PROPOSED REMEDIAL ACTION PLAN

NM - Troy Water St. MGP
Operable Unit Number 02: Area 3
Manufactured Gas Plant Project
Troy, Rensselaer County
Site No. 442029
January 2020

Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the above referenced site. The disposal of hazardous substances associated with former manufactured gas plant operations (MGP wastes) at the site has resulted in threats to public health and the environment that would be addressed by the remedy proposed by this Proposed Remedial Action Plan (PRAP). The contamination and media in which it is found at this site is more fully described in Section 6 of this document. The proposed remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This PRAP identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for the preferred remedy.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York; (6 NYCRR) Part 375. This document is a summary of the information that can be found in the site-related reports and documents in the document repository identified below.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all PRAPs. This is an opportunity for public participation in the remedy selection process. The public is encouraged to review the reports and documents, which are available at the following repositories:

NYSDEC
Division of Environmental Remediation
625 Broadway, 12th Floor
Albany, NY 12205
Phone: (518) 402-9662

Please note physical document repositories may be temporarily unavailable/limited hours due to COVID-19 precautions. Key project documents are also included on DEC Info Locator/On-line repository at:

https://www.dec.ny.gov/data/DecDocs/442029/

A public comment period has been set from:

January 7, 2021 to February 5, 2021

A virtual public meeting will be held on January 28, 2021 at 7 pm via Webex (virtual platform). The public may participate in the virtual public meeting using the link and login information that is contained in the PRAP fact sheet found at DEC Info Locator/On-line repository at the above link.

At the meeting, the findings of the remedial investigation (RI) and the feasibility study (FS) will be presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP.

Written comments may also be sent through to:

John Spellman
NYS Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233
john.spellman@dec.ny.gov

The Department may modify the proposed remedy or select another of the alternatives presented in this PRAP based on new information or public comments. Therefore, the public is encouraged to review and comment on the proposed remedy identified herein. Comments will be summarized and addressed in the responsiveness summary section of the Record of Decision (ROD). The ROD is the Department's final selection of the remedy for this site.

Receive Site Citizen Participation Information By Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, Manufactured Gas Plant Program, and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html

SECTION 3: SITE DESCRIPTION AND HISTORY

Location: The NM - Troy Water Street - Manufactured Gas Plant (MGP) site is located along the east side of the Hudson River in the vicinity of the NY Route 378 bridge (Menands Bridge). The site is located in an urban area in the City of Troy, Rensselaer County.

At the initiation of environmental studies, the site was divided into four areas to facilitate the investigations. These areas were all under the former ownership of the Hudson Valley Fuel Corporation, a National Grid predecessor corporation that operated the manufactured gas plant.

Area 1) The 111-acre Area 1 is located on the west side of the Hudson River. Manufactured gas operations did not occur at Area 1.

Area 2) The 16-acre Area 2 is located along the east side of the Hudson River on Water Street, approximately one-quarter mile east of the intersection of Water Street and US Route 4. The manufactured gas plant operations took place at Area 2.

Area 3) The 1.5-acre Area 3 is located adjacent to Area 2 to the south. Two tanks and three structures relating to coal tar byproducts were present at the time of MGP operation.

Area 4) The 14-acre Area 4 is located along the east side of the Hudson River approximately one-half mile south of the Menands Bridge. Wastes from the former MGP operations were disposed of at this area. Area 4 later became a distinct site, site number 442029A. Area 4 is a class 4 site, meaning the site has been remediated but requires continued site management and monitoring.

Site Features: The site is generally flat except along the bank of the Hudson River, where the elevation drops approximately twenty feet to the river. The site is vacant except for a currently unoccupied commercial building at Area 2.

Current Zoning and Use: The site is currently inactive and is zoned Waterfront Trade District, an industrial use classification. The surrounding parcels are currently used for combination of commercial, industrial and railroad uses. The nearest residences are approximately 200 feet east, and upgradient from Areas 2 and 3.

Past Use of the Site: The site has over a 150-year history of industrial use relating to steel and coke manufacturing, including manufactured gas from coal. A former asphalt storage and distribution terminal also operated at Area 3 (Areas described under Operable Units, below). The asphalt operation included a Department Major Oil Storage Facility (MOSF) Permit for several above-ground tanks. The tanks were removed in 2006. The practices of the historic industries and the materials they were handling resulted in the releases of contaminants into the environment.

Operable Units (OUs): The site is divided into three OUs. An OU represents a portion of a remedial program for a site that for technical or administrative reasons can be addressed separately to investigate, eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination.

The remedial process for three OUs related to the former manufactured gas plant is proceeding on

different schedules. Operable Unit 1 (OU1), consisting of Areas 1 and 2, is proceeding in advance of Operable Unit 2 (OU2). OU2 consists of Area 3 and is adjacent to the southern edge of OU1. Operable Unit 3 consists of Hudson River sediments impacted by the former plant. The Hudson River is a Class C stream within study area. Upland contamination in OUs 1 and 2 will be addressed first. OU3 (in-river) will be addressed last.

Site Geology and Hydrogeology: Shale bedrock underlies the site approximately 40 feet below ground surface at the western edge of the site and approximately 30 feet below ground surface at the eastern edge. A range of interbedded soil from clay to coarse sand and gravel is positioned on top of the shale. A fill layer consisting primarily of slag, cinders, ash bricks and gravel overlies the native overburden and is approximately 20 to 30 feet in thickness. The groundwater table is approximately 15 feet below ground surface. A localized groundwater mound has been observed in the west-central area of the site, possibly due to a former tank foundation, but does not affect the overall flow of groundwater to the west towards the Hudson River.

Operable Unit Number 2 (OU2) is the subject of this document.

A Record of Decision (ROD) was issued previously for OU1. The major remedial components included a combination of excavation and in-situ solidification of visual tar or soil containing greater than 500 parts per million polycyclic aromatic hydrocarbons. In addition, the ROD required a site cover, site management plan and environmental easement. Subsequent to the ROD, the remedial design modified the site cover at the top of the riverbank to enhance habitat with tree plantings and ecologically protective soil. A Record of Decision will be issued for OU3 in the future.

A site location map is attached as Figure 1. Figure 2 shows the location of the operable units. Figure 3 shows the locations of the historic MGP structures.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives (or an alternative) that restrict(s) the use of the site to commercial use (which allows for industrial use) as described in Part 375-1.8(g) are/is being evaluated in addition to an alternative which would allow for unrestricted use of the site.

A comparison of the results of the investigation to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is included in the Tables for the media being evaluated in Exhibit A.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The PRPs for the site, documented to date, include:

Niagara Mohawk Power Corporation

The Department and Niagara Mohawk Power Corporation, doing business as National Grid, entered into a Consent Order on November 7, 2003. The Order obligates the responsible party to implement a full remedial program.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A Remedial Investigation (RI) has been conducted. The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The field activities and findings of the investigation are described in the RI Report.

The following general activities are conducted during an RI:

- Research of historical information,
- Geophysical survey to determine the lateral extent of wastes,
- Test pits, soil borings, and monitoring well installations,
- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor,
- Sampling of surface water and sediment,
- Ecological and Human Health Exposure Assessments.

The analytical data collected on this site includes data for:

- groundwater
- soil
- soil vapor

6.1.1: Standards, Criteria, and Guidance (SCGs)

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

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

6.1.2: RI Results

The data have identified contaminants of concern. A "contaminant of concern" is a hazardous waste that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The nature and extent of contamination and environmental media requiring action are summarized in Exhibit A. Additionally, the RI Report contains a full discussion of the data. The contaminant(s) of concern identified for this Operable Unit at this site is/are:

benzene	chrysene
ethylbenzene	cyanides (soluble cyanide salts)
toluene	benzo(b)fluoranthene
xylene (mixed)	benzo(a)anthracene
coal tar	dibenz(a,h)anthracene
naphthalene	pyrene
benzo(a)pyrene	phenanthrene

As illustrated in Exhibit A, the contaminant(s) of concern exceed the applicable SCGs for:

- groundwater
- soil

6.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Record of Decision.

The following IRM has been completed at this site based on conditions observed during the RI.

IRM Surface Tar Removal

Tar observed at the surface, east of the top of the riverbank was removed in Area 3 in 2017 to a depth of one foot below ground surface. In addition, during the removal of the MOSF tanks (2006) described in Section 3, a viscous tar was observed in the bottom of tank T-41 and outside the tank at its foundation. The base of the tank remained following the decommissioning activities. During the IRM the remainder of the tank, its contents, and tar adjacent to the tank were removed. Approximately 190 tons of tar-impacted soil and 166 tons of tank contents were removed and disposed of off-site. Removal areas were backfilled with crushed stone or gravel to the pre-construction grade.

6.3: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water.

The Fish and Wildlife Resources Impact Analysis (FWRIA) for Area 3, which is included in the RI report, presents a detailed discussion of the existing and potential impacts from the site to fish and wildlife receptors. The FWRIA concluded that a potential risk to wildlife resources exists from the presence of PAHs and other non-MGP related contaminants in surface soils at Area 3. Also, in the shallow surface soil, xylene, PAHs and other non-MGP related contaminants present a potential risk to ecological resources.

Site soil and groundwater were analyzed for volatile organic compounds (VOCs), semi-VOCs, polychlorinated biphenyls (PCBs), pesticides, and metals. Soil vapor was analyzed for VOCs. The groundwater in Area 2 will be analyzed for per- and polyfluoroalkyl substances if/when access is allowed by the property owner.

Nature and Extent of Contamination:

Soil: Coal tar, in the forms of hardened tar, viscous tar and a non-aqueous phase liquid, was observed in soils from the ground surface to approximately 40 feet in depth, which corresponds to the top of bedrock, where observed. The coal tar is observed at the surface along the riverbank, since the 2017 IRM described in Section 6.2, excluded riverbank tar from the scope of removal. The tar is found sporadically and in discrete lenses throughout most of the site but is more prevalent in an approximately one-acre area in the central portion of the site. Several MGP contaminants, BTEX (benzene, toluene, ethylbenzene and xylene) and PAHs (polycyclic aromatic hydrocarbons, a subgroup of SVOCs), exceed commercial and industrial soil cleanup objectives (SCOs), generally at visible coal tar locations. Benzene was detected up to 8,200 parts per million (ppm), exceeding the commercial use SCO (CSCO) of 44 ppm, and naphthalene was detected up to 7,000 ppm, exceeding the CSCO of 500 ppm. Total PAHs were found as high as 7,998 ppm in surface soil, with several individual PAHs exceeding commercial and industrial SCOs as noted below.

Twenty-four samples were collected from 0 to 6 inches below ground surface and analyzed for semi-volatile organic compounds, pesticides, PCBs, and metals. Several PAHs exceeded commercial SCOs. As examples, benzo(a)pyrene was detected up to 1,100 ppm, exceeding the commercial use SCO of 1 ppm. Benzo(b)fluoranthene was detected up to 980 ppm, exceeding the commercial use SCO of 5.6 ppm and, chrysene was detected up to 790 ppm, exceeding the commercial use SCO of 56 ppm. The exceedances were found to be typically associated with the surface tar, but exceedances of the commercial SCOs are also present sporadically across Area 3. Cyanide, a contaminant associated with MGP purifier wastes, did not exceed the unrestricted use SCO in near surface soil.

One hundred twenty-eight soil samples were collected from depths greater than six inches and analyzed for the same parameters as the near-surface soil samples, including volatile organic compounds. Benzene was detected up to 8,200 ppm, exceeding the protection of groundwater SCO of 0.06 ppm. Toluene was detected up to 4,000 ppm, exceeding the protection of groundwater SCO

of 0.7 ppm. Xylene was detected up to 1,600 ppm, exceeding the protection of groundwater SCO of 1.6 ppm. Several PAHs also exceeded their respective SCOs. Among them, naphthalene was detected up to 7,000 ppm, exceeding the commercial use SCO of 500 ppm. Chrysene was detected up to 1,200 ppm, exceeding the commercial use SCO of 56 ppm and fluoranthene was detected up to 2,900 ppm, exceeding the commercial use SCO of 500 ppm. In general, the exceedances were co-located or proximate to areas and depth intervals where non-aqueous phase liquid (NAPL), tar or sheens were observed. Cyanide in sub-surface soil did not exceed the unrestricted use SCO.

Soil impacts at Area 3 do not extend beyond the Area 3 site boundary, except for its boundary with the Area 2 to the north. The impacts at Area 2 are being addressed pursuant to the 2011 Amended Record of Decision for NM – Troy Water St. Site.

Groundwater: Fifty-five groundwater samples were collected from Area 3 monitoring wells and analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. MGP-related constituents (i.e., BTEX, PAHs and cyanide) were detected in concentrations exceeding the Class GA groundwater standard in several wells. As examples, benzene was detected up to 8,900 parts per billion (ppb), exceeding the standard of 1 ppb. Toluene was detected up to 1,300 ppb, exceeding the standard of 5 ppb. Xylene was detected up to 340 ppb, exceeding the standard of 5 ppb. Naphthalene was detected up to 500 ppb, exceeding the standard of 10 ppb. Cyanide was detected up to 560 ppb, exceeding the standard of 200 ppb. Groundwater exceedances were located generally in the area of the IRM and in the northwest corner of Area 3. Groundwater samples from a bedrock well located beneath the area where NAPL was found on the bedrock surface showed benzene at 2 ppb (standard: 1 ppb), with no other MGP constituents exceeding the standard.

Groundwater impacts at Area 3 do not extend laterally beyond the Area 3 site boundary to the north, east and south. However, the data suggests the dissolved benzene plume is discharging to the Hudson River to the west.

Soil Vapor

There are no occupied structures at Area 3. However, six soil vapor and three outdoor air samples were collected and analyzed for certain volatile organic compounds, which included MGP-related compounds. Benzene was detected at concentrations up to 0.59 micrograms per cubic meter (mcg/m3). Ethylbenzene was detected up to 18 mcg/m3. Toluene was detected up to 7.6 mcg/m3. Xylene was detected up to 26 mcg/m3. 1,1,1-trichloroethane was detected up to 17 mcg/m3. Tetrachloroethene was detected up to 0.57 mcg/m3. Carbon tetrachloride was detected up to 2.7 mcg/m3. The soil vapor study concluded that MGP-related and other soil vapors are not a concern at Area 3, and that no further evaluation for the potential for impacts from soil vapor was required at the time of the study's completion.

6.4: Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure.*

People are not drinking the contaminated groundwater because the area is served by a public water supply that is not affected by site related contamination. A shallow soil removal action completed as an interim remedial measure has reduced the potential for people that enter the site to come into contact with soil contamination at the site's surface. However, the potential exists for people to come into contact with additional soil or groundwater contamination if they dig below the IRM excavation depth (1-foot below ground surface). Volatile organic compounds in the groundwater and soil may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings is referred to as soil vapor intrusion. Soil vapor data indicates soil vapor intrusion is not a concern for onsite or offsite buildings.

6.5: Summary of the Remediation Objectives

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

The remedial action objectives for this site are:

Groundwater

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

Surface Water

RAOs for Public Health Protection

- Prevent contact or inhalation of contaminants from impacted water bodies.
- Prevent surface water contamination which may result in fish advisories.

RAOs for Environmental Protection

- Restore surface water to ambient water quality criteria for the contaminants of concern.
- Prevent impacts to biota from ingestion/direct contact with surface water causing toxicity and impacts from bioaccumulation through the marine or aquatic food chain.

SECTION 7: SUMMARY OF THE PROPOSED REMEDY

To be selected, the remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. The remedy must also attain the remedial action objectives identified for the site, which are presented in Section 6.5. Potential remedial alternatives for the Site were identified, screened and evaluated in the FS report.

A summary of the remedial alternatives that were considered for this site is presented in Exhibit B. Cost information is presented in the form of present worth, which represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved. A summary of the remedial alternatives costs is included as Exhibit C.

The basis for the Department's proposed remedy is set forth at Exhibit D.

The proposed remedy is referred to as the Source Excavation and In-situ Solidification Remedy.

The estimated present worth cost to implement the remedy is $10,300,000. The cost to construct the remedy is estimated to be $8,300,000 and the estimated average annual cost is $69,000.

The elements of the proposed remedy are as follows:

1. Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;

- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings will include, at a minimum, a 20-mil vapor barrier/waterproofing membrane on the foundation to improve energy efficiency as an element of construction.

2. Excavation

Excavation and off-site disposal of contaminated materials meeting the following criteria to depths ranging from approximately 2 to 5 feet below ground surface (bgs):

- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
- concentrated solid or semi-solid hazardous substances per 6 NYCRR Part 375-1.2(au)(1);
- non-aqueous phase liquids;
- soil with visual waste material including tar or asphalt or non-aqueous phase liquid;
- soil containing total PAHs exceeding 500 ppm;
- soils that create a nuisance condition, such as purifier wastes, as defined in Commissioner Policy CP-51 Section G.

Based on the above criteria the following areas would be excavated:

- The approximate northeast quadrant of Area 3 to a depth of approximately 5 feet bgs;
- An area under the Menands Bridge to a depth of approximately 3 feet bgs; and
- Sporadic areas of hardened surficial tar along the riverbank typically to 2 feet, bgs. Tar is not expected in the bank at a depth greater than two feet. However, the Site Management Plan in remedial element 7 will provide for the monitoring of the streambank for the potential migration of tar to the surface, with additional removals as necessary.

Approximately 4,000 cubic yards of materials will be excavated.

3. Backfill

On-site soil which does not exceed the above excavation criteria may be used below the cover system described in remedy element 5 to backfill the excavation

Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) for commercial use will be brought in to complete the backfilling of the excavation and establish the designed grades at the site. For the streambank and extending 20 feet inland from the top of bank, clean fill will meet the requirements for the protection of ecological resources. The design will include a restoration plan and a monitoring plan for all streambank areas disturbed by the remedy and all streambank activities will be consistent with the requirements of 6 NYCRR Part 608. If vegetation is disturbed,

the vegetation will be restored through a combination of topsoil placement, biodegradable erosion matting, and planting/seeding, as appropriate, based on pre-existing conditions.

4. In-situ solidification (ISS)
ISS will be applied in deeper areas which are not excavated, and which contain:

- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
- concentrated solid or semi-solid hazardous substances per 6 NYCRR Part 375-1.2(au)(1);
- non-aqueous phase liquids;
- soil with visual waste material or non-aqueous phase liquid;
- soil containing total PAHs exceeding 500 ppm

The ISS zones include the west central and northwest areas of the site. Vertically, the treatment zone will extend from approximately four feet below the present grade to approximately 35 feet below grade to solidify approximately 18,500 cubic yards (cy) of soil. The four-foot pre-excavation would result in an additional 6,000 cy of soil removal. ISS is a process that binds the soil particles in place creating a low permeability mass. The contaminated soil will be mixed in place together with solidifying agents (typically Portland cement) or other binding agents using an excavator or augers. The soil and binding agents are mixed to produce a solidified mass resulting in a low permeability monolith. The resulting solid matrix reduces or eliminates mobility of contamination and reduces or eliminates the matrix as a source of groundwater contamination. The solidified mass will then be covered with a cover system described in remedy element 5 to prevent direct exposure to the solidified mass and protect the monolith from damage due to freeze/thaw cycles.

5. Cover System
A site cover in the upland area extending from the top of bank eastward will be required to allow for commercial use of the site in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where a soil cover is to be used it will be a minimum of one foot of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to: pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs.

In addition, a twenty-foot wide, two-foot deep ecological cover will be provided at the top of bank, extending twenty feet inland. The ecological cover will satisfy the protection of ecological resources SCOs and consist of materials of sufficient quality to maintain a vegetative layer. The remedial design will select appropriate plantings for the cover system.

6. Fencing
The site perimeter fencing will be inspected for defects and corrected as needed to prevent unauthorized entry.

7. Institutional Control

Imposition of an institutional control in the form of an environmental easement for the controlled property which will:

- require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allow the use and development of the controlled property for commercial use as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or Rensselaer County DOH; and
- require compliance with the Department approved Site Management Plan.

8. Site Management Plan

A Site Management Plan is required, which includes the following:

A. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The Environmental Easement discussed in Paragraph 7 above
Engineering Controls: The cover system discussed in Paragraph 5 above.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- descriptions of the provisions of the environmental easement including any land use, and groundwater use restrictions;
- provision for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and,
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

B. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

- monitoring of groundwater to assess the performance and effectiveness of the remedy, including the quality of groundwater discharge to the Hudson River;
- a schedule of monitoring and frequency of submittals to the Department; and,
- monitoring of restoration activities along the streambank, including the monitoring for future tar seeps.

Exhibit A

Nature and Extent of Contamination

This section describes the findings of the Remedial Investigation for all environmental media that were evaluated. As described in Section 6.1, samples were collected from various environmental media to characterize the nature and extent of contamination.

For each medium for which contamination was identified, a table summarizes the findings of the investigation. The tables present the range of contamination found at the site in the media and compares the data with the applicable SCGs for the site. The contaminants are arranged into four categories, as appropriate; volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, and inorganics (cyanide). For comparison purposes, the SCGs are provided for each medium that allows for unrestricted use. For soil, if applicable, the Restricted Use SCGs identified in Section 4 and Section 6.1.1 are also presented.

Waste/Source Areas

As described in the RI report, waste/source materials were identified at the site and are impacting groundwater and soil.

Wastes are defined in 6 NYCRR Part 375-1.2(aw) and include solid, industrial and/or hazardous wastes. Source areas are defined in 6 NYCRR Part 375(au). Source areas are areas of concern at a site where substantial quantities of contaminants are found which can migrate and release significant levels of contaminants to another environmental medium. Wastes and source areas identified at the site include asphalt and coal tar, which ranged in viscosity from hard, to gummy and non-aqueous phase liquid (NAPL) forms (Figure 4).

A tacky and viscous tar was found at the surface and in the subsurface above the water table, while coal tar in the form of NAPL exhibiting an oil-like consistency and occurring as blebs and grain coatings was encountered at depths below the groundwater table. The tar in its various forms was found from the ground surface down to near the top of bedrock at 40 feet below ground surface (Figure 5). Tar was not observed in the bedrock. Tar in the shallow subsurface was found sporadically, generally in the northern area of the site, while deeper NAPL was more limited to the west-central area of the site. NAPL was observed in one well screened at the top of bedrock but was not observed to be accumulating in the well. Hardened tar was observed on the Hudson riverbank in disconnected patches.

Purifier waste was observed in two investigative test pits excavated in the north central and eastern part of the site. Purifier waste is a solid waste which was generated during the process of removing impurities in the manufactured gas prior to distribution. The waste typically contains cyanide and exhibits an unpleasant burnt odor. Cyanide was not detected in the soil samples collected from these locations, however.

The interim remedial measure discussed in Section 6.2 was effective in removing surface tar from the upland area east of the riverbank. However, tar remains on the surface along the bank of the

Hudson River and in the upland subsurface. The remaining waste/source area identified during the RI will be addressed in the remedy selection process.

Groundwater

Groundwater samples were collected from 18 overburden monitoring wells and a single bedrock monitoring well. The overburden wells are typically coupled, meaning a well screened at the water table has an adjacent well screened within the saturated zone near the top of bedrock. The results indicate that contamination in the overburden groundwater at the site exceeds the SCGs for MGP-related constituents (BTEX PAHs and cyanide), with little distinction in contaminant levels between the upper and lower zones. Contaminant levels were highest in the west-central portion of the site. With the exception of benzene, bedrock groundwater did not exceed Class GA standards or guidance values for the contaminants of concern. Groundwater at the edges of the site did not exceed the SCGs except at one location at the top of bank in the northern portion of the site where it exceeded the SCG for benzene. This suggests there is no off-site migration of contaminated groundwater from Area 3 toward adjacent land, but that a potential discharge of dissolved benzene into the Hudson River exists.

The pesticides alpha-BHC and dieldrin were detected above the SCG in certain groundwater samples. These compounds are not known to be associated with any site operations.

Iron, sodium and manganese were detected in groundwater above the SCG site-wide, including upgradient, and are representative of background conditions.

PCBs were not detected in groundwater.

Table 1 - Groundwater

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
VOCs			
benzene	ND-8,900	1	18 of 55
ethylbenzene	ND-21	5	1 of 55
toluene	ND-1300	5	5 of 55
Xylenes, total	ND-340	5	5 of 55
2,4 dimethylphenol	ND-45	1	7 of 55
2 methylphenol	ND-57	1	6 of 55
4 methylphenol	ND-29	1	7 of 55
Benzo(a)anthracene	ND-0.64	0.002	2 of 55

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
Benzo(a)pyrene	ND-0.64	no detection	1 of 55
Benzo(b)flouranthene	ND-0.7	0.002	6 of 55
Naphthalene	ND-500	10	4 of 55
Phenol	ND-430	1	9 of 55
Chrysene	ND-0.6	0.002	2 of 55
Pesticides/PCBs			
BHC, alpha	ND-0.1	0.01	7 of 55
Dieldrin	ND-0.18	0.004	3 of 55
Cyanides, total	ND-560	200	3 of 55

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b - SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703, Surface water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).

Based on the findings of the RI, the presence of MGP-related wastes has resulted in the contamination of groundwater. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of groundwater to be addressed by the remedy selection process are BTEX, PAHs and cyanide, in addition to the tar noted above.

Soil

Surface and subsurface soil samples were collected at the site during the RI. Surface soil samples were collected from depths of 0 to 2 inches and 0 to 6 inches to assess direct human and ecological exposure. Subsurface soil samples were collected from a depth of 6 inches to 40 feet to assess soil contamination impacts to groundwater.

The majority of surface soil samples exceeded the unrestricted SCO for at least one PAH. Benzo(a)pyrene and benzo(a)anthracene also exceeded the commercial use SCO in most samples. In general, the highest total PAH concentrations were measured at locations close to where surficial or shoreline tar deposits were documented.

Table 2 - Surface Soil (0-6 inch depth)

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Restricted Use SCG[c] (ppm)	Frequency Exceeding Restricted SCG
SVOCs					
acenaphthene	ND-90	20	2 of 24	500	0 of 24
anthracene	ND-210	100	2 of 24	500	0 of 24
benzo(a)anthracene	ND-770	1	16 of 24	5.6	17 of 24
benzo(a)pyrene	ND-1100	1	16 of 24	1	16 of 24
benzo(k)fluoranthene	ND-670	0.8	13 of 24	56	2 of 24
chrysene	ND-790	1	17 of 24	56	2 of 24
dibenz(a,h)anthracene	ND-170	0.33	4 of 24	0.56	4 of 24
fluoranthene	ND-840	100	2 of 24	500	1 of 24
fluorene	ND-48	30	2 of 24	500	0 of 24
indeno(1,2,3-c,d)pyrene	ND-470	0.5	16 of 24	5.6	4 of 24
naphthalene	ND-89	12	2 of 24	500	0 of 24
phenanthrene	ND-520	100	2 of 24	500	1 of 24
pyrene	ND-810	100	2 of 24	500	1 of 24
Inorganics					
Arsenic	4.7-30	13	8 of 24	16	7 of 24
Lead	28.6-2540	63	20 of 24	1000	1 of 24

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use, unless otherwise noted.

Table 3 - Subsurface Soil (greater than 6-inch depth)

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Restricted Use SCG[c] (ppm)	Frequency Exceeding Restricted SCG
VOCs					
benzene	ND-8200	0.06	26 of 128	44	6 of 128
ethylbenzene	ND-60	1	9 of 128	390	0 of 128
toluene	ND-4000	0.7	14 of 128	500	4 of 128
xylenes, total	ND-1600	0.26	22 of 128	500	3 of 128
SVOCs					
acenaphthene	ND-110	20	3 of 128	500	0 of 128
acenaphthylene	ND-870	100	4 of 128	500	2 of 128
anthracene	ND-1400	100	7 of 128	500	2 of 128
benzo(a)anthracene	ND-1400	1	46 of 128	5.6	27 of 128
benzo(a)pyrene	ND-1840	1	42 of 128	1	42 of 128
benzo(b)fluoranthene	ND-1200	1	46 of 128	5.6	25 of 128
benzo(k)fluoranthene	ND-480	0.8	38 of 128	56	7 of 128
chrysene	ND-1200	1	45 of 128	56	10 of 128
dibenz(a,h)anthracene	ND-35	0.33	14 of 128	0.56	13 of 128
fluoranthene	ND-2800	100	10 of 128	500	4 of 128
fluorene	ND-1700	30	10 of 128	500	3 of 128
indeno(1,2,3-c,d)pyrene	ND-440	0.5	44 of 128	5.6	19 of 128
naphthalene	ND-7000	12	19 of 128.	500	7 of 128
phenanthrene	ND-4400	100	11 of 128	500	7 of 128
pyrene	ND-2000	100	11 of 128	500	4 of 128
Inorganics					
Arsenic	1.8-84	13	32 of 73	16	23 of 73
Lead	4.7-249	63	15 of 73	1000	0 of 73

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use, unless otherwise noted.

Subsurface soil samples were collected from test pits and soil borings excavated and drilled during the remedial investigation. Certain samples exceeded the unrestricted use SCO for individual PAHs. Total PAH concentrations were greater than the 500 ppm soil cleanup guidance level specified in the Department's Commissioner Policy 51 (CP-51) at 11 locations in Area 3. In addition, concentrations of one or more BTEX compounds were detected at concentrations greater than the unrestricted SCOs. In general, the locations of PAH and BTEX exceedances fall within areas and depth intervals impacted by tar and/or sheen.

Arsenic and lead were found in several samples exceeding the unrestricted use SCO in both the surface and subsurface soil. Metal contamination in soil is associated with historic fill activity at the site. Disposal of ash, cinders, and coal has resulted in inorganic soil contamination above the unrestricted SCGs. However, the inorganic concentrations are consistent with the background samples collected in the immediate area of the site and are not associated with the coal tar constituents. Therefore, arsenic and lead are not considered site-specific contaminants of concern.

Based on the findings of the Remedial Investigation, the presence of MGP-related impacts has resulted in the contamination of soil. The site contaminants identified in soil which are considered to be the primary contaminants of concern, to be addressed by the remedy selection process are BTEX and PAHs.

Soil Vapor

The evaluation of the potential for soil vapor intrusion resulting from the presence of site related soil or groundwater contamination was evaluated by the sampling of soil vapor. No buildings exist at Area 3, therefore no sub-slab or indoor air samples were collected. However, soil vapor samples were collected from within the fill material above the water table

Individual BTEX compounds were detected in soil vapor. Benzene concentrations ranged from 0.011 micrograms per cubic meter (mcg/m3) to 0.39 mcg/m3. Toluene concentrations ranged up to 7.6 mcg/m3. Ethylbenzene concentrations ranged from not detected to 18 mcg/m3. Xylene concentrations ranged from 1.4 mcg/m3 to 26 mcg/m3. Except for xylene in one sample, the soil vapor concentrations did not exceed the NYSDOH typical indoor air concentration guidance for a non-residential building.

The remedial alternatives will consider future buildings along with the existing data and the need for any additional data for evaluating soil vapor intrusion.

Exhibit B

Description of Remedial Alternatives

The following alternatives were considered based on the remedial action objectives (see Section 6.5) to address the contaminated media identified at the site as described in Exhibit A.

Alternative 1: No Further Action

The No Further Action Alternative recognizes the remediation of the site completed by the IRM described in Section 6.2. This alternative leaves the site in its present condition and does not provide any additional protection of the environment.

Present Worth: *$0*
Capital Cost: *$0*
Annual Costs: *$0*

Alternative 2: Restoration to Unrestricted Conditions

This alternative achieves all of the SCGs discussed in Section 6.1.1 and Exhibit A and soil meets the unrestricted soil clean objectives listed in Part 375-6.8 (a). This alternative would include:

Excavation of all soil containing contaminants in excess of unrestricted use SCOs, followed by treatment or disposal of the soil at an off-site permitted facility. The estimated volume of soil that would be removed is approximately 82,000 cubic yards (cy). This alternative would involve excavation to a depth of 40 feet below ground surface, with the majority of Area 3 requiring excavation down to bedrock. In order to achieve these depths shoring would be required to protect excavation sidewalls and surrounding infrastructure including the Route 378 bridge, Water Street and various utilities. Extensive dewatering with treatment of the water would also be required.

Restoration for this alternative would require the import and placement of approximately 82,000 cy of fill material as backfill. Surface restoration for the upland area would consist of crushed stone or topsoil with vegetation. For the Hudson riverbank surface restoration would consist of topsoil placement followed by planting and seeding to maintain vegetation.

The removal of soil containing contaminants in excess of unrestricted use SCOs would substantially improve groundwater quality and would likely achieve groundwater standards. However, attainment of groundwater standards may require some time after excavation and backfilling activities are completed.

The construction phase of Alternative 2 is estimated to take 25 months. The remedial action goals for soil will be achieved immediately upon completion with the groundwater goals achieved soon thereafter due to the removal of all contaminants in soil in excess of the unrestricted use SCO and the placement of a substantive volume of clean soil backfill.

Since this alternative would achieve unrestricted use SCOs, engineering and institutional controls are not expected to be required. Also, annual maintenance of the site would not be required.

Capital Cost:..... $ 26.8 million

Alternative 3: Site Cover, NAPL Monitoring/Recovery and Institutional Controls

This alternative consists of the installation of a site-wide cover system to serve as a direct contact barrier for impacted soils. The 65,000 square-foot cover will be a minimum of one foot of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to: pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs.

For the riverbank, remediation consists of the removal of tar deposits through excavation (approximately 80 cubic yards) followed by off-site treatment and/or disposal. These isolated areas will be restored with topsoil and vegetation. In order to preserve the vegetation along the riverbank, the protection of existing vegetation will be specified in the remedial design. The existing perimeter fencing will be inspected for defects and corrected as needed to prevent unauthorized entry.

Since this alternative will not remove or otherwise treat contaminated source materials, a network of wells will be installed in zones where potentially flowable tar exists to monitor and collect tar from the subsurface. Tar recovered from the wells will be treated or disposed off-site.

An environmental easement would be placed on Area 3, restricting land use, prohibiting use of the site groundwater and requiring the implementation of the Department-approved SMP. As part of site management, a monitoring program consisting of periodic monitoring of groundwater, NAPL recovery and cover integrity would be developed and implemented. The SMP would contain an excavation plan to manage MGP contamination and structures encountered during ground invasive activities. The SMP would also require a soil vapor intrusion evaluation of future buildings constructed on the site. Periodic certification of the institutional and engineering controls would be required.

The construction phase of Alternative 3 is estimated to take 4 months. Achievement of the remedial action objectives for soil would be dependent on the establishment of the easement. Achievement of the remedial action objectives for groundwater environmental protection would occur over time, as sources to groundwater contamination would remain under the site cover.

Present Worth:..... $6.5 million
Capital Cost:..... $3.0 million
Annual Costs:.....$113,000

Alternative 4: Source Excavation, Site Cover and Institutional Controls

This alternative consists of the removal and off-site disposal of contaminant source areas. Specifically, the removal by excavation of:

- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
- non-aqueous phase liquids;
- soil with visual tar, purifier waste or non-aqueous phase liquid;
- soil containing total PAHs exceeding 500 ppm in the uppermost 15-feet of soil;
- soils that create a nuisance condition, as defined in Commissioner Policy CP-51 Section G.

Following excavation, clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to replace the excavated soil and establish the designed grades at the site. Excavation would extend to a depth of 40 feet below ground surface. Approximately 27,000 cubic yards of contaminated soil will be removed from the site.

For the riverbank, tar deposits would be removed through excavation (approximately 80 cubic yards) followed by off-site treatment or disposal. These isolated areas would be restored with topsoil satisfying the protection of ecological resources SCOs and vegetation. In order to preserve the established mature vegetation along the riverbank, the protection of existing vegetation will be specified in the remedial design. The existing perimeter fencing will be inspected for defects and corrected as needed to prevent unauthorized entry.

A site cover will be required from the top of bank inland to allow for commercial use of the site in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where a soil cover is to be used it will be a minimum of one foot of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to: pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs.

An environmental easement would be placed on Area 3, restricting land use, prohibiting use of the site groundwater and requiring the implementation of the Department-approved SMP. As part of the site management, a monitoring program consisting of periodic monitoring of groundwater, NAPL recovery and cover integrity would be developed and implemented. The SMP would contain an excavation plan to manage MGP contamination and structures encountered during ground invasive activities. The SMP would also require a soil vapor intrusion evaluation of future buildings constructed on the site. Periodic certification of the institutional and engineering controls would be required.

The construction phase of Alternative 4 is estimated to take 12 months. The remedial action goals for soil will be achieved immediately upon completion, with the groundwater goals expected to be achieved relatively quickly over time due to the removal of contaminant source areas followed by the placement of clean backfill material.

Present Worth: ..... *$14.2 million*
Capital Cost: ..... *$12.2 million*
Annual Costs: *$69,000*

Alternative 5: Source Excavation and In-Situ Solidification, Site Cover and Institutional Controls

Alternative 5 is similar to Alternative 4, however, it employs in-situ solidification (ISS) for the deeper source areas in lieu of excavation. Soils consisting of the following will be addressed by either removal or ISS:

- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
- non-aqueous phase liquids;
- soil with visual tar, purifier waste or non-aqueous phase liquid;
- soil containing total PAHs exceeding 500 ppm in the uppermost 15-feet of soil;
- soils that create a nuisance condition, as defined in Commissioner Policy CP-51 Section G.

Soil excavation will extend to a depth of approximately 5 feet below the existing grade. ISS will be applied to the source areas that extend from approximately 5 feet to 40 feet below the existing grade. Approximately 4,000 cubic yards will be removed by excavation. Approximately 6,000 cubic yards of soils will be removed through pre-ISS excavation. ISS will then proceed from the bottom of the pre-ISS excavation to the depth of the source area. The estimated volume of soil that would be treated by ISS is 18,000 cy.

ISS is a process that binds the soil particles in place creating a low permeability mass. The contaminated soil will be mixed in place together with solidifying agents (typically Portland cement) or other binding agents using an excavator or augers. The soil and binding agents are mixed to produce a solidified mass resulting in a low permeability monolith. The monolith reduces or eliminates mobility of contamination and reduces or eliminates the matrix as a source of groundwater contamination. Following ISS, clean fill meeting the requirements of 6NYCRR Part 375-6.7(d) will be brought in to complete the backfilling and establish the designed grades at the site. The solidified mass will then be covered with a cover system t to prevent direct exposure to the solidified mass.

For the riverbank, remediation consists of the removal of tar deposits through excavation (approximately 80 cubic yards) followed by off-site treatment or disposal. These isolated areas will be restored with topsoil and vegetation. In order to preserve the vegetation along the riverbank, the protection of existing vegetation will be specified in the remedial design. The existing perimeter fencing will be inspected for defects and corrected as needed to prevent unauthorized entry.

This alternative includes a site cover from the top of bank inland to allow for commercial use of the site in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where a soil cover is to be used it will be a minimum of one foot of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to

maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to: pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs. In addition, a twenty-foot wide, two-feet deep ecological cover will be provided at the top of bank, extending twenty feet inland. The ecological cover will satisfy the protection of ecological resources SCOs and consist of materials of sufficient quality to maintain a vegetative layer.

An environmental easement would be placed on Area 3, restricting land use, prohibiting use of the site groundwater and requiring the implementation of the Department-approved SMP. As part of the site management, a monitoring program consisting of periodic monitoring of groundwater, NAPL recovery and cover integrity would be developed and implemented. The SMP would contain an excavation plan to manage MGP contamination and structures encountered during ground invasive activities. Periodic certification of the institutional and engineering controls would be required.

The construction phase of Alternative 5 is estimated to take 11 months. The remedial action goals for soil will be achieved immediately upon completion with the groundwater goals expected to be achieved soon after remediation due to the combination of removal of contaminant source areas and placement of a low permeability monolith.

Present Worth: ..... *$10.3 million*
Capital Cost: ..... *$8.3 million*
Annual Costs: *$69,000*

Exhibit C

Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Cost ($)	Total Present Worth ($)
1) No Action	0	0	0
2) Restore to Unrestricted	26.8 million	0	26.8 million
3) Cover, NAPL Recovery, Institutional Controls	3.0 million	113,000	6.5 million
4) Source Area Removal, Cover, Institutional Controls	12.2 million	69,000	14.2 million
5) Source Removal/ISS, Cover, Institutional Controls	8.3 million	69,000	10.3 million

Exhibit D

SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Alternative 5, Source Removal and In-situ Solidification, as the remedy for this site. Alternative 5 would achieve the remediation goals for the site by removing or solidifying the sources of groundwater contamination and eliminating exposure to residual contamination that remains following the removal and ISS through a site management plan and environmental easement. The elements of this remedy are described in Section 7. The proposed remedy is depicted in Figure 6.

Basis for Selection

The proposed remedy is based on the results of the RI and the evaluation of alternatives. The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

The proposed remedy, Alternative 5, would satisfy this criterion by eliminating the source of groundwater contamination through removal and solidification of the source areas and by preventing exposures to contaminants through the placement of site cover. Alternative 4 also, satisfies this criterion by eliminating the source of groundwater contamination through removal of the source areas and by preventing exposures to contaminants through the placement of site cover. Although Alternative 3 eliminates the movement of NAPL through the placement of recovery wells, it does not eliminate source areas as a continuing contribution of groundwater contamination, and thus is not as environmentally protective as Alternatives 4 and 5. Alternative 2 provides the best protection of public health and the environment by removing all soil above unrestricted use, thus removing all groundwater source areas, and by removing exposures to impacted soil. Alternative 1, the no further action alternative, does not address the continuing source of groundwater contamination nor the potential for exposure to contaminants in soil and groundwater.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

Alternative 5 complies with the SCGs to the extent practicable. It addresses source areas of contamination through ISS and excavation and complies with the commercial use soil cleanup objective at the surface through construction of a cover system. Alternative 4 also complies with

the SCGs to the extent practicable. It addresses source areas of contamination through excavation and complies with the commercial use soil cleanup objective at the surface through construction of a cover system. Although Alternative 3 will not reduce the contaminant mass, it will comply with the applicable SCGs through a combination of engineering controls, institutional controls and site management implementation. Alternative 2 will comply with the soil SCGs immediately upon remediation and is expected to comply with groundwater SGCs rapidly following remediation due to the extensive soil and source removals. Alternative 1 will not satisfy this criterion as no effort is made to address compliance to the SCGs.

Alternative 1 does not satisfy the threshold criteria and thus is not considered further as a potential remedy. Because Alternatives 2, 3, 4 and 5 satisfy the threshold criteria, the remaining criteria are particularly important in selecting a remedy.

The next six "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

Long-term effectiveness is best accomplished by those alternatives involving excavation of the overburden soils, as identified in Alternatives 2, 4 and 5. Alternative 2 is a complete excavation and removal of all contaminants in soil (82,000 cy) in concentrations exceeding unrestricted use, which includes site source areas, and thus has the greatest long-term effectiveness. Alternative 4 also involves excavation, (27,000 cy) but to a lesser extent than Alternative 2. Alternative 5 involves excavation of approximately 4,000 cy of soil to a shallower depth than Alternative 4. Alternative 5 will however, actively address an additional 18,500 cy of soil through the solidification process. Alternative 3 does not actively address non-mobile source areas and thus provides minimal long-term effectiveness as compared to Alternatives 2, 4 and 5.

4. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

Through the removal of all spoil containing contaminants of concern above unrestricted use, Alternative 2 provides the greatest reduction of toxicity mobility and volume of the wastes. Alternatives 4 and 5 provide a similar reduction in toxicity, mobility and volume by addressing the same volume of contaminated soil; however, Alternative 4 provides a more permanent reduction through the removal of deeper impacted soil as compared to in-place soil solidification under Alternative 5. Alternatives 2, 4 and 5 will require a groundwater use restriction, although the groundwater quality will be expected to improve over time, possibly resulting in no groundwater use restrictions at a later point in time. Alternative 3 will remove mobile NAPL from the site, but residual NAPL bound in soil will not be removed yet still provide a source of groundwater contamination. Thus, Alternative 3 provides the least reduction of toxicity mobility and volume of the alternatives, and a groundwater use restriction will be expected in-perpetuity.

5. Short-term Impacts and Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

Alternative 2 has the greatest short-term adverse impacts of the alternatives. Alternative 2 involves the transportation of approximately 82,000 cubic yards of impacted soil from the site and the transportation of approximately the same volume of clean backfill to the site. Alternative 2 will require shoring of the Menands Bridge pier with possible impacts to traffic on State Route 378. In contrast, Alternatives 4 and 5 will result in the transportation of approximately 27,000 and 10,000 cy respectively. With less public road traffic and noise resulting from the use of heavy equipment, Alternative 5 is expected to have less short-term impact as compared to Alternative 4, but both alternatives will achieve the remedial objectives in approximately the same time following remediation. Alternative 3 would have less short-term adverse impact from construction but achievement of the groundwater remedial action objective will take the longest amount of time among the objectives due to the presence of a continuing source area.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

Alternative 3 presents the least difficulty in constructing the remedy and is readily implementable. Alternatives 2, 4 and 5 require shoring to support the excavation, although Alternative 5 will have the least extensive shoring since the excavation depth and lateral extent is less than that of Alternatives 2 and 4. Alternatives 2 and 4 will require significant dewatering and subsequent groundwater treatment as compared to Alternative 5, since much of the Alternative 5 excavation will be above the groundwater table. Alternative 3 will not require shoring, nor dewatering and be accomplished with readily available construction equipment and materials. Hence, Alternative 3 is the most favorable to implement followed by Alternative 5. Alternative 4 is more difficult than Alternative 5 to implement due to its support of excavation and dewatering requirements. The difficulties associated with Alternative 4 are compounded under Alternatives 2 due to the larger expanse of deep excavation and the proximity of the Route 378 bridge pier to the removal area.

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

The costs of the alternatives vary significantly. Thus, the benefits and goals achieved by each of the alternatives becomes significant. Alternative 3 has a low cost, but the benefit is also low, as the contaminated soil and source area will not be addressed other than by institutional controls. With its large volume of soil to be handled, extensive shoring and dewatering requirements, Alternative 2 presents the greatest cost among the alternatives. Alternative 2 removes an additional

55,000 cy (82,000-27,000) of contaminated soil. However, the 55,000 cubic yards of soil is not the source material and is not considered to be contributing significantly to the groundwater contamination. Thus, much of the cost of Alternative 2 is borne from extensive shoring, dewatering and excavation to remove soil that does not present an exposure or groundwater source concern. Alternative 4 and Alternative 5 are similar in actively remediating the same volume of the soil with the most contaminated mass and preventing exposure to the remaining contaminated soil by application of institutional controls. Alternative 4 and Alternative 5 have similar long-term monitoring requirements and costs. However, by eliminating the extensive shoring and dewatering required for deep removals, Alternative 5 is less costly than Alternative 4 to implement, while providing similar goals and benefits.

8. Land Use. When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

Although the site is currently zoned industrial, the potential for future commercial use is reasonably anticipated for the purpose of remediation. Alternative 3 is the least desirable alternative for future development since soil exceeding the commercial use SCOs would remain immediately below the soil cover. In addition, with Alternative 3, development would have to account for the presence of NAPL recovery wells. In contrast, the clean backfill provided under Alternatives 4 and 5 would facilitate installation of subsurface structures and both alternatives would allow for development including the installation of piles below a 15-foot depth. Alternative 2 would allow for unrestricted use of Area 3, however, Alternative 2 is determined to be infeasible due to the implementability, short-term construction impacts, and low cost to benefit ratio discussed above.

The final criterion, Community Acceptance, is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

9. Community Acceptance. Concerns of the community regarding the investigation, the evaluation of alternatives, and the PRAP are evaluated. A responsiveness summary will be prepared that describes public comments received and the manner in which the Department will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

Alternative 5 is being proposed because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.

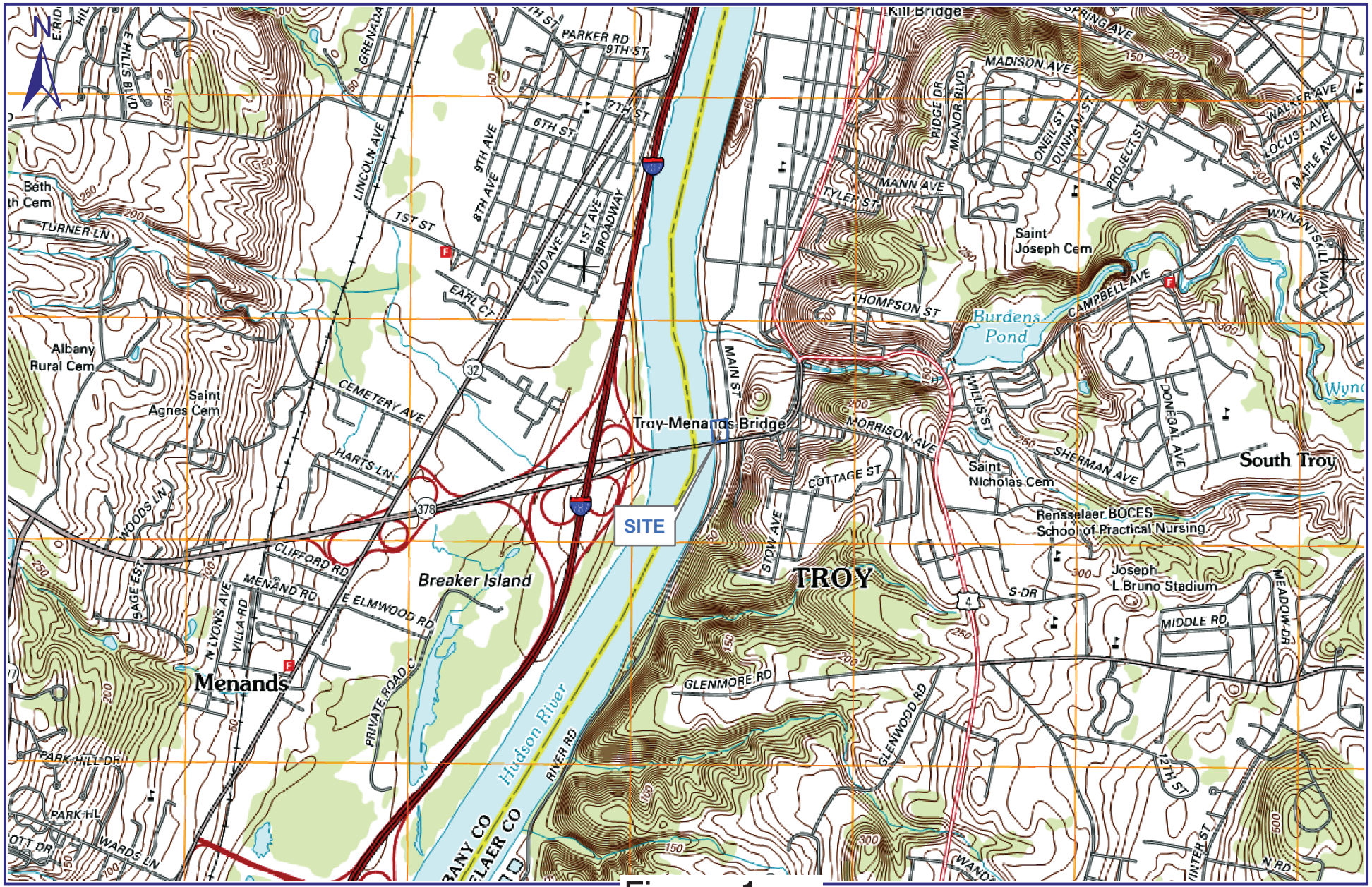


Figure 1

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

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

0 1,000 2,000
Feet

Brown AND Caldwell
BROWN AND CALDWELL ASSOCIATES

Author: BFTaylor Path: P:\GIS\National_Grid\Troy\Troy_Area_3\RI_RPT\TroyArea3_SiteLoc_RI_RPT.mxd 8/15/2018

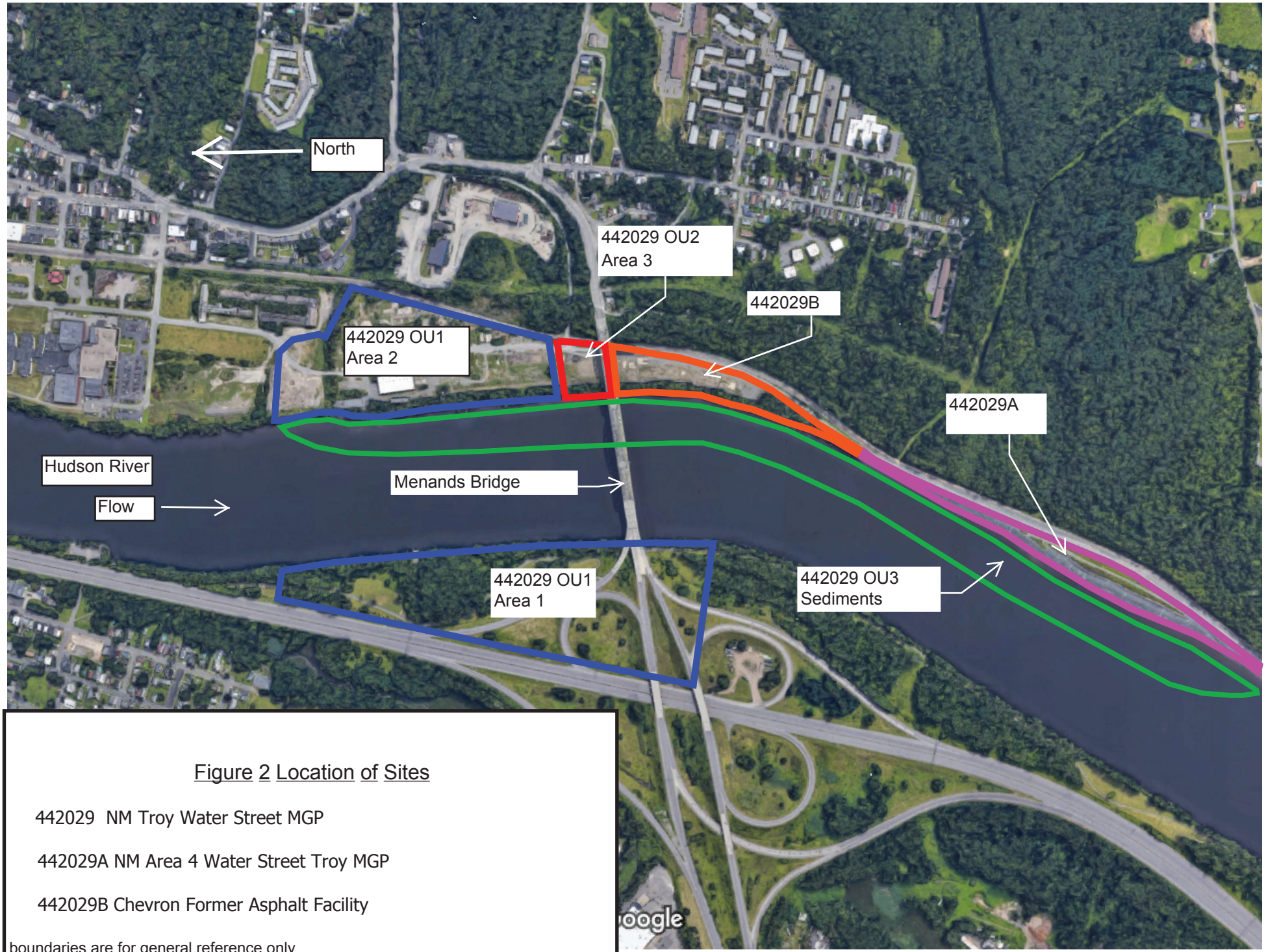


Figure 2 Location of Sites

442029 NM Troy Water Street MGP

442029A NM Area 4 Water Street Troy MGP

442029B Chevron Former Asphalt Facility

boundaries are for general reference only

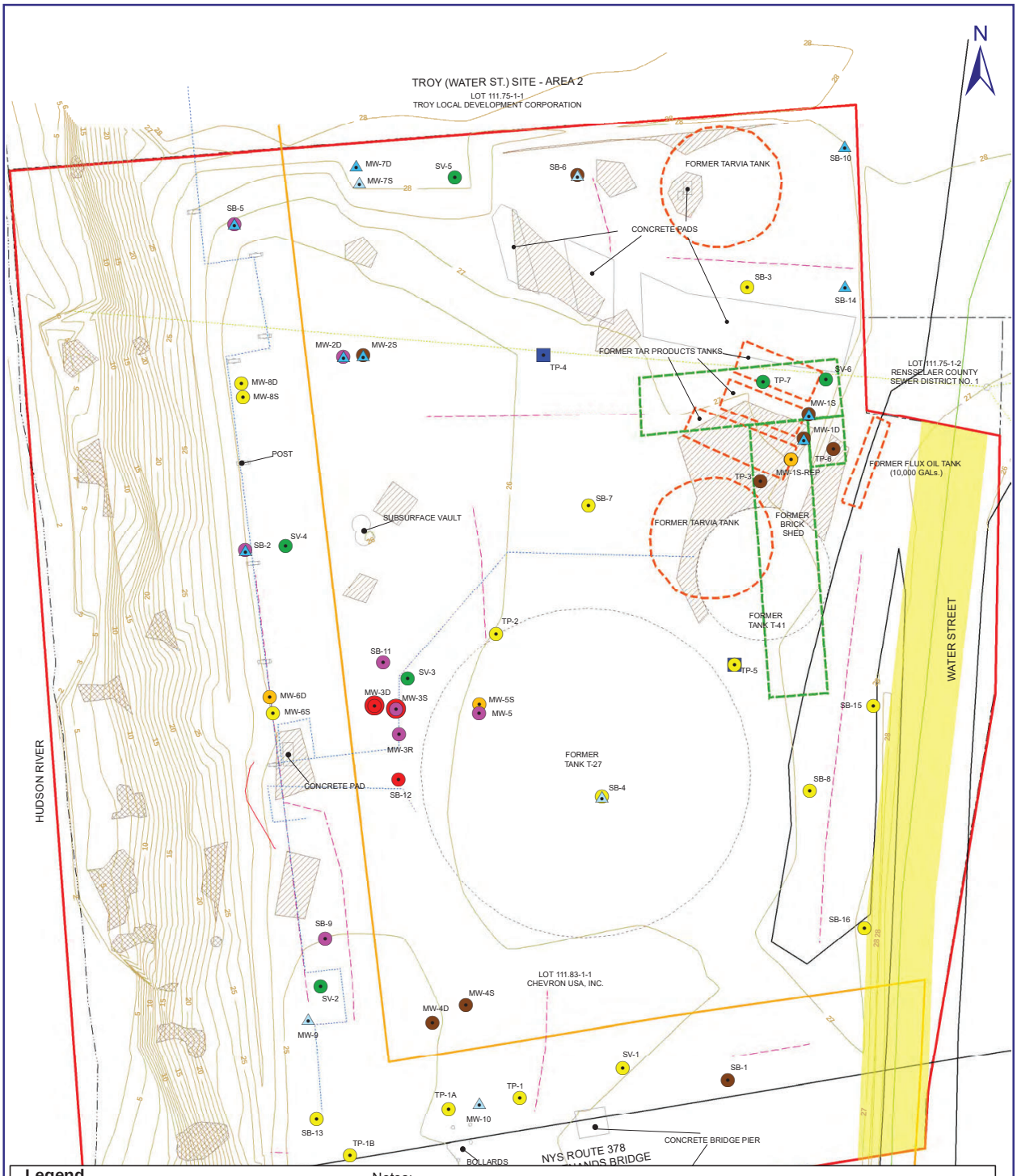
Figure 3

AERIAL PHOTOGRAPH
NATIONAL GRID
TROY (WATER ST.) SITE - AREA 3, TROY, NEW YORK

0 25 50
Feet

2/19/2020

Author: BFTaylor Path: V:\Ramsey\National_Grid\Troy\Troy_Area_3\TroyArea3_Existing_Site_Plan.mxd



Legend

Visual/Olfactory Impacts (See Note 2)

- No Observed Impacts
- 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
- Deposit of Surficial Semi-Solid/Hard Tar (Removed 0-1' BGS as Part of IRM, October 2017)
- Hard Tar Deposit on Shoreline

Notes:

1) Refer to Table 4 for descriptions and depth intervals of NAPL/tar observations and to hydrogeologic cross-sections (Figures 3 - 6) for vertical position of observations.

2) NYSDEC's standard colors and associated desciptors for reporting MGP-related or other impacts were used to depict locations where impacts were observed

- Gas Line
- Combined Storm/Sanitary Sewer Line
- Suspected Utility (Surface Geophysical Survey)
- Road
- Property Line
- Ground Surface Elevation Contour (ft., NGVD). Contour Interval = 1 ft.
- Sanitary Sewer Force Main
- Hudson River Shoreline. Estimated based on 2017 Orthoimagery
- 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 Asphalt Plant Tank (Demolished/Removed)
- 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)
- Site Boundary
- 22' Wide Sanitary Sewer Force Main Easement

Figure 4

VISUAL/OLFACTORY OBSERVATIONS: OVERBURDEN SOILS
NATIONAL GRID
TROY (WATER ST.) SITE - AREA 3, TROY, NEW YORK

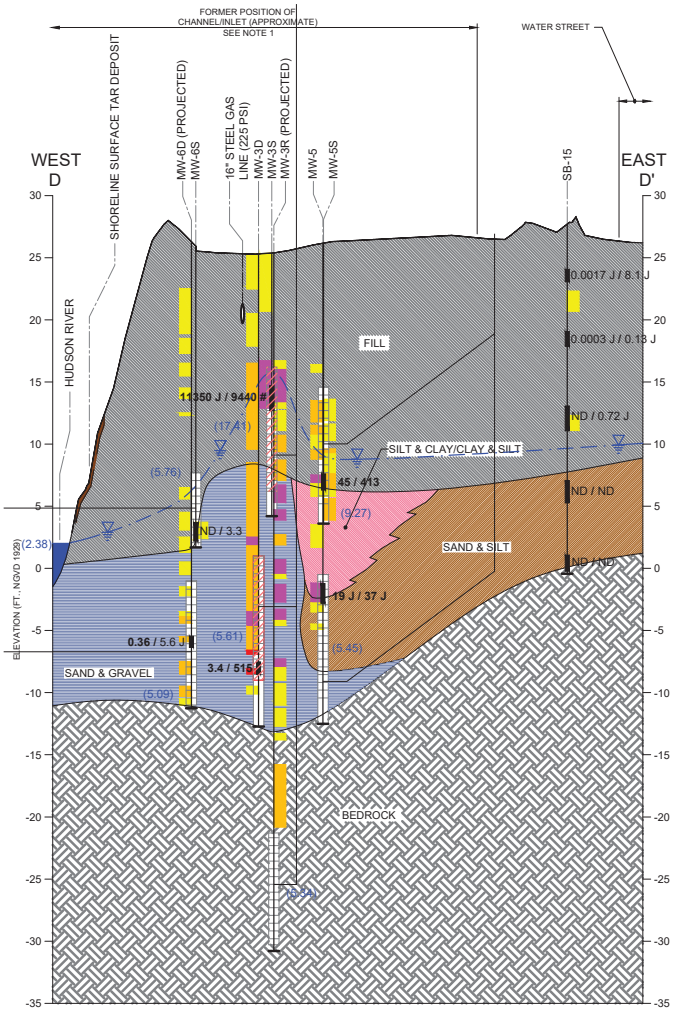
Sources: Base map developed based on drawing prepared by CT Male Associates (June 15, 2015, updated February 21, 2017) and based on drawing prepared by NAEVA Geophysics, Inc. (April, 2015)

0 15 30 60
Feet

BROWN AND CALDWELL ASSOCIATES

9/25/2018

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



CROSS-SECTION D-D'

0 30 60
SCALE IN FEET HORIZONTAL

0 5 10
SCALE IN FEET VERTICAL

LEGEND:

MW-11S — MONITORING WELL / SOIL BORING / TEST PIT IDENTIFICATION AND APPROXIMATE LOCATION

GENERALIZED GROUND SURFACE

0.012 / 27 — TOTAL BTEX/TOTAL PAH(mg/kg) CONCENTRATION WITHIN SAMPLE INTERVAL. BOLD VALUE INDICATES ONE OR MORE CONSTITUENT CONCENTRATIONS ABOVE NYS PART 375 SOIL CLEANUP OBJECTIVES (PROTECTION OF PUBLIC HEALTH-INDUSTRIAL ZONING, PROTECTION OF ECOLOGICAL RESOURCES, AND/OR PROTECTION OF GROUNDWATER)

WELL SCREEN INTERVAL

SUMP

TOTAL DEPTH OF BOREHOLE

FILL

SILT & CLAY/CLAY & SILT

SAND & SILT

SAND & GRAVEL

BEDROCK

WATER TABLE, 2/27/17

(5.49) — WATER ELEVATION (FT., NGVD), 2/27/17

VISUAL/OLFACTORY IMPACTS (SEE NOTE 3)

TAR SATURATED

COATED MATERIAL, LENSES

HARDENED TAR

BLEBS, GLOBS, SHEEN

STAINING, ODOR

PETROLEUM IMPACTS; SATURATION & SHEENS

PETROLEUM IMPACTS; STAINING & ODORS

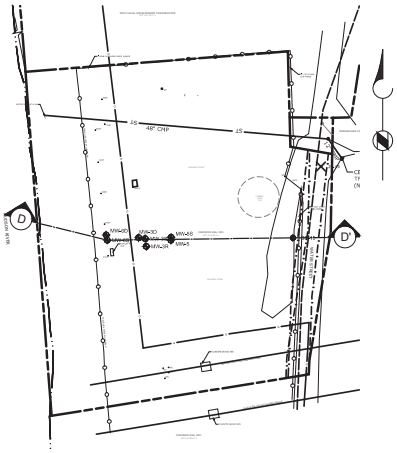
NAPL OBSERVED WITHIN WELL CASING DURING FEBRUARY AND JUNE, 2017 GAUGING EVENTS

ABBREVIATIONS:

NS	NOT SAMPLED DUE TO NAPL OBSERVED IN WELL DURING GAUGING EVENTS
ND	NOT DETECTED
J	ESTIMATED CONCENTRATION
J+	ESTIMATED CONCENTRATION. REPORTED VALUE MAY BE BIASED HIGH.
B	CONSTITUENT WAS FOUND IN THE BLANK AND THE SAMPLE
#	HIGHEST CONCENTRATION FROM ORIGINAL AND DUPLICATE SAMPLE

NOTES:

1. FORMER POSITION OF SHORELINE AND CHANNEL/INLET BASED ON 1855 BARTON'S MAP.
2. LOCATION BASED ON DRAWING: NEW YORK POWER & LIGHT, HUDSON VALLEY FUEL PLANT, TROY, N.Y. (1946).
3. NYSDEC'S STANDARD COLORS AND ASSOCIATED DESCRIPTORS FOR REPORTING MGP-RELTATED OR OTHER IMPACTS WERE USED TO DEPICT INTERVALS WHERE IMPACTS WERE OBSERVED.



SECTION KEY MAP

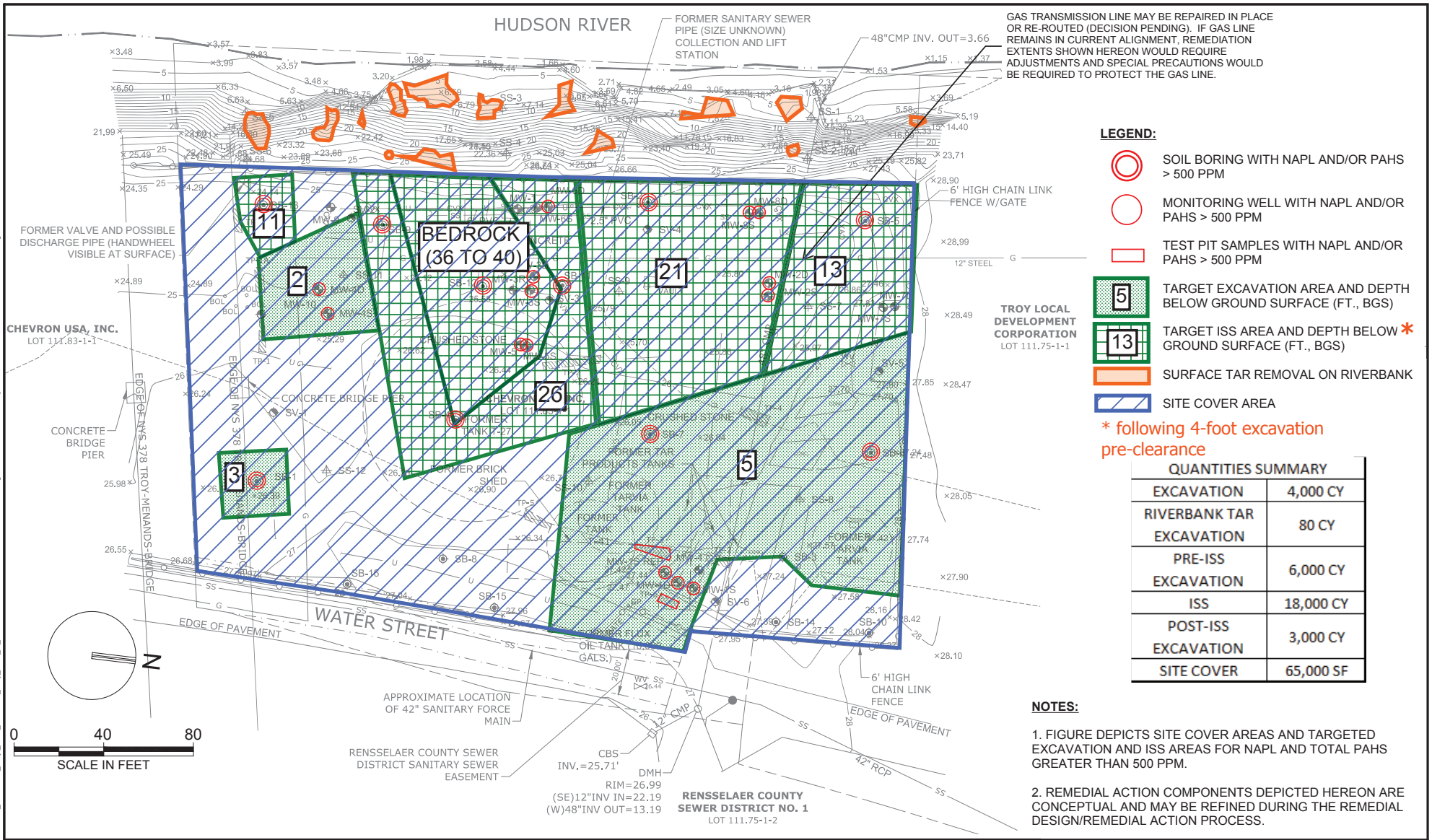
0 60 120
SCALE IN FEET

FIGURE 5
GEOLOGIC
CROSS-SECTION D-D'

	DATE	PROJECT NUMBER
TROY (WATER ST.) SITE - AREA 3 TROY, NEW YORK	09/18	152169

BROWN AND CALDWELL ASSOCIATES
UPPER SADDLE RIVER, NEW JERSEY

P:\National_Grid\Nimo_Troy_Area_3\146094_Troy_Area3_RI_CAD\2-SHEETS\C-CIVIL\146094-FIG-4.dwg



LEGEND:

- SOIL BORING WITH NAPL AND/OR PAHS > 500 PPM
- MONITORING WELL WITH NAPL AND/OR PAHS > 500 PPM
- TEST PIT SAMPLES WITH NAPL AND/OR PAHS > 500 PPM
- 5 — TARGET EXCAVATION AREA AND DEPTH BELOW GROUND SURFACE (FT., BGS)
- 13 — TARGET ISS AREA AND DEPTH BELOW * GROUND SURFACE (FT., BGS)
- SURFACE TAR REMOVAL ON RIVERBANK
- SITE COVER AREA

* following 4-foot excavation pre-clearance

QUANTITIES SUMMARY	
EXCAVATION	4,000 CY
RIVERBANK TAR EXCAVATION	80 CY
PRE-ISS EXCAVATION	6,000 CY
ISS	18,000 CY
POST-ISS EXCAVATION	3,000 CY
SITE COVER	65,000 SF

NOTES:

1. FIGURE DEPICTS SITE COVER AREAS AND TARGETED EXCAVATION AND ISS AREAS FOR NAPL AND TOTAL PAHS GREATER THAN 500 PPM.

2. REMEDIAL ACTION COMPONENTS DEPICTED HEREON ARE CONCEPTUAL AND MAY BE REFINED DURING THE REMEDIAL DESIGN/REMEDIAL ACTION PROCESS.

Brown AND Caldwell

SCALE: 1" = 40'

152169

DATE: April 2020

TROY (WATER ST.) SITE - AREA 3
TROY, NEW YORK

ALTERNATIVE 5
TARGETED EXCAVATION AND ISS (VISIBLE NAPL AND PAHs > 500 PPM), SITE COVER, AND INSTITUTIONAL CONTROLS

FIGURE 6