field to characterize soil type, including grain size, texture, and apparent moisture content. Soil samples will be logged in accordance with the Burmister Soil Classification System and classified using the USCS as per the FSP. The samples will also be field screened for indications of MGP-related impacts or other impacts based on appearance, odors or organic vapor concentration measurements using a PID. Head-space screening will be conducted as described above in Section 3.5. One soil sample will be collected from each soil boring intended for installation of a monitoring well from the mid point of the proposed well screen interval. The samples will be submitted for analysis of TCL VOCs, TCL SVOCs, TCL pesticides, PCBs, TAL metals, and total cyanide.

Monitoring well installation procedures are provided in the FSP. The monitoring wells will be constructed of two-inch diameter, Schedule 40 PVC well casing with 0.020 inch slot PVC screens and an appropriately-sized filter pack. If NAPL is encountered, a sump will be installed below the screen, if appropriate, as described in the FSP. The length of the sump will be field determined based on

subsurface conditions; if conditions are suitable, it will be one or two feet in length. The base of the sump will be positioned so as not to penetrate a low permeability layer (e.g., dense glacial till), if encountered, and will not be installed below the top of bedrock surface. The annular space between the sump and formation will be filled with bentonite, cement/bentonite grout, or other suitable, relatively low permeability material.

The monitoring wells will be developed after a minimum period of 24 hours has passed following well installation to allow for the cement/bentonite grout to set. Well development will be conducted in accordance with procedures in the FSP.

## 3.8 Slug Tests

Before conducting the continuous water level monitoring, in-situ hydraulic conductivity tests (i.e., slug tests) will be performed on each monitoring well installed pursuant to this work plan[6] to evaluate the horizontal hydraulic conductivity of the adjacent formation. Rising head slug tests will be conducted in accordance with the procedures described in the FSP and the data generated will be input into AQTESOLV® software for hydraulic conductivity calculations using analytical solutions appropriate for the hydrogeologic conditions.

## 3.9 Continuous Water Level Monitoring

Continuous monitoring of water levels will be conducted within all on-Site monitoring wells and a staff gauge installed in the adjacent Hudson River. The monitoring will be conducted with pressure transducers equipped with automatic data loggers (e.g., In-Situ Level TROLL®). The automatic data loggers with be set to record water levels from the pressure transduces every 15 minutes for approximately one week. A manual water level meter will also be used to measure water levels in the monitoring wells and in other monitoring wells at the beginning and end of continuous monitoring period. Hourly barometric pressure data and precipitation data for the monitoring period will be obtained from the National Oceanic and Atmospheric Administration (NOAA) meteorological measurement station located at Albany International Airport. This station is located approximately six miles from the Site, and thus, the data should be generally representative of Site conditions. Additionally, barometric pressure will be measured on-Site every 15 minutes using a pressure transducer and automatic data logger configured to measure and record barometric pressure (e.g., In-Situ BaroTROLL®). The continuous water level, barometric and precipitation data will be used to facilitate the evaluation of the degree to which changes in groundwater levels are influenced by tidal changes in the Hudson River.

## 3.10 Groundwater Monitoring and NAPL Gauging

Two (2) rounds of groundwater monitoring will be conducted as part of the RI field activities. For each round, groundwater samples will be collected from the monitoring wells installed pursuant to this RI work plan. The first round of groundwater sampling will be initiated after at least one week has passed since completion of well development and after water levels in the wells have stabilized. The second round will be conducted approximately three months (one quarter) after the first round, preferably in a time period when groundwater elevation conditions differ seasonally from the first round. For example, if the first round is conducted during a period when the water table is relatively high, then it is preferable to schedule the second round for a period when the water table is relatively low.

[6] The presence and reliability of any on-Site monitoring wells installed during earlier investigations has not been determined.

Prior to groundwater sampling, depth to water measurements and NAPL gauging will be conducted on each well planned for sampling and the on-site overburden wells. In the event that NAPL is detected in a monitoring well, a groundwater sample will not be collected from that well. Groundwater samples will be collected according to the USEPA low flow sampling protocol and in accordance with procedures outlined in the FSP.

The groundwater samples will be analyzed for TCL VOCs, TCL SVOCs, TCL pesticides, PCBs, TAL metals, and total cyanide. The groundwater samples will also be analyzed in the field for pH, specific conductivity, temperature, turbidity, oxidation-reduction potential (ORP), and dissolved oxygen.

Analysis of groundwater samples will be conducted by a laboratory certified under DOH ELAP to provide ASP/CLP deliverables. As described in Section 3.5, the analytical results will be provided to the DEC as an EDD formatted to the DEC's required specifications.

## 3.11 Surface Soil Sampling

Surface soil samples (0 to 2-inch BGS and 0 to 6-inch BGS intervals) will be collected at twelve (12) locations. Three pairs of locations (SS-1 through SS-6) will be on the river bank (top and bottom) as shown on Figure 3-1. The remaining locations (SS-7 through SS-12) will be determined in the field and favor locations of visibly impacted soils or locations that appear unable to support vegetation or which contained visible stressed vegetation. Should there be no locations that fit these criteria the six locations will be evenly spaced across the Site as shown on Figure 3-1. At each of the sample locations, a surface soil sample will be collected from the top 2 inches of soil after the overlying vegetation has been removed. In addition, following collection of the 0 to 2-inch sample, a sample will be collected from the 0 to 6-inch interval below loose vegetative cover at a location immediately adjacent to where the 0 to 2-inch sample will be collected.

Each surface soil sample will be collected using a field cleaned stainless steel trowel. The trowel will be decontaminated between sampling stations using Alconox followed by a deionized water rinse.

The surface soil samples will be analyzed for TCL SVOCs, TCL pesticides, PCBs, TAL metals, and total cyanide. A summary of the planned soil sample analyses is provided in Table 3-2. Analysis of soil samples will be conducted by a laboratory certified under DOH ELAP to provide ASP/CLP deliverables. As described in Section 3.5, the analytical results will be provided to the DEC as an EDD formatted to the DEC's required specifications.

## 3.12 Demarcation of Potential Surface Tar and Shoreline Tar Deposits

Considering that the Site was previously used as a terminal for loading trucks with asphalt and that MGP waste reputedly passed through Area 3 for disposal south of the Site, surficial deposits of tar may be encountered across the Site. Thus, a reconnaissance of surface tar will be performed as part of the RI field work. Locations of surface tar (if encountered) will be demarcated in the field by a qualified field geologist or engineer. The subsurface extent (if any) of the surface tar will not be delineated. The edges of the surficial tar deposits will be marked with survey flags or paint and surveyed in accordance with Section 3.14.

Surficial deposits of hard tar were previously noted at the toe of the river bank. In some areas the hard tar deposits extend from the toe over the gravel along the river's edge. The on-Site shoreline tar deposits (i.e., those present above approximate mean high tide) will be demarcated in the field by a qualified geologist or engineer. The subsurface extent (if any) of the hard tar will not be delineated. The edges of the shoreline surficial tar deposits will be marked with survey flags or paint and surveyed in accordance with Section 3.14.

## 3.13 Soil Vapor Investigation

A soil vapor investigation will be conducted to evaluate the potential for MGP residuals to be contributing VOCs to soil vapor. Following receipt of the analytical results from the soil and groundwater samples collected during the RI, a separate work plan that provides proposed soil vapor sampling locations along with methods and procedures associated with the installation of soil vapor probes and sample collection will be prepared and submitted to the DEC under separate cover. This approach is proposed in an effort to position the soil vapor sampling locations in areas where elevated constituent concentrations in soil and/or groundwater samples are observed, if any.

## 3.14 Survey

The Site boundaries and each of the test pit, soil boring, monitoring well and surface soil sampling locations will be surveyed. The survey will include location coordinates, ground surface elevation, and in the case of the wells, top of casing elevation data. In addition, the demarcated tar deposits (Section 3.12) will be surveyed. All coordinates will be referenced to the State Plane coordinate system for New York using the North American Datum of 1983 (NAD 1983) in units of feet. Elevations will be referenced to the National Geodetic Vertical Datum (NGVD) of 1929 in units of feet. The survey will be performed by a New York State licensed surveyor.

## 3.15 Investigation-Derived Waste

Investigation-derived waste (IDW) generated during the RI activities will include soil cuttings, drilling water, development water, equipment decontamination water, purge water, disposable sampling equipment, and personal protective equipment (PPE). The waste will be containerized in DOT-approved, 55 gallon drums, which will be properly labeled to identify their contents. Waste profiles will be prepared based on the analytical results of the environmental sampling. The appropriate treatment/disposal will be arranged based on the characterization of the waste streams. Treatment/disposal of the IDW will be managed by a properly licensed, permitted transportation and disposal contractor on National Grid's approved vendor list.

## 3.16 Data Evaluation and Reporting

Laboratory results for the soil and groundwater samples will be forwarded to a qualified data validator for preparation of a Data Usability Summary Report (DUSR). The DUSR will present a summary of data usability, including a discussion of qualified and rejected data and provide recommendations for resampling/reanalysis, as applicable.

A RI Data Summary Report for the Site will be provided to the DEC. The RI Data Summary Report will include the following:

- Data generated during the field investigation in EQuIS™ compatible format;
- DUSR and tabular and graphic summaries of the analytical results;
- Maps of sampling locations;
- Maps of groundwater elevations and interpreted flow directions; and
- Hydrogeologic cross sections depicting subsurface conditions.

Accompanying the RI Data Summary Report will be conclusions related to the objectives of the RI, and an assessment of whether or not the data collected to-date are sufficient to meet the RI objectives for the Site. Also included will be either a recommendation that a RI Report be prepared (if the data collected to-date are sufficient), or recommendations for addressing additional data needs to complete the RI, including human and ecological exposure assessments.

In the event that preparation of a RI Report is recommended and the DEC concurs with this recommendation, a RI Report will be prepared to address the following:

- The identity and characteristics of the source(s) of MGP-related or asphaltic-related impacts;
- The amount, concentration, phase, location, environmental fate and transport, and other significant characteristics of any MGP-related or asphaltic-related constituents present;
- Hydrogeologic characteristics, including grain size, hydraulic conductivity of saturated formations monitored, depth to saturated zone, nature of bedrock, hydraulic gradients, proximity to surface water, floodplains, or wetlands;
- Assessment of routes of exposure and potential human receptors via a qualitative human health exposure assessment in accordance with Section 3.1(C)17 and Appendix 3B of the May 2010 DER-10 Technical Guidance for Site Investigation and Remediation; and
- A determination as to whether or not Steps 1 through 2b of a Fish and Wildlife Resource Impact Analysis (FWRIA) are required based on Appendix 3C of the May 2010 DER 10 Technical Guidance for Site Investigation and Remediation and, if so required, conduct Steps 1 through 2b in accordance with the following DEC guidance documents: 1) Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (FWIA); October 1, 1994 (Steps 1 through 2b); and 2) DER 10 Technical Guidance for Site Investigation and Remediation, May 2010.

The RI Report will include the following:

- Pertinent information obtained throughout the implementation of this work plan and previous investigations;
- Descriptions of the work done under this work plan and the results of that completed work;
- Deviations from this work plan that result from unexpected conditions encountered during the investigation;
- Summary of the overall nature and extent of contamination referencing any exceedances of applicable State standards, criteria, and guidance;
- Summary of any ecological assessments conducted;
- Summary tables of analytical data collected;
- Soil boring logs and well construction diagrams, which will include well development data and field instrument (PID) readings;
- Groundwater elevation contour maps with flow directions specified;
- Hydrogeologic cross sections of the Site;
- Figure depicting the elevation contours of the top of bedrock surface;
- Figures illustrating the distribution of constituent concentrations in soils and groundwater, including sample depths; and
- Conclusions which summarize the areas of concern, identify any potentially completed exposure pathways, and recommendations for any future work (e.g., none, additional investigation, or an evaluation of remedial alternatives.

## Section 4

# Schedule

Following submittal of this RI Work Plan, a Site meeting will be proposed with representatives of National Grid, BC, DEC, and DOH in attendance to review the proposed RI locations. If there are adjustments or additions to the proposed investigation locations based on the Site meeting, a revised sampling plan figure will be submitted to the DEC/DOH depicting these modifications. Following DEC/DOH review and approval of the proposed locations and RI Work Plan, efforts to develop and/or update the existing property access agreements will commence. Field activities will be initiated after approximately two weeks following execution of the property access agreement(s) and notification of the property owner(s) of the planned RI activities.

It is anticipated that approximately three (3) to four (4) weeks will be required to conduct the field activities described in this RI Work Plan through completion of: test pits; soil borings; monitoring well installations; well development; slug testing; collection of surface soil samples; and the first round of groundwater sampling. As noted in Section 3.10, the second round of groundwater sampling will be conducted approximately three (3) months following the first round, preferably in an interval of hydrologic conditions that differs seasonally from the first round. Within approximately six (6) to eight (8) weeks of completion of the second round of groundwater sampling, the laboratory analyses and the DUSR are expected to be complete.

A RI Data Summary Report will be submitted approximately 10 weeks after the DUSR for the groundwater samples for the second sampling round is received from the data validator. If following DEC's review of the Data Summary Report (see Section 3.16), it is determined that the RI is complete, then a schedule for submitting the RI Report will be developed.

## Section 5

# References


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# Tables

**TABLE 3-1**
**RATIONALE FOR REMEDIAL INVESTIGATION LOCATIONS**
**TROY (WATER STREET) - AREA 3**
**TROY, NEW YORK**

| Location ID | Objective | Target Depth[1] |
|---|---|---|
| ***SOIL BORINGS*** | | |
| SB-1 | Evaluate hydrostratigraphy. Delineate NAPL. Collect analytical samples to assess potential for constituents above SCOs. | Advance to top of bedrock surface or overlying dense till (approximately 40 ft BGS) |
| SB-2 | Evaluate hydrostratigraphy. Delineate NAPL and evaluate potential continuity with hard tar deposits along shoreline. Collect analytical samples to assess potential for constituents above SCOs. | Advance to top of bedrock surface or overlying dense till (approximately 40 ft BGS) |
| SB-3 | Evaluate hydrostratigraphy. Delineate NAPL. Collect analytical samples to assess potential for constituents above SCOs. | Advance to top of bedrock surface or overlying dense till (approximately 40 ft BGS) |
| SB-4 | Evaluate structure of T-27 foundation. Delineate NAPL and evaluate potential continuity with hard tar deposits along shoreline. Collect analytical samples to assess potential for constituents above SCOs. | If feasible and liquid or semi-liquid tank residues NOT encountered, advance to top of bedrock surface or overlying dense till (approximately 40 ft BGS) |
| SB-5 | Evaluate hydrostratigraphy. Delineate adjacent NAPL previously identified below 18 ft on Area 2. Evaluate potential continuity with hard tar deposits along shoreline. Collect analytical samples to assess potential for constituents above SCOs. | Advance to top of bedrock surface or overlying dense till (approximately 40 ft BGS) |
| SB-6 | Evaluate hydrostratigraphy. Delineate adjacent NAPL previously identified below 18 ft on Area 2. Collect analytical samples to assess potential for constituents above SCOs. | Advance to top of bedrock surface or overlying dense till (approximately 40 ft BGS) |
| SB-7 | Evaluate hydrostratigraphy. Delineate NAPL. Collect analytical samples to assess potential for constituents above SCOs. | Advance to top of bedrock surface or overlying dense till (approximately 40 ft BGS) |
| SB-8 | Evaluate hydrostratigraphy. Delineate NAPL. Collect analytical samples to assess potential for constituents above SCOs. | Advance to top of bedrock surface or overlying dense till (approximately 40 ft BGS) |
| SB-9 | Evaluate hydrostratigraphy. Delineate NAPL and evaluate potential continuity with hard tar deposits along shoreline. Collect analytical samples to assess potential for constituents above SCOs. | Advance to top of bedrock surface or overlying dense till (approximately 40 ft BGS) |

**TABLE 3-1**
**RATIONALE FOR REMEDIAL INVESTIGATION LOCATIONS**
**TROY (WATER STREET) - AREA 3**
**TROY, NEW YORK**

| Location ID | Objective | Target Depth[1] |
|---|---|---|
| ***OVERBURDEN MONITORING WELLS*** | | |
| MW-1S | Evaluate shallow overburden groundwater quality conditions upgradient from area of former MGP and asphalt plant operations. Evaluate aquifer characteristics in the shallow overburden. Collect analytical soil samples to asses potential for constituents across screened interval. | *Soil Boring* - advance and continuously sample to top of fine-grained alluvial deposits (estimated 20 ft BGS) or other potential confining layer if present. *Well* - position well screen within fill material on top of fine-grained alluvial deposits observed in Area-2. Assume well will be positioned hydraulically upgradient. |
| MW-1D | Evaluate deep overburden groundwater quality conditions upgradient of former MGP and asphalt plant operations. Evaluate aquifer characteristics in the deep overburden. Collect analytical soil samples to asses potential for constituents across screened interval. | *Soil Boring* - advance and continuously sample to top of bedrock surface (estimated 40 ft BGS). *Well* - position well screen on top of bedrock or overlying dense till within "lower sand and gravel" unit observed in Area-2. Assume well will be positioned hydraulically upgradient. |
| MW-2S | Evaluate shallow overburden groundwater quality conditions upgradient from area of former MGP and asphalt plant operations. Evaluate aquifer characteristics in the shallow overburden. Collect analytical soil samples to asses potential for constituents across screened interval. | *Soil Boring* - advance and continuously sample to top of fine-grained alluvial deposits (estimated 20 ft BGS) or other potential confining layer if present. *Well* - position well screen within fill material on top of fine-grained alluvial deposits observed in Area-2. |
| MW-2D | Evaluate deep overburden groundwater quality conditions upgradient of former MGP and asphalt plant operations. Evaluate aquifer characteristics in the deep overburden. Collect analytical soil samples to asses potential for constituents across screened interval. | *Soil Boring* - advance and continuously sample to top of bedrock surface (estimated 40 ft BGS). *Well* - position well screen on top of bedrock or overlying dense till within "lower sand and gravel" unit observed in Area-2. |
| MW-3S | Evaluate shallow overburden groundwater quality conditions upgradient from area of former MGP and asphalt plant operations. Evaluate aquifer characteristics in the shallow overburden. Collect analytical soil samples to asses potential for constituents across screened interval. | Soil Boring - advance and continuously sample to top of fine-grained alluvial deposits (estimated 20 ft BGS) or other potential confining layer if present. Well - position well screen within fill material on top of fine-grained alluvial deposits observed in Area-2. |
| MW-3D | Evaluate deep overburden groundwater quality conditions upgradient of former MGP and asphalt plant operations. Evaluate aquifer characteristics in the deep overburden. Collect analytical soil samples to asses potential for constituents across screened interval. | *Soil Boring* - advance and continuously sample to top of bedrock surface (estimated 40 ft BGS). *Well* - position well screen on top of bedrock or overlying dense till within "lower sand and gravel" unit observed in Area-2. |
| MW-4S | Evaluate shallow overburden groundwater quality conditions upgradient from area of former MGP and asphalt plant operations. Evaluate aquifer characteristics in the shallow overburden. Collect analytical soil samples to asses potential for constituents across screened interval. | *Soil Boring* - advance and continuously sample to top of fine-grained alluvial deposits (estimated 20 ft BGS). *Well* - position well screen within fill material on top of fine-grained alluvial deposits observed in Area-2. |
| MW-4D | Evaluate deep overburden groundwater quality conditions upgradient of former MGP and asphalt plant operations. Evaluate aquifer characteristics in the deep overburden. Collect analytical soil samples to asses potential for constituents across screened interval. | *Soil Boring* - advance and continuously sample to top of bedrock surface (estimated 40 ft BGS). *Well* - position well screen on top of bedrock or overlying dense till within "lower sand and gravel" unit observed in Area-2. |

**TABLE 3-1**
**RATIONALE FOR REMEDIAL INVESTIGATION LOCATIONS**
**TROY (WATER STREET) - AREA 3**
**TROY, NEW YORK**

| Location ID | Objective | Target Depth[1] |
|---|---|---|
| ***TEST PITS*** | | |
| TP-1[2] | Delineate purifier wastes observed on surface beneath span of Troy-Menands Bridge. Collect analytical samples to assess potential for constituents above SCOs | 10 feet or below impacts identified by field screening (if any). |
| TP-2 | Evaluate structure of foundation of former tank T-27. Collect analytical samples to assess potential for constituents above SCOs. | *Within Structure* - excavate to base of structure (if foundation bottom is not visible on surface). *Outside of Structure*- excavate to expose sidewall of foundation to determine thickness, and excavate below impacts identified by field screening (if any). |
| TP-3 | Evaluate structure of foundation of former tank T-41. Collect analytical samples to assess potential for constituents above SCOs. | *Within Structure* - excavate to base of structure (if foundation bottom is not visible on surface). *Outside of Structure*- excavate to expose sidewall of foundation to determine thickness, and excavate below impacts identified by field screening (if any). |
| TP-4 | Evaluate any geophysical anomaly identified during onsite subsurface obstruction survey performed during RI activities, or AST foundations/structures. Collect analytical samples to assess potential for constituents above SCOs. | 10 feet or below impacts identified by field screening (if any). |

**TABLE 3-1**
**RATIONALE FOR REMEDIAL INVESTIGATION LOCATIONS**
**TROY (WATER STREET) - AREA 3**
**TROY, NEW YORK**

| Location ID | Objective | Target Depth[1] |
|---|---|---|
| ***SURFICIAL SOIL SAMPLES*** | | |
| SS-1 | Measure concentrations of constituents in on-site surficial soil for qualitative assessment potential human and ecological exposure. | 0 to 2 inches below vegetative cover and 0 to 6 inches below vegetative cover. |
| SS-2 | Measure concentrations of constituents in on-site surficial soil for qualitative assessment potential human and ecological exposure. | 0 to 2 inches below vegetative cover and 0 to 6 inches below vegetative cover. |
| SS-3 | Measure concentrations of constituents in on-site surficial soil for qualitative assessment potential human and ecological exposure. | 0 to 2 inches below vegetative cover and 0 to 6 inches below vegetative cover. |
| SS-4 | Measure concentrations of constituents in on-site surficial soil for qualitative assessment potential human and ecological exposure. | 0 to 2 inches below vegetative cover and 0 to 6 inches below vegetative cover. |
| SS-5 | Measure concentrations of constituents in on-site surficial soil for qualitative assessment potential human and ecological exposure. | 0 to 2 inches below vegetative cover and 0 to 6 inches below vegetative cover. |
| SS-6 | Measure concentrations of constituents in on-site surficial soil for qualitative assessment potential human and ecological exposure. | 0 to 2 inches below vegetative cover and 0 to 6 inches below vegetative cover. |
| SS-7 | Measure concentrations of constituents in on-site surficial soil for qualitative assessment potential human and ecological exposure. | 0 to 2 inches below vegetative cover and 0 to 6 inches below vegetative cover. |
| SS-8 | Measure concentrations of constituents in on-site surficial soil for qualitative assessment potential human and ecological exposure. | 0 to 2 inches below vegetative cover and 0 to 6 inches below vegetative cover. |
| SS-9 | Measure concentrations of constituents in on-site surficial soil for qualitative assessment potential human and ecological exposure. | 0 to 2 inches below vegetative cover and 0 to 6 inches below vegetative cover. |
| SS-10 | Measure concentrations of constituents in on-site surficial soil for qualitative assessment potential human and ecological exposure. | 0 to 2 inches below vegetative cover and 0 to 6 inches below vegetative cover. |
| SS-11 | Measure concentrations of constituents in on-site surficial soil for qualitative assessment potential human and ecological exposure. | 0 to 2 inches below vegetative cover and 0 to 6 inches below vegetative cover. |
| SS-12 | Measure concentrations of constituents in on-site surficial soil for qualitative assessment potential human and ecological exposure. | 0 to 2 inches below vegetative cover and 0 to 6 inches below vegetative cover. |

Notes:
(1) - Target depths are assumed similar to stratigraphy of Troy (Water St.) Site - Area 2. Adjustments may be made based on field observations.
(2) - If the slope of the river bank or other conditions do not permit sufficient westward extension of the test pit, additional delineation and shallow soil sampling may be attempted using hand tools.

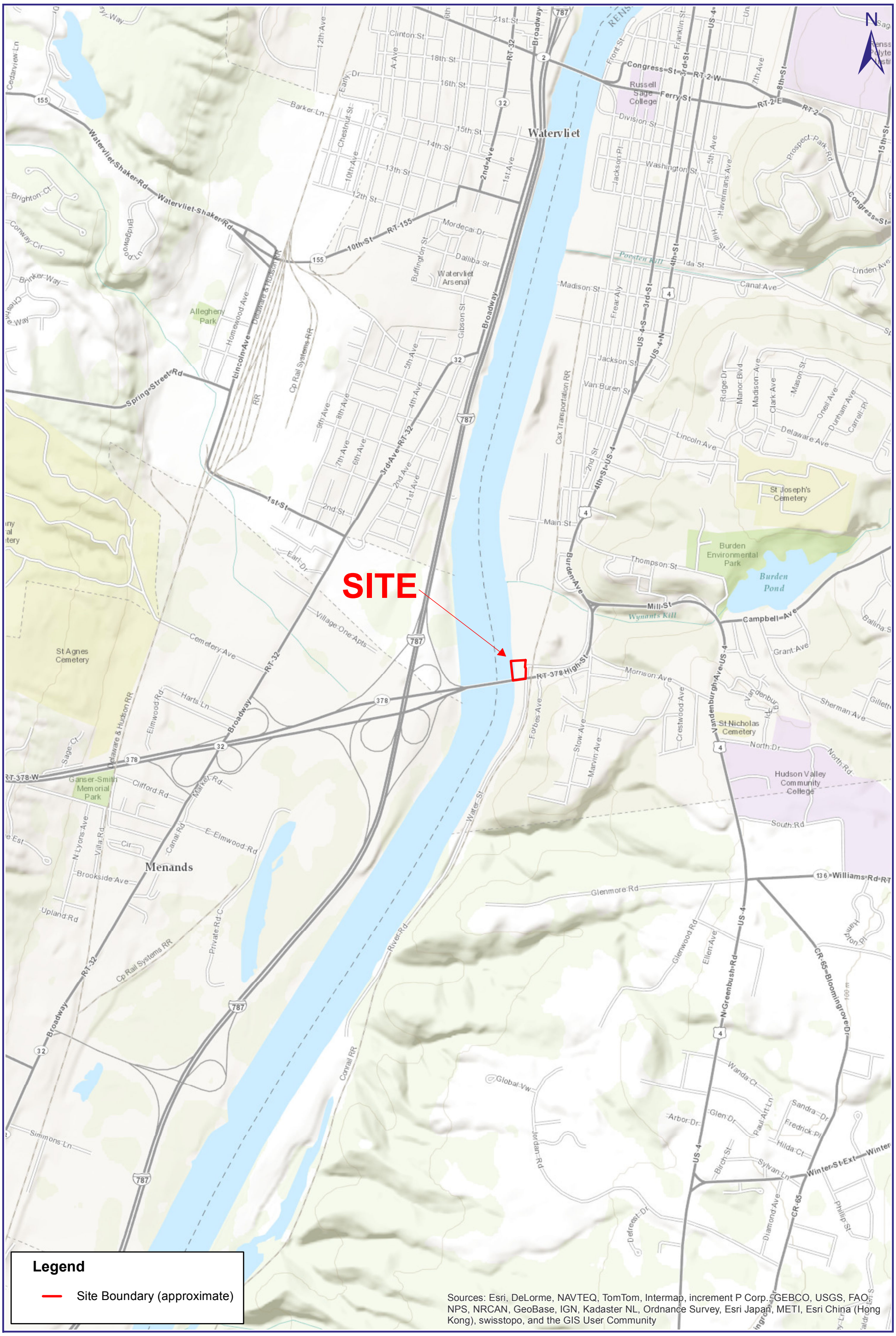
**TABLE 3-2**
**SUMMARY OF LABORATORY ANALYSES**
**TROY (WATER STREET) - AREA 3**
**TROY, NEW YORK**

| Medai and Sample Type | TCL VOCs Method 8260 | TCL SVOCs Method 8270 | PCBs Method 8081 | TCL Pesticides Method 8082 | TAL Metals Method 6010 | Total Cyanide |
|---|---|---|---|---|---|---|
| Test Pit Samples (4 test pits, 1 to 2 soil samples per location) | 8 | 8 | 8 | 8 | 8 | 8 |
| Duplicate(1) | 1 | 1 | 1 | 1 | 1 | 1 |
| MS/MSD(1) | 1 | 1 | 1 | 1 | 1 | 1 |
| Trip Blank(2) | -- | -- | | -- | -- | -- |
| Equipment Blank(1) | 1 | 1 | 1 | 1 | 1 | 1 |
| | | | | | | |
| Soil Boring Samples (9 borings, 9 Soil samples each)(3) | 81 | 81 | 81 | 81 | 81 | 81 |
| Duplicate(1) | 5 | 5 | 5 | 5 | 5 | 5 |
| MS/MSD(1) | 5 | 5 | 5 | 5 | 5 | 5 |
| Trip Blank(2) | -- | -- | -- | -- | -- | -- |
| Equipment Blank(1) | 5 | 5 | 5 | 5 | 5 | 5 |
| | | | | | | |
| Monitoring Well Soil Boring Samples (8 Borings, 1 Soil sample each) | 8 | 8 | 8 | 8 | 8 | 8 |
| Duplicate(1) | 1 | 1 | 1 | 1 | 1 | 1 |
| MS/MSD(1) | 1 | 1 | 1 | 1 | 1 | 1 |
| Trip Blank(2) | -- | -- | -- | -- | -- | -- |
| Equipment Blank(1) | 1 | 1 | 1 | 1 | 1 | 1 |
| | | | | | | |
| Surface Soil Samples (at 12 locations, 2 depths [0-2" and 0-6" bgs intervals]) | -- | 24 | 24 | 24 | 24 | 24 |
| Duplicate(1) | -- | 2 | 2 | 2 | 2 | 2 |
| MS/MSD(1) | -- | 2 | 2 | 2 | 2 | 2 |
| Trip Blank(2) | -- | -- | -- | -- | -- | -- |
| Equipment Blank(1) | -- | 2 | 2 | 2 | 2 | 2 |
| | | | | | | |
| Groundwater (8 wells, 2 events)(4) | 16 | 16 | 16 | 16 | 16 | 16 |
| Duplicate(1) | 2 | 2 | 2 | 2 | 2 | 2 |
| MS/MSD(1) | 2 | 2 | 2 | 2 | 2 | 2 |
| Trip Blank(2) | ±4 | -- | -- | -- | -- | -- |
| Equipment Blank(1) | 2 | 2 | 2 | 2 | 2 | 2 |

Notes:
(1) - Per the QAPP, one duplicate sample, one MS/MSD pair, and one equipment blank will be submitted and analyzed for every Sample Deliver y Group (maximum 20 samples).
(2) - Per the QAPP, one trip blank will be included in every shipment of water samples to be analyzed for VOCs, and subsequently analyzed.
(3) - Minimum of one sample collected every 5 feet and additional samples of impacted soils (if encountered based on visual observations/field screening in between planned sample intervals).
(4) - If NAPL is identified in well, groundwater samples from that well will not be analyzed.

# Figures

6/16/2014




Author: JMarolda Path: P:\GIS\National_Grid\Troy\Troy_Area_3\Troy_Area_3_Site_Location.mxd

Brown AND Caldwell

**FIGURE 2-1**
**SITE LOCATION**
**NATIONAL GRID**
**TROY (WATER ST.) SITE - AREA 3, TROY, NEW YORK**

0 1,000 2,000
Feet

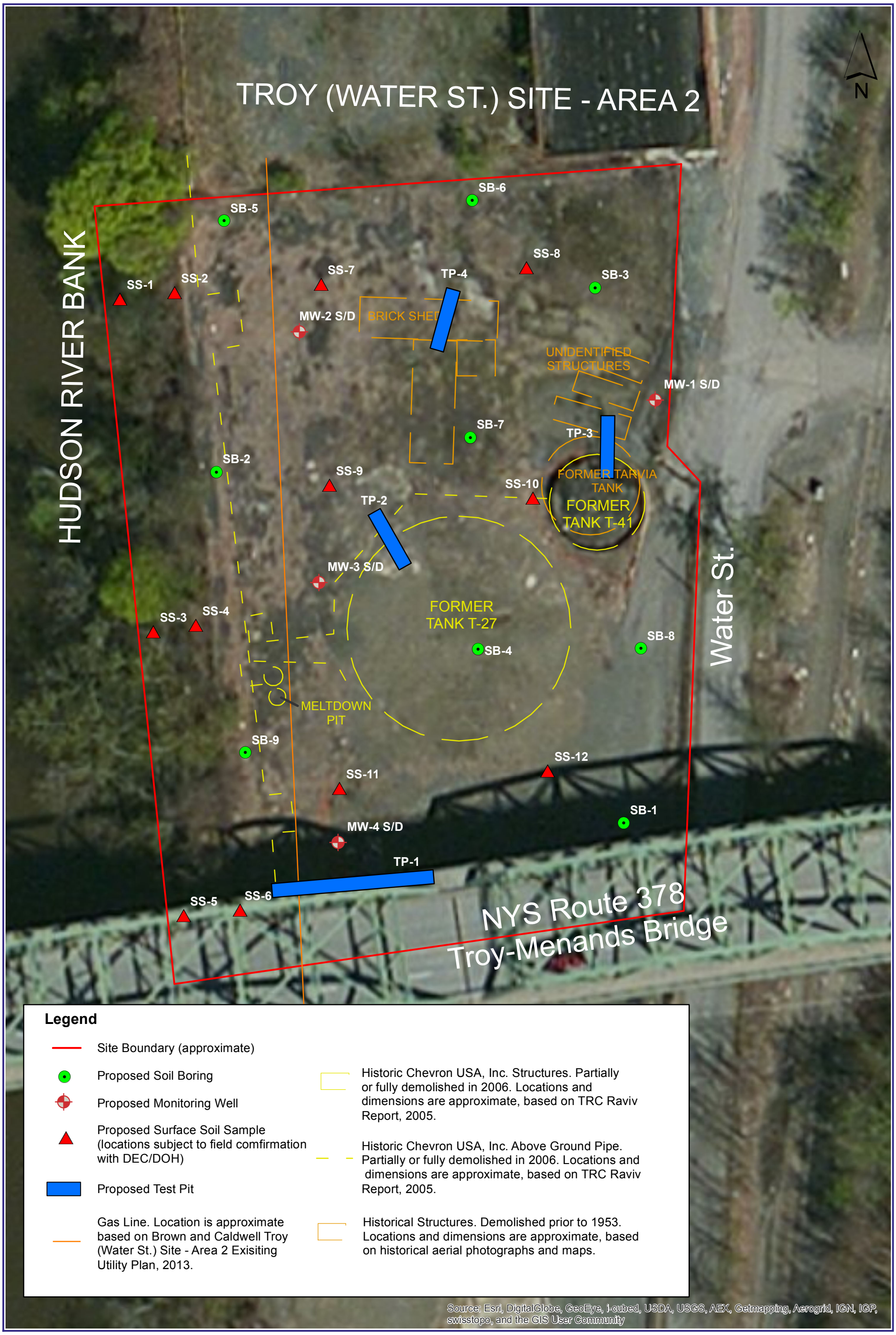
7/18/2014

Author: CMeyn Path: P:\GIS\National_Grid\Troy\Troy_Area_3\TroyArea3_Existing_Site_Plan.mxd

Brown AND Caldwell

**FIGURE 2-2**
**EXISTING SITE PLAN**
**NATIONAL GRID**
**TROY (WATER ST.) SITE - AREA 3, TROY, NEW YORK**

0 25 50
Feet




Brown AND Caldwell

**FIGURE 3-1**
**PROPOSED REMEDIAL INVESTIGATION LOCATIONS**
**NATIONAL GRID**
**TROY (WATER ST.) SITE - AREA 3, TROY, NEW YORK**

0 25 50
Feet

7/22/2014

Author: CMeyn Path: P:\GIS\National_Grid\Troy\Troy_Area_3\Troy_Area_3_Proposed_RI_Locs_mod.mxd

# Appendix A: Analytical Results from Previous Area 3 Investigations

**FIGURE A-1**
**EXISTING SAMPLE LOCATIONS**
**NATIONAL GRID**
**TROY (WATER ST.) SITE - AREA 3, TROY, NEW YORK**

0 25 50
Feet

1/30/2015

Author: BFTaylor Path: P:\GIS\National_Grid\Troy\Troy_Area_3\TroyArea3_Existing_Sample_Locations.mxd

**TABLE A-1**
**GROUNDWATER ANALYTICAL RESULTS -**
**TRC RAVIV ASSOCIATED, INC. 2005**
**TROY (WATER STREET) - AREA 3**
**TROY, NEW YORK**

| | TRC Raviv Sample ID: | MW1 | MW4 |
|---|---|---|---|
| | Location: | MW-1 | MW-4 |
| | Date Collected: | 4/18/2005 | 4/18/2005 |
| Constituent | Units | | |
| **Volatile Organic Compounds (VOCs)** | | | |
| 1,1,1-Trichloroethane | µg/L | ND | ND |
| 1,1,2,2-Tetrachloroethane | µg/L | ND | ND |
| 1,1,2-Tricholorethane | µg/L | ND | ND |
| 1,1-Dichloroethane | µg/L | ND | ND |
| 1,1-Dichloroethene | µg/L | ND | ND |
| 1,2-Dichloroethane | µg/L | ND | ND |
| 1,2-Dichloropropane | µg/L | ND | ND |
| 2-Butanone (MEK) | µg/L | ND | ND |
| 2-Hexanone | µg/L | ND | ND |
| 4-Methyl-2-penthanone(MIBK) | µg/L | ND | ND |
| Acetone | µg/L | ND | ND |
| Benzene | µg/L | 0.5 J | ND |
| Bromodichloromethane | µg/L | ND | ND |
| Bromoform | µg/L | ND | ND |
| Bromomethane | µg/L | ND | ND |
| Carbon disulfide | µg/L | ND | ND |
| Carbon tetrachloride | µg/L | ND | ND |
| Chlorobenzene | µg/L | ND | ND |
| Chloroethane | µg/L | ND | ND |
| Chloroform | µg/L | ND | ND |
| Chloromethane | µg/L | ND | ND |
| cis-1,2-Dichloroethene | µg/L | ND | ND |
| cis-1,3-Dichloropropene | µg/L | ND | ND |
| Dibromochloromethane | µg/L | ND | ND |
| Ethylbenzene | µg/L | ND | ND |
| Methylene chloride | µg/L | ND | ND |
| Styrene | µg/L | ND | ND |
| Tetrachloroethylene | µg/L | ND | ND |
| Toluene | µg/L | ND | ND |
| trans-1,2-Dichloroethene | µg/L | ND | ND |
| trans-1,3-Dichloropropene | µg/L | ND | ND |
| Trichloroethylene | µg/L | ND | ND |
| Vinyl chloride | µg/L | ND | ND |
| Xylene (total) | µg/L | ND | ND |
| Total Targeted VOCs | µg/L | 0.5 | ND |
| Total TICs | µg/L | ND | ND |
| Total VOCs | µg/L | 1 | ND |

**TABLE A-1**
**GROUNDWATER ANALYTICAL RESULTS -**
**TRC RAVIV ASSOCIATED, INC. 2005**
**TROY (WATER STREET) - AREA 3**
**TROY, NEW YORK**

| | TRC Raviv Sample ID: | MW1 | MW4 |
|---|---|---|---|
| | Location: | MW-1 | MW-4 |
| | Date Collected: | 4/18/2005 | 4/18/2005 |
| Constituent | Units | | |
| **Semi-Volatile Organic Compounds (SVOCs)** | | | |
| 1,2,4-Trichlorobenzene | µg/L | ND | ND |
| 1,2-Dichlorobenzene | µg/L | ND | ND |
| 1,3-Dichlorobenzene | µg/L | ND | ND |
| 1,4-Dichlorobenzene | µg/L | ND | ND |
| 2,4,5-Trichlorophenol | µg/L | ND | ND |
| 2,4,6-Trichlorophenol | µg/L | ND | ND |
| 2,4-Dichlorophenol | µg/L | ND | ND |
| 2,4-Dimethylphenol | µg/L | ND | ND |
| 2,4-Dinitrophenol | µg/L | ND | ND |
| 2,4-Dinitrotoluene | µg/L | ND | ND |
| 2,6-Dinitrotoluene | µg/L | ND | ND |
| 2-Chloronaphthalene | µg/L | ND | ND |
| 2-Chlorophenol | µg/L | ND | ND |
| 2-Methylnaphthalene | µg/L | ND | ND |
| 2-Mehtylphenol | µg/L | ND | ND |
| 2-Nitroaniline | µg/L | ND | ND |
| 2-Nitrophenol | µg/L | ND | ND |
| 3,3'-Dichlorobenzidine | µg/L | ND | ND |
| 3-Methyphenol | µg/L | ND | ND |
| 3-Nitroaniline | µg/L | ND | ND |
| 4,6-Dinitro-o-creson | µg/L | ND | ND |
| 4-Bromophenyl phenyl ether | µg/L | ND | ND |
| 4-Chloro-3-methy phenol | µg/L | ND | ND |
| 4-Chloroaniline | µg/L | ND | ND |
| 4-Chlorophenyl phenyl ether | µg/L | ND | ND |
| 4-Methylphenol | µg/L | ND | ND |
| 4-Nitroaniline | µg/L | ND | ND |
| 4-Nitrophenol | µg/L | ND | ND |
| Acenaphthylene | µg/L | ND | ND |
| Acenaphthene | µg/L | ND | ND |
| Anthracene | µg/L | ND | ND |
| Benzo(a)anthracene | µg/L | ND | ND |
| Benzo(a)pyrene | µg/L | ND | ND |
| Benzo(b)fluoranthene | µg/L | ND | ND |
| Benzo(g,h,i)perylene | µg/L | ND | ND |
| Benzo(k)fluoranthene | µg/L | ND | ND |
| bis(2-Chloroethoxy)methane | µg/L | ND | ND |
| bis(2-Chloroethyl)ether | µg/L | ND | ND |
| bis(2-Ethylhexyl)phthalate | µg/L | ND | ND |
| Butyl benzyl phthalate | µg/L | ND | ND |

**TABLE A-1**
**GROUNDWATER ANALYTICAL RESULTS -**
**TRC RAVIV ASSOCIATED, INC. 2005**
**TROY (WATER STREET) - AREA 3**
**TROY, NEW YORK**

| | TRC Raviv Sample ID: | MW1 | MW4 |
|---|---|---|---|
| | Location: | MW-1 | MW-4 |
| | Date Collected: | 4/18/2005 | 4/18/2005 |
| Constituent | Units | | |
| Carbazole | µg/L | ND | ND |
| Chrysene | µg/L | ND | ND |
| Dibenzo(a,h)anthracene | µg/L | ND | ND |
| Dibenzofuran | µg/L | ND | ND |
| Diethyl phthalate | µg/L | ND | ND |
| Dimethyl phthalate | µg/L | ND | ND |
| Di-n-butyl phthalate | µg/L | ND | ND |
| Di-n-octyl phthalate | µg/L | ND | ND |
| Fluoranthene | µg/L | ND | ND |
| Fluorene | µg/L | ND | ND |
| Hexachlorobenzene | µg/L | ND | ND |
| Hexachlorobutadiene | µg/L | ND | ND |
| Hexachlorocyclopentadiene | µg/L | ND | ND |
| Hexachloroethane | µg/L | ND | ND |
| Indeno(1,2,3-cd)pyrene | µg/L | ND | ND |
| Isophorone | µg/L | ND | ND |
| Naphthalene | µg/L | ND | ND |
| Nitrobenzene | µg/L | ND | ND |
| N-Nitroso-di-npropylamine | µg/L | ND | ND |
| N-Nitrosodiphenylamine | µg/L | ND | ND |
| Pentachlorophenol | µg/L | ND | ND |
| Phenanthrene | µg/L | ND | ND |
| Phenol | µg/L | ND | ND |
| Pyrene | µg/L | ND | ND |
| Total Targeted SVOCs | µg/L | ND | ND |
| Total TICs | µg/L | | 300 J |
| Total SVOCs | µg/L | ND | 300 |

Notes:
ND - The analyte was analyzed for, but was not detected above detection limit.
J - Estimated concentration. The result is below the quantitation limit but above the method detection limit.
Data re-presented from TRC Raviv Associated, Inc. 2005. "Facility Closure, Site Investigation Report, Chevron Products USA, Troy Asphalt Facility, 7 Water Street, Troy, New York".
The data provided is for background information only; Brown and Caldwell has not evaluated the reliability of the data or its usability for defining the nature or extent of any contamination

**TABLE A-2**
**SOIL ANALYTICAL RESULTS -**
**TRC RAVIV ASSOCIATED, INC. 2005**
**TROY (WATER STREET) - AREA 3**
**TROY, NEW YORK**

| | TRC Raviv Sample ID: | AST34 | AST34 | AST35 | AST36 | AST37 | AST38 |
|---|---|---|---|---|---|---|---|
| | Depth Sampled (ft. BGS): | 0.5-1.0 | 9.5-10.0 | 0.0-0.5 | 0.5-1.0 | 0.5-1.0 | 0.0-0.5 |
| | Date Collected: | 4/18/2005 | 4/18/2005 | 4/18/2005 | 4/18/2005 | 4/18/2005 | 4/19/2005 |
| Constituent | Units | | | | | | |
| **Volatile Organic Compounds (VOCs)** | | | | | | | |
| 1,1,1-Trichloroethane | mg/kg | ND | ND | ND | ND | ND | ND |
| 1,1,2,2-Tetrachloroethane | mg/kg | ND | ND | ND | ND | ND | ND |
| 1,1,2-Tricholorethane | mg/kg | ND | ND | ND | ND | ND | ND |
| 1,1-Dichloroethane | mg/kg | ND | ND | ND | ND | ND | ND |
| 1,1-Dichloroethene | mg/kg | ND | ND | ND | ND | ND | ND |
| 1,2-Dichloroethane | mg/kg | ND | ND | ND | ND | ND | ND |
| 1,2-Dichloropropane | mg/kg | ND | ND | ND | ND | ND | ND |
| 2-Butanone (MEK) | mg/kg | ND | ND | ND | ND | ND | ND |
| 2-Hexanone | mg/kg | ND | ND | ND | ND | ND | ND |
| 4-Methyl-2-penthanone(MIBK) | mg/kg | ND | ND | ND | ND | ND | ND |
| Acetone | mg/kg | ND | ND | ND | ND | ND | ND |
| Benzene | mg/kg | 0.1 | 440 | ND | ND | 0.001 J | ND |
| Bromodichloromethane | mg/kg | ND | ND | ND | ND | ND | ND |
| Bromoform | mg/kg | ND | ND | ND | ND | ND | ND |
| Bromomethane | mg/kg | ND | ND | ND | ND | ND | ND |
| Carbon disulfide | mg/kg | 0.002 J | ND | ND | ND | ND | ND |
| Carbon tetrachloride | mg/kg | ND | ND | ND | ND | ND | ND |
| Chlorobenzene | mg/kg | ND | ND | ND | ND | ND | ND |
| Chloroethane | mg/kg | ND | ND | ND | ND | ND | ND |
| Chloroform | mg/kg | ND | ND | ND | ND | ND | ND |
| Chloromethane | mg/kg | ND | ND | ND | ND | ND | ND |
| cis-1,2-Dichloroethene | mg/kg | ND | ND | ND | ND | ND | ND |
| cis-1,3-Dichloropropene | mg/kg | ND | ND | ND | ND | ND | ND |
| Dibromochloromethane | mg/kg | ND | ND | ND | ND | ND | ND |

**TABLE A-2**
**SOIL ANALYTICAL RESULTS -**
**TRC RAVIV ASSOCIATED, INC. 2005**
**TROY (WATER STREET) - AREA 3**
**TROY, NEW YORK**

| | TRC Raviv Sample ID: | AST34 | AST34 | AST35 | AST36 | AST37 | AST38 |
|---|---|---|---|---|---|---|---|
| | Depth Sampled (ft. BGS): | 0.5-1.0 | 9.5-10.0 | 0.0-0.5 | 0.5-1.0 | 0.5-1.0 | 0.0-0.5 |
| | Date Collected: | 4/18/2005 | 4/18/2005 | 4/18/2005 | 4/18/2005 | 4/18/2005 | 4/19/2005 |
| Constituent | Units | | | | | | |
| Ethylbenzene | mg/kg | ND | 21 | ND | ND | ND | ND |
| Methylene chloride | mg/kg | 0.022 | ND | 0.007 | 0.01 | 0.009 | 0.1 |
| Styrene | mg/kg | ND | ND | ND | ND | ND | ND |
| Tetrachloroethylene | mg/kg | ND | ND | ND | ND | ND | ND |
| Toluene | mg/kg | 0.004 | 580 | ND | ND | ND | ND |
| trans-1,2-Dichloroethene | mg/kg | ND | ND | ND | ND | ND | ND |
| trans-1,3-Dichloropropene | mg/kg | ND | ND | ND | ND | ND | ND |
| Trichloroethylene | mg/kg | ND | ND | ND | ND | ND | ND |
| Vinyl chloride | mg/kg | ND | ND | ND | ND | ND | ND |
| Xylene (total) | mg/kg | ND | 480 | ND | ND | ND | ND |
| Total Targeted VOCs | mg/kg | 0.128 | 1521 | 0.007 | 0.01 | 0.01 | 0.1 |
| Total TICs | mg/kg | ND | 1967 J | ND | ND | ND | ND |
| Total VOCs | mg/kg | 0.128 | 3488 | 0.007 | 0.01 | 0.01 | 0.1 |
| **Semi-Volatile Organic Compounds (SVOCs)** | | | | | | | |
| 1,2,4-Trichlorobenzene | mg/kg | ND | ND | ND | ND | ND | ND |
| 1,2-Dichlorobenzene | mg/kg | ND | ND | ND | ND | ND | ND |
| 1,3-Dichlorobenzene | mg/kg | ND | ND | ND | ND | ND | ND |
| 1,4-Dichlorobenzene | mg/kg | ND | ND | ND | ND | ND | ND |
| 2,4,5-Trichlorophenol | mg/kg | ND | ND | ND | ND | ND | ND |
| 2,4,6-Trichlorophenol | mg/kg | ND | ND | ND | ND | ND | ND |
| 2,4-Dichlorophenol | mg/kg | ND | ND | ND | ND | ND | ND |
| 2,4-Dimethylphenol | mg/kg | ND | ND | ND | ND | ND | ND |
| 2,4-Dinitrophenol | mg/kg | ND | ND | ND | ND | ND | ND |
| 2,4-Dinitrotoluene | mg/kg | ND | ND | ND | ND | ND | ND |
| 2,6-Dinitrotoluene | mg/kg | ND | ND | ND | ND | 1 J | ND |

**TABLE A-2**
**SOIL ANALYTICAL RESULTS -**
**TRC RAVIV ASSOCIATED, INC. 2005**
**TROY (WATER STREET) - AREA 3**
**TROY, NEW YORK**

| | TRC Raviv Sample ID: | AST34 | AST34 | AST35 | AST36 | AST37 | AST38 |
|---|---|---|---|---|---|---|---|
| | Depth Sampled (ft. BGS): | 0.5-1.0 | 9.5-10.0 | 0.0-0.5 | 0.5-1.0 | 0.5-1.0 | 0.0-0.5 |
| | Date Collected: | 4/18/2005 | 4/18/2005 | 4/18/2005 | 4/18/2005 | 4/18/2005 | 4/19/2005 |
| Constituent | Units | | | | | | |
| 2-Chloronaphthalene | mg/kg | ND | ND | ND | ND | ND | ND |
| 2-Chlorophenol | mg/kg | ND | ND | ND | ND | ND | ND |
| 2-Methylnaphthalene | mg/kg | ND | ND | ND | ND | ND | ND |
| 2-Mehtylphenol | mg/kg | 1 J | 280 | 0.17 J | 32 | 39 | 15 |
| 2-Nitroaniline | mg/kg | ND | ND | ND | ND | ND | ND |
| 2-Nitrophenol | mg/kg | ND | ND | ND | ND | ND | ND |
| 3,3'-Dichlorobenzidine | mg/kg | ND | ND | ND | ND | ND | ND |
| 3-Methyphenol | mg/kg | ND | ND | ND | ND | ND | ND |
| 3-Nitroaniline | mg/kg | ND | ND | ND | ND | ND | ND |
| 4,6-Dinitro-o-creson | mg/kg | ND | ND | ND | ND | ND | ND |
| 4-Bromophenyl phenyl ether | mg/kg | ND | ND | ND | ND | ND | ND |
| 4-Chloro-3-methy phenol | mg/kg | ND | ND | ND | ND | ND | ND |
| 4-Chloroaniline | mg/kg | ND | ND | ND | ND | ND | ND |
| 4-Chlorophenyl phenyl ether | mg/kg | ND | ND | ND | ND | ND | ND |
| 4-Methylphenol | mg/kg | ND | 20 J | ND | ND | 2.1 J | ND |
| 4-Nitroaniline | mg/kg | ND | ND | ND | ND | ND | ND |
| 4-Nitrophenol | mg/kg | ND | ND | ND | ND | ND | ND |
| Acenaphthylene | mg/kg | 3.6 | 54 | 0.63 | 19 | 13 | 11 |
| Acenaphthene | mg/kg | ND | 12 J | ND | 4.7 | 9.5 | ND |
| Anthracene | mg/kg | 1.7 J | 270 | 0.37 | 18 | 40 | 17 |
| Benzo(a)anthracene | mg/kg | 6.3 J | 280 | 101 | 31 | 71 | 55 |
| Benzo(a)pyrene | mg/kg | 6.3 | 170 | 1 | 30 | 42 | 50 |
| Benzo(b)fluoranthene | mg/kg | 8 | 270 | 1.6 | 26 | 63 | 62 |
| Benzo(g,h,i)perylene | mg/kg | 3.7 | 92 | 0.68 | 16 | 19 | 28 |
| Benzo(k)fluoranthene | mg/kg | 3.9 | 90 | 0.48 | 11 | 23 | 21 |

**TABLE A-2**
**SOIL ANALYTICAL RESULTS -**
**TRC RAVIV ASSOCIATED, INC. 2005**
**TROY (WATER STREET) - AREA 3**
**TROY, NEW YORK**

| | TRC Raviv Sample ID: | AST34 | AST34 | AST35 | AST36 | AST37 | AST38 |
|---|---|---|---|---|---|---|---|
| | Depth Sampled (ft. BGS): | 0.5-1.0 | 9.5-10.0 | 0.0-0.5 | 0.5-1.0 | 0.5-1.0 | 0.0-0.5 |
| | Date Collected: | 4/18/2005 | 4/18/2005 | 4/18/2005 | 4/18/2005 | 4/18/2005 | 4/19/2005 |
| Constituent | Units | | | | | | |
| bis(2-Chloroethoxy)methane | mg/kg | ND | ND | ND | ND | ND | ND |
| bis(2-Chloroethyl)ether | mg/kg | ND | ND | ND | ND | ND | ND |
| bis(2-Ethylhexyl)phthalate | mg/kg | ND | ND | ND | ND | ND | ND |
| Butyl benzyl phthalate | mg/kg | ND | ND | ND | ND | ND | ND |
| Carbazole | mg/kg | 0.51 J | 69 | 0.071 J | 1.4 J | 20 | 0.83 J |
| Chrysene | mg/kg | 6 | 210 | 1.1 | 36 | 63 | 47 |
| Dibenzo(a,h)anthracene | mg/kg | 1.4 J | 49 | 0.28 J | 4.1 | 9.1 | 10 |
| Dibenzofuran | mg/kg | 0.54 J | 180 | 0.099 J | 4.1 | 33 | 2.4 |
| Diethyl phthalate | mg/kg | ND | ND | ND | ND | ND | ND |
| Dimethyl phthalate | mg/kg | ND | ND | ND | ND | ND | ND |
| Di-n-butyl phthalate | mg/kg | ND | ND | ND | ND | ND | ND |
| Di-n-octyl phthalate | mg/kg | ND | ND | ND | ND | ND | ND |
| Fluoranthene | mg/kg | 8.4 | 520 | 1.2 | 58 | 130 | 58 |
| Fluorene | mg/kg | ND | 280 | 0.082 J | 25 | 61 | 8.2 |
| Hexachlorobenzene | mg/kg | ND | ND | ND | ND | ND | ND |
| Hexachlorobutadiene | mg/kg | ND | ND | ND | ND | ND | ND |
| Hexachlorocyclopentadiene | mg/kg | ND | ND | ND | ND | ND | ND |
| Hexachloroethane | mg/kg | ND | ND | ND | ND | ND | ND |
| Indeno(1,2,3-cd)pyrene | mg/kg | 4.1 | 100 | 0.73 | 13 | 23 | 29 |
| Isophorone | mg/kg | ND | ND | ND | ND | ND | ND |
| Naphthalene | mg/kg | 1.1 J | 1100 | 0.29 J | 32 | 68 | 16 |
| Nitrobenzene | mg/kg | ND | ND | ND | ND | ND | ND |
| N-Nitroso-di-npropylamine | mg/kg | ND | ND | ND | ND | ND | ND |
| N-Nitrosodiphenylamine | mg/kg | ND | ND | ND | 1.3 J | ND | ND |

**TABLE A-2**
**SOIL ANALYTICAL RESULTS -**
**TRC RAVIV ASSOCIATED, INC. 2005**
**TROY (WATER STREET) - AREA 3**
**TROY, NEW YORK**

| | TRC Raviv Sample ID: | AST34 | AST34 | AST35 | AST36 | AST37 | AST38 |
|---|---|---|---|---|---|---|---|
| | Depth Sampled (ft. BGS): | 0.5-1.0 | 9.5-10.0 | 0.0-0.5 | 0.5-1.0 | 0.5-1.0 | 0.0-0.5 |
| | Date Collected: | 4/18/2005 | 4/18/2005 | 4/18/2005 | 4/18/2005 | 4/18/2005 | 4/19/2005 |
| Constituent | Units | | | | | | |
| Pentachlorophenol | mg/kg | ND | ND | ND | ND | ND | ND |
| Phenanthrene | mg/kg | 4.7 | 770 | 0.52 | 150 | 220 | 52 |
| Phenol | mg/kg | ND | 10 J | ND | ND | 1.3 J | 0.2 J |
| Pyrene | mg/kg | 8.4 | 410 | 1.2 | 110 | 140 | 78 |
| Total Targeted SVOCs | mg/kg | 69.7 | 5236 | 11.6 | 619.9 | 1091 | 560.6 |
| Total TICs | mg/kg | 97.7 J | 1012 J | 21.34 J | 249.8 J | 127.8 J | 59 J |
| Total SVOCs | mg/kg | 167.35 | 5248 | 32.942 | 869.7 | 1218.8 | 619.63 |

Notes:
ND - The analyte was analyzed for, but was not detected above detection limit.
J - Estimated concentration. The result is below the quantitation limit but above the method detection limit.
Data re-presented from TRC Raviv Associated, Inc. 2005. "Facility Closure, Site Investigation Report, Chevron Products USA, Troy Asphalt Facility, 7 Water Street, Troy, New York".
The data provided is for background information only; Brown and Caldwell has not evaluated the reliability of the data or its usability for defining the nature or extent of any contamination

**TABLE A-3**
**GROUNDWATER ANALYTICAL RESULTS -**
**ECOLOGY and ENVIRONMENT, INC. 1993**
**TROY (WATER STREET) - AREA 3**
**TROY, NEW YORK**

| | Ecology & Environment Inc. Sample ID: | VH-101-TRY | VH-102-TRY |
|---|---|---|---|
| | Location | MW-1 | MW-4 |
| | Date Collected: | 9/23/1993 | 9/23/1993 |
| Constituent | Units | | |
| **Total Recoverable Petroleum Hydrocarbons (TRPH)** | | | |
| TRPHs | µg/L | ND | ND |
| **Volatile Organic Compounds (VOCs)** | | | |
| Chlorobenzene | µg/L | ND | ND |
| Benzene | µg/L | ND | ND |
| Toluene | µg/L | ND | ND |
| Ethylbenzene | µg/L | ND | ND |
| Total Xylenes | µg/L | ND | ND |
| **Polynuclear Aromatic Hydrocarbons (PAHs)** | | | |
| 1,2-Dichlorobenzene | µg/L | ND | ND |
| 1,3-Dichlorobenzene | µg/L | ND | ND |
| 1,4-Dichlorobenzene | µg/L | ND | ND |
| MTBE | µg/L | ND | ND |
| Acenaphthene | µg/L | 8.8 | ND |
| Fluoranthene | µg/L | 9 | ND |
| Naphthalene | µg/L | 8.1 | ND |
| Benzo(a)anthracene | µg/L | 2.9 | ND |
| Benzo(a)pyrene | µg/L | 1.2 | ND |
| Benzo(b)fluoranthene | µg/L | 2 | ND |
| Benzo(k)fluoranthene | µg/L | 1 | ND |
| Chrysene | µg/L | 2.7 | ND |
| Acenaphthylene | µg/L | 6.8 | ND |
| Anthracene | µg/L | 3.1 | ND |
| Fluorene | µg/L | 11 | ND |
| Phenanthrene | µg/L | 4.5 | ND |
| Indeno(1,2,3-cd)pyrene | µg/L | 1.3 | ND |
| Pyrene | µg/L | 5 | ND |
| 1-Methylnaphthalene | µg/L | 24 | ND |
| 2-Methynaphthalene | µg/L | 12 | ND |
| **Resource Conservation and Recovery Act Metals** | | | |
| Arsenic | µg/L | 33 | 29 |
| Barium | µg/L | 440 | 320 |
| Cadmium | µg/L | 32 | 14 |
| Chromium (Total) | µg/L | 45 | ND |
| Lead | µg/L | 140 | 27 |
| Mercury | µg/L | 0.48 | ND |
| Selenium | µg/L | 6.8 | 5 |
| Silver | µg/L | ND | ND |

Notes:
ND - The analyte was analyzed for, but was not detected above detection limit.
Data re-presented from Ecology and Environment, Inc. 1993. "Phase I Site History and Limited Phase II, Environmental Assessment Report, Chevron Asphalt Plant, Water Street, Troy, Rensselaer County, New York".
The data provided is for background information only; Brown and Caldwell has not evaluated the reliability of the data or its usability for defining the nature or extent of any contamination

**TABLE A-4**
**GROUNDWATER ANALYTICAL RESULTS -**
**ECOLOGY and ENVIRONMENT, INC. 1993**
**TROY (WATER STREET) - AREA 3**
**TROY, NEW YORK**

| | Ecology & Environment Inc. Sample ID: | VH-111-TRY |
|---|---|---|
| | Depth Sampled (ft. BGS): | 0.0-0.5 |
| | Date Collected: | 9/23/1993 |
| Constituent | Units | |
| **Total Recoverable Petroleum Hydrocarbons (TRPH)** | | |
| TRPHS | mg/kg | 16000 |
| **Polynuclear Aromatic Hydrocarbons (PAHs)** | | |
| PAHs (Total) | mg/kg | 42 |
| **Polychlorinated Bipheynls (PCBs)** | | |
| PCBs | mg/kg | ND |

Notes:
ND - The analyte was analyzed for, but was not detected above detection limit.
Data re-presented from Ecology and Environment, Inc. 1993. "Phase I Site History and Limited Phase II, Environmental Assessment Report, Chevron Asphalt Plant, Water Street, Troy, Rensselaer County, New York".
The data provided is for background information only; Brown and Caldwell has not evaluated the reliability of the data or its usability for defining the nature or extent of any contamination